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Dynamic Balancing of Exploration and Exploitation: The Contingent Benefits of Ambidexterity

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Abstract. We study the evolution of firms' exploration–exploitation allocations and their long-term performance outcomes. Extending current ambidexterity theory, we suggest that not only firms pursuing one-sided exploration or exploitation orientations show self-reinforcing tendencies but also ambidextrous firms adopting balanced exploration–exploitation orientations. Integrating formal modeling arguments, we further propose that reinforcing ambidexterity can be good or bad for firms' long-term performance, depending on the environment they face: In contexts characterized by incremental change, firms benefit more from the learning effects of maintaining ambidexterity, which lead to superior performance. Firms in discontinuous change contexts, however, suffer more from the misalignment that reinforcement creates, which affects their performance negatively. A longitudinal data set of global insurance firms (1999–2014) supports our arguments. Building on these findings, we reconceptualize ambidexterity as the ability to dynamically balance exploration and exploitation, which emerges from combining capability-building processes (to balance exploration and exploitation) with capability-shifting processes (to adapt the exploration–exploitation balance). We contribute to the organizational literature by developing a dynamic perspective on balancing exploration and exploitation, by clarifying the contingent nature of the ambidexterity–firm performance relationship, and by integrating and extending the ambidexterity and formal modeling perspectives on exploration and exploitation.

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Introduction

One of the most lively organization theory debates in recent years emerged from the ambidexterity concept, which refers to firms' ability to simultaneously explore and exploit (Lavie et al. 2010, O'Reilly and Tushman 2013). Exploration, which relates to “things captured by terms such as search, variation, . . . and experimentation” (March 1991, p. 71), enables firms to adapt and embrace new knowledge. Exploitation, which refers to “things [such] as refinement, . . . selection, [and] implementation” (p. 71), allows them to increase their operational efficiency. The eternal challenge behind the ambidexterity concept is that exploration and exploitation are contradictory forces, and firms need to reconcile their paradoxical organizational demands to enjoy superior long-term performance (Raisch and Birkinshaw 2008).

The ambidexterity literature provides rich descriptions of the structures (Tushman and O'Reilly 1996), contexts (Gibson and Birkinshaw 2004), and leadership processes (Lubatkin et al. 2006) that enable firms to simultaneously explore and exploit. However, the bulk of these studies takes a fairly static perspective (Lavie et al. 2010). While scholars describe the organizational measures that allow firms to become ambidextrous, little is known about how these activities evolve over time. Most studies implicitly assume an optimization logic: since ambidexterity is an organizational capability that takes a long time to develop (Gibson and Birkinshaw 2004), firms that maintain their ambidextrous orientation learn from experience and thereby improve their ability to balance exploration and exploitation (O'Reilly and Tushman 2008), which results in superior long-term returns (Raisch et al. 2009).

While the ambidexterity perspective may be fairly static, the larger exploration–exploitation debate has benefitted from more dynamic contributions. The literature on formal models of exploration and exploitation (Gulati and Puranam 2009, Posen and Levinthal 2012) argues that successive choices to either explore new knowledge or exploit existing knowledge optimize firms' overall learning and performance (Sutton and Barto 1998). From this perspective, the organizational focus is on matching the exploration–exploitation balance to the contextual requirements (Levinthal 1997, Stieglitz et al. 2016). Since most environments change over time, maintaining any given exploration–exploitation balance would therefore cause misalignment with the environment, which will affect performance negatively.

These varied perspectives lead to a set of interesting questions: Do firms maintain ambidexterity over time to learn from experience and improve their ambidextrous ability? Or do they move away from ambidexterity if external contexts demand stronger alignment with either exploration or exploitation? And which of these opposing strategies is more beneficial for their long-term performance? These questions reflect the need for a better understanding of how ambidextrous firms behave in the longer run and the performance implications of their long-term strategies (O'Reilly and Tushman 2013).

In this paper, we study the evolution of firms' exploration–exploitation allocations and their long-term performance outcomes. Extending current ambidexterity theory, we suggest that ambidexterity shows self-reinforcing effects over time. These self-reinforcing effects cause organizations, especially those with high levels of slack, to maintain their ambidextrous orientation. We then integrate formal modeling arguments to further propose that, depending on the environmental conditions firms face, such stability is good or bad for their long-term performance: in environments characterized by incremental changes, firms benefit more from the learning effects of maintaining ambidexterity over time, which result in positive performance. Firms in discontinuous change contexts, however, suffer more from the inertia and misalignment that self-reinforcement creates, which affect their performance negatively.

We test our propositions on a longitudinal sample of global insurance firms (1999–2014). The insurance industry sample allows for an interesting comparison of and contrast between an initial period (1999–2005), marked by discontinuous environmental changes (including the September 11 terrorist attacks in 2001 and Hurricane Katrina in 2005), and a subsequent period (2006–2014) characterized by more incremental environmental changes. From this empirical setting, we find statistical evidence of ambidexterity's

self-reinforcing effect. In addition, we show that, depending on the environmental dynamics firms face, they benefit or suffer financially from maintaining ambidexterity.

We contribute to the organizational literature by providing a dynamic perspective on balancing exploration and exploitation. This dynamic perspective reveals that self-reinforcing effects not only are associated with focused strategies (Levinthal and March 1993) but can also arise from pursuing balanced orientations. Moreover, whereas prior studies found that ambidexterity's utility varies across contexts (Jansen et al. 2006), we show that its performance outcomes can also increase or decrease over time. We introduce a contingency perspective, which highlights that whether maintaining ambidexterity is good or bad for performance depends on the environmental dynamics firms face.

Building on these insights, we reconceptualize ambidexterity as the *ability to dynamically balance exploration and exploitation*, which emerges from combining capability-building processes (to balance exploration and exploitation) with capability-shifting processes (to adapt the exploration–exploitation balance). This dynamic conception of ambidexterity captures not only exploration and exploitation's complementary returns (Smith and Lewis 2011) but also their coalignment returns (Gulati and Puranam 2009), which jointly explain firms' long-term performance.

Theoretical Background

In the following paragraphs, we briefly review the literatures on organizational ambidexterity and formal models of exploration and exploitation. We highlight how the ambidexterity debate has stopped short of providing a dynamic perspective whereas the formal modeling debate provides process arguments. The formal modeling perspective is particularly useful to investigate how firms' exploration–exploitation allocation affects performance over time under varying environmental conditions.

Organizational Ambidexterity

The debate on organizational ambidexterity originated from March's (1991) proposition that organizations have to engage in conflicting activities, such as exploration and exploitation. Building on this pioneering research, scholars have conceptualized ambidexterity as an organizational-level capability (Raisch and Birkinshaw 2008) that enables firms to deal with tensions between the different conflicting activities associated with exploration and exploitation, such as adaptation and alignment (Gibson and Birkinshaw 2004), incremental and radical innovation (Jansen et al. 2006), product development and product commercialization (Rothaermel and Deeds 2004), and local and distant search (Katila and Ahuja 2002). The predominant view

in this literature defines ambidexterity as firms' capability to balance, or simultaneously pursue, exploration and exploitation (Lavie et al. 2010, Raisch and Birkinshaw 2008). Ambidexterity is conceptually different from alternative solutions, such as vacillation, cycling, or temporal separation, which describe how "exploration and exploitation coexist in the same organizational unit but at different points in time" (Lavie et al. 2010, p. 129).

Empirical studies have provided strong evidence of ambidexterity's positive performance effect (Junni et al. 2013), but prior research has also stressed the difficulties associated with building an ambidextrous capability (Lavie et al. 2010, Raisch et al. 2009). Accordingly, most ambidexterity studies focus on organizational mechanisms, such as structures (Tushman and O'Reilly 1996), contexts (Gibson and Birkinshaw 2004), networks (Rogan and Mors 2014), leadership systems (Lubatkin et al. 2006), incentive systems (McCarthy and Gordon 2011), and control systems (McGrath 2001), which enable firms to build an ambidextrous capability. While the extant literature offers rich insight into organizational solutions that enable ambidexterity, these studies generally take a static perspective (Raisch et al. 2009). Consequently, little is known about how ambidexterity evolves over time and how this evolution affects organizations' long-term performance.

Formal Models of Exploration and Exploitation

While the ambidexterity perspective may be fairly static, the larger exploration–exploitation debate has benefitted from more dynamic contributions. The literature on formal models of exploration and exploitation (Gulati and Puranam 2009, Posen and Levinthal 2012) builds on March's (1991) original model of exploratory choices, exploitative choices, and feedback from these choices. In formal models, an "organization must choose from a set of policy alternatives" while facing uncertainty regarding each alternative's payoffs (Posen and Levinthal 2012, p. 588). When organizations aim to lessen the uncertainty with regard to their available choice set, they successively choose between exploiting existing knowledge and exploring new knowledge. Each exploitative or explorative choice provides feedback about each policy's merits (Puranam et al. 2015). This feedback enables organizations to update their beliefs and improve their policy choices over time.

The formal modeling literature developed different models to map firms' exploration–exploitation dilemma. While earlier studies used system dynamics models (Nickerson and Zenger 2002), or NK models (Levinthal 1997), multiarmed bandit models dominate the more recent discussion (Lee and Puranam 2016, Posen and Levinthal 2012, Stieglitz et al. 2016). Consistent with this development, we focus our main arguments on bandit models. In these models, the analogy of a slot machine with N arms is used to model

policy choices. Each arm has a different underlying payoff function that is unknown (Posen and Levinthal 2012). Choosing any arm (or policy) with a currently known or "believed to be superior" payoff indicates an exploitative choice (Posen and Levinthal 2012, p. 588). By contrast, choosing an arm (or policy) with a currently unknown or "believed to be inferior" payoff indicates an exploratory choice.

Formal modeling scholars find that some degree of alternation (or "balance") between exploration and exploitation is best for organizational performance (Lee and Puranam 2016, Posen and Levinthal 2012). The underlying mechanism is termed "reinforcement learning" (Sutton and Barto 1998) and describes a process in which exploratory and exploitative actions, and the feedback received from these actions, construct beliefs about unknown alternatives. An exogenously selected parameter, often referred to as τ , defines the degree of balance between exploratory and exploitative choices (Lee and Puranam 2016, Posen and Levinthal 2012). Prior work has argued that the optimal level of τ depends on external (Stieglitz et al. 2016) and internal contingencies (Lee and Puranam 2016).

Contrasting the Ambidexterity and Formal Modeling Perspectives

The core difference between the ambidexterity and the formal modeling perspectives results from different theoretical foci on either investigating a firm's capability (i.e., ambidexterity) or studying firms' reinforcement learning processes (i.e., formal modeling). In consequence, the two debates hold different assumptions about organizations' exploration–exploitation balance (or τ). The modeling perspective considers τ as an *exogenous* choice parameter and is concerned with exploring the relationship between any given τ and firm performance as well as with identifying contingencies affecting the optimal "learning balance" (Posen and Levinthal 2012, Stieglitz et al. 2016). In the ambidexterity perspective, however, balancing exploration and exploitation requires firms to develop an organizational capability to implement a dual orientation (O'Reilly and Tushman 2008, Raisch and Birkinshaw 2008), which means τ is an *endogenous* parameter. The ambidexterity literature's focus is therefore on how some organizations (but not others) manage to build this critical organizational-level capability (Lavie et al. 2010).

These varying assumptions about firms' exploration–exploitation balance led to the two perspectives providing complementary insights. Combining these insights can inform a more dynamic understanding of ambidexterity. We initially use ambidexterity arguments to develop hypotheses about the evolution of firms' exploration–exploitation allocation. We subsequently leverage formal modeling arguments to develop hypotheses on how such evolution affects firms' long-term performance.

Ambidextrous Firms' Long-Term Evolution and Performance

The Evolution of Ambidexterity

Three theoretical arguments suggest that ambidextrous organizations gradually reinforce their exploration–exploitation balance over time; that is, the more these organizations reach balanced levels of exploration and exploitation, the less they adapt this balance in the subsequent period.

First, ambidexterity scholars argue that pursuing ambidexterity does not reflect a short-term decision taken in each period, but rather it demands the formulation of a long-term vision (O'Reilly and Tushman 2008, 2011). Implementing this vision requires fundamental changes to an organization's strategy, structure, and culture (Gibson and Birkinshaw 2004) and involves the long-term commitment of organizational resources (Lavie et al. 2010). When senior managers formulate an ambidexterity vision, they are therefore strongly incentivized to defend this vision against short-term pressures to adapt the exploration–exploitation balance (O'Reilly and Tushman 2011). The reason for this defense is that these senior managers perceive ambidexterity as a rare and valuable capability that takes time and effort to build and refine. While short-term returns may be deceptive, senior leaders expect their ambidextrous strategy to provide long-term benefits. They therefore act as “protectors” of this strategy (O'Reilly and Tushman 2008, p. 198). In particular, moves away from a balanced orientation—toward greater attention to either exploration or exploitation—are vetoed, as they contradict the firm's ambidextrous vision, strategy, and structure (Lavie et al. 2010).

Second, the comprehensive structural, contextual, and leadership mechanisms that scholars associate with ambidextrous organizations (Lavie et al. 2010) are likely to generate continuity with regard to these organizations' exploration–exploitation allocation. The purpose of ambidextrous designs is to enable organizations “to continuously ensure a balance of exploration and exploitation” (Gerbert et al. 2016, p. 7) while preventing them from shifting their focus toward either exploration or exploitation (Benner and Tushman 2003). Research on organizational inertia further substantiates this argument by highlighting that investments made in an organization's formal and informal structure bring stability and continuity to that organization's actions (Hannan and Freeman 1984). For example, Greenwood and Hinings (1988, p. 295) argue that organizational investments “establish a particular distribution of resources and power that in turn buttresses the coherence of that design.” In ambidextrous organizations, such investments are substantial (Lavie et al. 2010) because managing the contradictory forces of exploration and exploitation requires comprehensive structures, cultures, and networks (Gibson and

Birkinshaw 2004, Rogan and Mors 2014). These organizational arrangements, as well as inertial tendencies arising from them, further stabilize an organization's balanced exploration–exploitation allocation.

Third, ambidexterity scholars argue that balancing exploration and exploitation enables complementary returns. Taking a paradox theory perspective, these scholars suggest that organizations can cope with exploration–exploitation tensions and enable synergies between the dual activities (Schad et al. 2016, Smith and Lewis 2011).¹ For example, Yang and Atuahene-Gima (2007, p. 5) conclude that “the interaction of exploitation and exploration enhances firm performance because it generates an ambiguous resource, the value of which only exists in their relationship.” Such complementary returns are important because economic success leads to a repetition of the behavior that first generated this success, whereas negative feedback causes variation (Levinthal and March 1981). Since complementary returns increase when firms balance exploration and exploitation (Farjoun 2010), they increasingly motivate firms to maintain their balanced orientation, even when potentially changing environmental conditions decrease firms' coalignment returns. In such changing environmental conditions, the complementary returns may mask or (over)compensate the decreasing coalignment returns. Consequently, firms with a balanced exploration–exploitation orientation are more likely to maintain their orientation—even in the face of changing environmental conditions that would otherwise motivate firms to adapt their orientation.

In sum, the above arguments suggest that, because of defensive managerial actions, organizational inertia, and complementary performance outcomes, ambidexterity has a self-reinforcing effect. The more organizations reach a balanced exploration and exploitation orientation, the less likely they are to adapt their exploration–exploitation balance in the subsequent period.²

Hypothesis 1 (H1). *Ambidexterity has a self-reinforcing effect: the higher the level of organizational ambidexterity in one period, the lower the degree of change in the exploration–exploitation allocation in the subsequent period.*

We further acknowledge that the strength of this self-reinforcing effect is contingent on contextual conditions. In an initial effort to consider contextual influences, we assess organizational slack's moderating role. Slack in general (Voss et al. 2008) and unabsorbed slack in particular (Lavie et al. 2010) are essential for firms' ability to simultaneously explore and exploit.

First, unabsorbed slack, which refers to uncommitted, ready-to-deploy assets (O'Reilly and Tushman 2004), strengthens ambidexterity's self-reinforcing effect, because it contributes to senior managers' ability

to pursue and implement complex long-term strategies such as ambidexterity. This is mostly because ambidexterity is resource intensive and costly in the short run, whereas returns on it only materialize in the long run (Raisch and Birkinshaw 2008). Slack, which has the “purpose . . . to allow the firm to forego short-term gains in favor of long-term outcomes” (Sharfman et al. 1988, p. 612), is particularly instrumental for such long-term strategies. It directly facilitates the pursuit of ambidexterity (Raisch and Birkinshaw 2008)—which is particularly demanding in terms of resources (Jansen et al. 2006, Lubatkin et al. 2006)—and enables senior managers to defend this strategy in the long run.

Second, in terms of organizational inertia, slack facilitates the implementation and retention of an organization’s formal and informal structure. As suggested above, ambidexterity requires comprehensive investment in firms’ structure, culture, and systems (Lavie et al. 2010). Slack is supportive regarding making such investments by, for example, enabling organizations to build “hierarchical administrative systems that can help . . . [them] in managing their contradictory knowledge processes” (Lubatkin et al. 2006, p. 647). Slack allows organizations to implement and reinforce ambidextrous designs (Schmitt et al. 2010), which helps them maintain a balance between exploration and exploitation.

Third, slack may also strengthen ambidexterity’s self-reinforcing effect by delaying organizations’ response to performance feedback. As argued above, misalignment may not necessarily cause immediate adaptation in ambidextrous organizations, because of, for example, exploration and exploitation’s complementary returns. High levels of slack can further prevent such adaptive action. Kraatz and Zajac (2001) argue that “resource-rich organizations are less likely to experience a sense of urgency regarding adaptation” (p. 634). Slack works as a “buffer against bad times,” thus ensuring “performance smoothing” (Bourgeois 1981, p. 30). It functions as a cushion that insulates the decision maker from negative performance effects. Firms with high levels of ambidexterity and high levels of slack are therefore more likely to maintain their exploration–exploitation balance even if their performance turns negative. Owing to the complementary performance and organizational slack’s performance-smoothing effects, these organizations are likely to overlook weak signals regarding the need for adaptation and continue with their chosen strategy.

Hypothesis 2 (H2). *Slack positively moderates ambidexterity’s self-reinforcing effect: the higher the levels of ambidexterity and organizational slack in one period, the lower the degree of change in the exploration–exploitation allocation in the subsequent period.*

Maintaining Ambidexterity, Environmental Change, and Long-Term Performance

Following our argumentation that organizations are, over time, likely to maintain ambidexterity, the resulting question is whether such self-reinforcing effects are good or bad for long-term firm performance. As shown earlier, prior ambidexterity and formal modeling studies provide varying arguments pertaining to this matter. We suggest that considering the role of the environment allows us to reconcile these diverging perspectives. Environmental conditions are the most studied contingency regarding how exploration and exploitation relate to firm performance (e.g., Jansen et al. 2006, Posen and Levinthal 2012, Uotila et al. 2009). Integrating formal modeling arguments, we propose that environmental conditions play an important role not only regarding how any given exploration–exploitation balance relates to firm performance but also regarding how this balance’s stability or change over time translates into firm performance.

More specifically, we argue that the downsides of inertia and inflexibility become particularly evident when discontinuous changes in the environment require firms to adapt their behavior (Miller 1992). In the case of discontinuous environmental change, March (1991) argues that an exploration orientation is an appropriate strategy, because the prior knowledge has been devalued, which forces the organization to explore new knowledge about alternative choices’ relative returns. While confirming March’s (1991) initial perspective, Posen and Levinthal (2012) add further nuance to his argumentation. If organizations experience *frequent* changes of a discontinuous nature, the repeated change not only erodes “the future value of existing knowledge” but also “reduces the value of efforts to generate new knowledge because the lifespan of returns to new knowledge is reduced in a world in which change is more frequent” (Posen and Levinthal 2012, p. 594). Consequently, Posen and Levinthal (2012) argue that an exploitation orientation is superior in contexts of high turbulence. In sum, formal modeling scholars suggest that discontinuous environmental change requires organizations to adopt corner solutions (i.e., focused orientations toward either exploration or exploitation), which are associated with higher returns than balancing exploration and exploitation (March 1991, Posen and Levinthal 2012, Stieglitz et al. 2016).

Beyond the formal modeling perspective, the ambidexterity perspective provides additional arguments that help explain why maintaining ambidexterity should lead to negative performance effects under discontinuous environmental change. These arguments are based on the definition of ambidexterity as the organizational capability to simultaneously balance exploration and exploitation (Raisch and Birkinshaw 2008). Such capability, which, as described earlier,

includes the resisting of short-term pressure to focus on either exploration or exploitation (O'Reilly and Tushman 2011), may turn into a liability under discontinuous environmental change. Put differently, in unstable environmental conditions, any capability to maintain an exploration–exploitation balance may not only lose its purpose but also deter firms from engaging in more exploration- or exploitation-focused strategies. While potential returns from adaptation are not realized, alternative returns from ambidexterity's complementary benefits decline. This is particularly harmful since ambidexterity, which is a difficult-to-develop capability, is expected to generate higher costs than focused strategies. On the whole, we therefore suggest the following:

Hypothesis 3A (H3A). *In times of discontinuous environmental change, maintaining high levels of ambidexterity is negatively associated with firm performance.*

Conversely, the misalignment and rigidity effects are far less problematic in environments characterized by more incremental change. In these contexts, maintaining ambidexterity can actually result in positive returns from coalignment and learning. Formal modeling scholars have particularly stressed the advantages of balancing exploration and exploitation in more stable environments (March 1991, Posen and Levinthal 2012). In these contexts, it is beneficial for an organization “to engage in sufficient exploitation to ensure its current viability and, at the same time, to devote enough energy to exploration to ensure its future viability” (Levinthal and March 1993, p. 105). In short, intermediate levels of τ , rather than a focused orientation, seem to provide the best coalignment in incremental change contexts. In these environments, knowledge about balancing the two activities is neither eroded nor is its future value depreciated (Posen and Levinthal 2012), which explains its positive performance effect.

Empirical findings from the ambidexterity debate provide supportive evidence for these formal modeling arguments. Jansen et al. (2006) found that firms pursuing ambidexterity enjoyed superior long-term performance in contexts characterized by incremental changes. The balance between exploration and exploitation allows them to accommodate minor changes in contextual requirements. Furthermore, the relative stability allows them to develop and refine their ambidextrous capability. This is important since prior studies describe balancing exploration and exploitation as a difficult task that requires organizations to develop specific capabilities over time (Gibson and Birkinshaw 2004). We know from studies on other complex organizational tasks, such as acquisitions (Laamanen and Keil 2008), that stability and repetition enable organizational learning, which should yield positive long-term performance outcomes.

Hypothesis 3B (H3B). *In times of incremental environmental change, maintaining high levels of ambidexterity is positively associated with firm performance.*

Methodology

Empirical Context and Sample

We use a longitudinal data set of companies from the global insurance industry (1999–2014) to test our hypotheses. The global insurance industry seems particularly suitable for our study of organizational ambidexterity's long-term evolution and outcome for the following reasons: First, the insurance sector was subject to deregulation, capital market volatility, demographic change, and major exogenous shocks during this period. These environmental conditions are conducive to testing our hypotheses regarding the evolution of firms' exploration and exploitation activities. Second, insurance companies are usually not engaged in businesses outside the financial service sector, which ensured sample homogeneity. Finally, more recent studies have found the insurance sector particularly useful for studying ambidexterity (e.g., Jansen et al. 2012) and coalignment moves (e.g., Klarner and Raisch 2013). Our work can thus build on established empirical procedures, which helps increase our study's validity and comparability.³

We derived our sample from the Dow Jones Stoxx Insurance Index (81 firms). We relied on the index's initial 1999 configuration to avoid survivorship bias. We excluded 11 broker firms that focus on the retailing of financial products and 13 firms with insufficient data. Our observation period includes an initial phase dominated by discontinuous environmental changes (1999–2005) and a subsequent phase characterized by more incremental environmental changes (2006–2014). We explicitly acknowledge that incremental and discontinuous environmental changes can co-occur (Sørensen 2002) but clarify that, in our sample, one type of change dominated each phase.

The initial phase contains major exogenous shocks that were, in terms of the insurance industry, of an unprecedented size and/or nature (i.e., the 9/11 terrorist attacks in 2001 and Hurricane Katrina in 2005). According to insurance industry experts, these unprecedented shocks had far-reaching effects on the industry because they demanded a paradigm shift in insurance firms' long-standing risk models, reinsurance strategies, and capitalization structures (Dlugolecki et al. 2013, Liedtke and Courbage 2002). For example, terrorism was not perceived as a major risk before 9/11 and therefore not excluded in policies written at the time. After 9/11, insurance firms had to develop terrorism insurance and adopt catastrophe-modeling techniques to assess their underwriting risks (Liedtke and Schanz 2011). While there were also large disasters in the subsequent (2006–2014) period (i.e., the Japanese earthquake in 2010 and

Hurricane Sandy in 2012), these disasters did not fundamentally change insurance firms' practices after the preceding catastrophes that had been similar in size and nature (DiPietro 2015).

Main Variables

Exploration–Exploitation. Scholars have developed a variety of exploration–exploitation measures (e.g., Lavie and Rosenkopf 2006, Rothaermel and Deeds 2004), but the nature of our theoretical arguments strongly suggests using the Uotila et al. (2009) approach. It is the only established measure of exploration and exploitation that allows for collecting large-scale, organizational-level, and longitudinal data. Following this approach, we used content analysis to measure a firm's exploration and exploitation in each period. We used the press releases on the firms' websites (Duriau et al. 2000) as a data source. Insurance firms are required to release corporate decisions fully and in a timely manner, making press releases a superior source of information compared with alternative sources, such as external press articles (Boyd and Bresser 2008).

We applied a stepwise process to make the press releases accessible, to identify their announcement dates, and to analyze their content (Shapiro and Markoff 1997). We downloaded the firms' press release archives with an open source download manager. This data collection process resulted in 34,853 releases. We then used news analytics software (Schimmer et al. 2015) to assign each press release to a specific period by identifying its announcement date. Finally, we used the same software to analyze the number of words relating to exploration and exploitation in each release; these words are based on March's (1991) word list (Uotila et al. 2009). Since differences in firms' communication styles may influence our measure, we subtracted each firm's total average exploration and exploitation words from the exploration–exploitation word count in each specific press release.⁴

We applied three procedures to ensure the validity of our exploration–exploitation measure. First, we presented a randomly generated subsample of 1,000 press releases to two independent coders. Both coders fulfilled the following requirements: they were in the final stages of their Ph.D. thesis on insurance economics; they had more than two years of prior professional experience in the insurance industry; having participated in a Ph.D. course on organizational ambidexterity, they were familiar with the exploration–exploitation construct; and they were unaware of our study and its specific hypotheses. Under one of the authors' supervision, the two insurance experts coded an initial test sample of press releases until they were familiar with the coding instructions. They subsequently coded the subsample independently. The comparison of this manual coding's outcome with that from our

computer-assisted analysis yielded a satisfactory conformity (Cohen's kappa of 0.72).⁵

Second, we constructed an alternative exploration–exploitation measure. We reanalyzed a random sample of 10% of the press releases in our database by identifying specific and concrete firm activities (Neuhierl et al. 2013). From the extant literature, we classified these activities (e.g., product innovation) as either exploration (e.g., the introduction of entirely new products) or exploitation (e.g., the refinement of existing products) (De Visser et al. 2009). Table 1 provides an overview of the different categories of firm activities, their classification as either exploration or exploitation, and the literature sources we used for their classification, as well as illustrative quotes from the press releases on each type of activity. The last column shows Cohen's kappa (Cohen 1960), which indicates the level of consistency between March's (1991) keyword-based measure and the newly developed activity-based measure. The validity check resulted in a total of 83% matches (Cohen's kappa of 0.66).

Third, we correlated our textual measures with insurance industry proxies for exploration (the increase in the degrees of diversification and internationalization) and exploitation (the decrease in the underwriting expense ratio). While these proxies are imperfect representations of exploration and exploitation (March 1991), we found the expected correlations between our textual measures and the industry-specific variables.

Following the validation of our exploration–exploitation measure, we used two alternative forms of aggregation at the firm level. First, following Uotila et al. (2009), we aggregated all exploration- and exploitation-related words in each time period.⁶ Second, in preparation of a more fine-grained, activity-based measure, we assigned each press release to a particular exploration- or exploitation-related activity. We then aggregated those activities to assess the firms' orientation to exploration and exploitation in the respective time period. This form of aggregation again ensured that individual press releases with a particularly high number of exploration- or exploitation-related words did not bias our results. The two forms of aggregation provided largely consistent results for our paper's analyses. Owing to space limitations, we only report findings based on the more established word count measure.

Ambidexterity scholars have provided different arguments about the operationalization of exploration and exploitation. Some describe the two activities in terms of an orthogonal connection (Jansen et al. 2006, Lubatkin et al. 2006), which implies that these activities are separate and do not compete for the same resources. Conversely, others conceptualize exploration and exploitation as lying on a continuum (Rogan and Mors 2014, Uotila et al. 2009), which assumes that

Table 1. Assessment of Exploration and Exploitation Activities

Categories (no. of observations)	Description of exploration and exploitation activities	Illustrative quotes from press releases	References	Cohen's kappa
Acquisition (556)	<i>Acquisition exploitation:</i> Acquisitions that are intended to strengthen a firm's established businesses/operations. Focus on market power and/or core business. <i>Acquisition exploration:</i> Acquisitions that are intended to expand a firm's established businesses/operations. Focus on innovation, access to new markets, and/or entering new product categories.	Munich Re signs agreement to acquire U.S. healthcare insurer Sterling Life Insurance Company. It is an important step in the development of the Group's business segment International Health. Dr. Wolfgang Strassl, member of the Board of Munich Re for Life and HealthCare: "Sterling is a target we have chosen carefully, and it perfectly contributes to the strategy we implemented in early 2006. It also further strengthens our capabilities as a global provider of integrated healthcare management." (1) Sun Life Financial Services of Canada Inc. today announced that it has completed the acquisition of 30% of the common shares of SECLON Inc. and Seclon Logic Inc. ("Seclon"). Located in Don Mills, Ontario, and incorporated in May 1996, Seclon is a Canadian privately-held technology business focused on the design and development of internet web-based applications and software solutions for the Canadian financial services marketplace. (2)	Stettner and Lavie (2014)	0.58
Alliance (245)	<i>Alliance exploitation:</i> Alliances that are intended to strengthen a firm's established businesses/operations. Focus on market power and/or core business. Restructuring of existing alliances. <i>Alliance exploration:</i> Alliances that are intended to expand a firm's established businesses/operations. Focus on innovation, access to new markets, or entering of new products/product categories.	ING and GE Commercial Finance have finalized the restructuring of the companies' working-capital finance joint venture, NMB-Heller. (3) AEGON and Ranbaxy Promoter Group today signed definitive agreements to jointly enter the life insurance and asset management business in India. AEGON and Religare, the financial services division of Ranbaxy Promoter Group, will implement the ventures. "India is an important new market for AEGON given the significant growth potential for the products and services we provide," said Alexander Wynaendts, member of the Executive Board of AEGON N.V. (4)	Lavie and Rosenkopf (2006), Rothaermel and Deeds (2004)	0.82
Markets (geographical) (280)	<i>Market exploitation:</i> Strengthening/revising/withdrawing from activities in existing (geographical) markets. <i>Market exploration:</i> Expanding into new (geographical) markets.	Following the closure to new individual business in July 2003, Swiss Life (UK) will now also stop writing new group business. This represents a further step in the Swiss Life Group's strategic realignment and a continuation of its planned withdrawal from the UK market. (5) Zurich Financial Services Group (Zurich), a leading global insurance company, has been granted a business license to establish a general insurance branch in Beijing by the State Administration for Industry and Commerce (SAIC), after receiving approval from the China Insurance Regulatory Commission (CIRC). Zurich is the first foreign insurer to have been granted a license to establish a general insurance branch in Beijing. (6)	Hsu et al. (2013)	0.54

Table 1. (Continued)

Categories (no. of observations)	Description of exploration and exploitation activities	Illustrative quotes from press releases	References	Cohen's kappa
Markets (industries) (62)	<i>Industry exploitation:</i> Withdrawal from unrelated industries; focus on core business.	Sun Life Financial Inc. announced today that it had reached agreement in principle to sell its 31.7% investment in Administradora de Fondos de Pensiones Cuprum for approximately \$120 million in cash. "This withdrawal reflects our continued focus on building a sustainable presence in markets in which we choose to compete, and exiting those markets where we do not have a meaningful presence," said Donald A. Stewart, Chief Executive Officer. (7)	March (1991), Tushman and O'Reilly (1996)	0.66
	<i>Industry exploration:</i> Expansion into new industries (e.g., banking, investment management).	Zurich Financial is steadfastly progressing from an insurance company to a financial services organization. In the near future it will be including tailored savings and investment solutions for the public at large in its range of services. Doing so will enable it to offer customers more solutions in the area of financial protection and asset accumulation. (8)		
Organization structure (OS) (84)	<i>OS exploitation:</i> Restructuring of existing organization; introduction of organizational efficiency programs; centralization of operations.	ING today announced that after careful deliberation and assessment of the strength of its business, it has made a decision to reorganize ING Insurance in Argentina. Effective immediately, the efforts of ING Insurance will be focused on managing existing customer accounts only. As a result of this decision, ING Insurance Argentina is closing its branch offices throughout the country and will be terminating the 650 staff at these locations, as well as part of the Buenos Aires head office. (9)	Tushman and O'Reilly (1996)	0.63
	<i>OS exploration:</i> Creation of new business units, ventures, or subsidiaries; initial public offering of businesses; decentralization of operations.	ING announces that it has established a separate Board and Supervisory Board for ING Netherlands. On 18 December 2002, ING already announced that it would transfer the voluntary Dutch legal large company regime from Group level to the management level of ING Netherlands in response to international developments in the field of corporate governance and the increasingly international character of ING Group. (10)		
Products and services (580)	<i>Product exploitation:</i> Extension/adaptation/refinement of existing products or product category.	The St. Paul Companies today introduced an enhanced version of Global Companion, an international commercial property and general liability product designed to help protect U.S.-based companies from the risks associated with conducting business overseas. (11)	De Visser et al. (2009), Stettner and Lavie (2014)	0.66
	<i>Product exploration:</i> Introduction of new products or product category.	Manulife Investments is launching a first-of-its-kind financial product into the Canadian marketplace. Income Plus is Canada's first offering in the Guaranteed Minimum Withdrawal Benefit (GMWB) category designed to help baby boomers navigate the "retirement risk zone," a period of extreme portfolio risk identified in a new research study. (12)		

Table 1. (Continued)

Categories (no. of observations)	Description of exploration and exploitation activities	Illustrative quotes from press releases	References	Cohen's kappa
Sales and distribution (S&D) (126)	<i>S&D exploitation</i> : Rebranding activities; pricing actions; reactivation, reorganization, and termination of existing distribution channels.	Assurant, Inc. ("Assurant") (NYSE: AIZ), a premier provider of specialized insurance and insurance-related products and services, announced today that it will extend for three years its exclusive distribution partnership with Service Corporation International. (13)	Andriopoulos and Lewis (2009)	0.57
	<i>S&D exploration</i> : Launch of new distribution channels (e.g., bancassurance, online business); adoption of new sales strategy.	Zurich Financial Services Group (Zurich) announces the launch of its new pan-European direct insurance offering Zurich Connect in Germany. As part of the European-wide roll out of Zurich Connect, customers in Germany can now buy insurance policies easily and directly through the internet... Germany is the first country to go live with its direct offering on the new Zurich Connect platform with a product range across the consumer market. (14)		
Top management team (TMT) (754)	<i>TMT exploitation</i> : Promotion of internal TMT members; return of former TMT members.	Peer van Harten, the ExCo member in charge of Fortis Insurance International, will also become responsible for Fortis Insurance Netherlands. (15)	O'Reilly and Tushman (2008)	0.63
	<i>TMT exploration</i> : Outsiders join the TMT; reconfiguration of TMT.	Brit Insurance Holdings PLC today announces the appointment of George Maxwell to the position of Head of Sales for its Brit UK division. Joining George Maxwell are three new Business Development Managers: Kevin Coaker, Rob Faulkner, and Mick Hunter... George Maxwell joins Brit Insurance from Royal & Sun Alliance, where he has spent over 30 years. (16)		
Overall Cohen's kappa (compared with March's 1991 keyword list)				0.66

Notes. (1) Munich Re (2007, December 17) Munich Re concludes agreement to acquire U.S. healthcare insurer Sterling Life Insurance Company [press release]; (2) Sun Life Financial Inc. (2000, October 26) Sun Life Financial acquires interest in technology company [press release]; (3) ING Group (2005, June 17) ING and GE Commercial Finance complete restructuring of NMB-Heller joint venture [press release]; (4) Aegon (2006, December 28) Aegon and Ranbaxy Promoter Group sign final agreements for life insurance and asset management businesses [press release]; (5) Swiss Life Holding (2003, December 16) New agreement between Swiss Life and UnumProvident [press release]; (6) Zurich Financial Services (2006, May 22) License for General Insurance branch in Beijing [press release]; (7) Sun Life Financial Inc. (2005, August 12) Sun Life Financial sells Chilean investment [press release]; (8) Zurich Financial Services (1999, January 29) Zurich receives bank license [press release]; (9) ING Group (2004, February 12) Strategic restructuring of ING Insurance activities in Argentina [press release]; (10) ING Group (2004, June 4) ING establishes two-tier board structure for ING Netherlands [press release]; (11) Travelers Cos Inc. (2004, April 13) St. Paul Travelers introduces enhanced commercial property and general liability product for companies with foreign operations [press release]; (12) Manulife Financial Corp. (2006, October 3) Manulife Investments introduces new product category with first-ever Guaranteed Minimum Withdrawal Benefit product in Canada [press release]; (13) Assurant Inc. (2006, December 1) Assurant announces three-year extension to its exclusive distribution partnership with Service Corporation International (SCI) [press release]; (14) Zurich Financial Services (2007, August 21) Zurich launches new direct insurance offering in Germany [press release]; (15) Fortis (2005, November 4) Fortis announces senior management changes [press release]; (16) Brit Insurance Holdings PLC (2007, October 18) New Head of Sales and Business Development Managers [press release].

there is an inherent trade-off between the two activities. Gupta et al. (2006) compare these approaches and argue that the orthogonal approach is better for examining exploration and exploitation across domains, while the continuum approach better reflects the trade-offs at the organizational level (see Lavie et al. 2010 for a similar conclusion). In this study, we are concerned with the relative allocation of scarce attention and resources at the organizational level. We therefore used the continuum approach and measured a company's relative degree of exploration in each period by dividing the number of exploration words by the sum of the exploration and exploitation words (and accordingly for exploitation).

We built three variables from this continuous exploration–exploitation measure. First, *ambidexterity* was operationalized as the multiplication of $exploration_{i,t}$ and $exploitation_{i,t}$ in each period (Gibson and Birkinshaw 2004, Jansen et al. 2012). This procedure yielded a continuous measure of ambidexterity, taking a minimum value of 0 (for firms with a one-sided focus on either exploration or exploitation) and a maximum value of 0.25 (for firms with a balanced allocation). Second, to measure *maintaining high levels of ambidexterity*, we calculated ambidexterity's arithmetic mean over three periods.⁷ Finally, *exploration–exploitation change* was operationalized as the difference between $|exploitation_{t-1}|$ and $|exploitation_t|$.

Organizational Slack. Prior work provided a variety of options to operationalize organizational slack (Bourgeois 1981), but scholars have suggested that unabsorbed slack, which refers to uncommitted, ready-to-deploy assets (O'Reilly and Tushman 2004), can be best applied to organizational ambidexterity (Lavie et al. 2010). We operationalized *unabsorbed slack* by means of the ratio of firms' cash and short-term investments divided by their short-term debt (Iyer and Miller 2008).

Firm Performance. We followed most prior ambidexterity studies' approach to assess *long-term firm performance* by relying on firms' accounting performance (e.g., Jansen et al. 2006, Lavie and Rosenkopf 2006). Specifically, we measured insurance firms' *long-term performance* in terms of their three-period average return on equity (RoE).⁸ We also crafted an alternative market-based performance measure by calculating firms' total shareholder return (TSR) (e.g., Miller and Bromiley 1990), which is a firm's stock price at the end of each period minus the stock price at the beginning of the period, plus its respective share of the annual dividend (Hayward 2003). To ensure that extreme observations would not drive our results, the RoE and TSR were winsorized at the 1% level.

Control Variables

For our two dependent variables (DVs), *exploration–exploitation change* and *long-term firm performance*, we constructed distinct sets of control variables. We selected control variables that capture firm characteristics (i.e., financial leverage, firm size, and loss ratio), firm strategies (i.e., the business scope, diversification, internationalization, investment strategy, and reinsurance strategy), and contextual factors (i.e., chief executive officer (CEO) turnover, competitive pressure, and time effects). We winsorized all the control variables at the 1% level to prevent outlier observations biasing our results.

As the first important firm characteristic, *financial leverage* reflects an insurance firm's risk-taking capacity, which might be related to its explorative activities and, ultimately, affect its performance. In line with previous work, we operationalized financial leverage as firms' net premiums written to policyholder surplus (Beckman and Tremeling 1972). Furthermore, *firm size* was identified as an antecedent to firms' exploration–exploitation allocation and firm performance (Lubatkin et al. 2006). We measured firm size by means of the logarithm of insurance firms' net premiums written. Finally, the *loss ratio* is a popular measure used in the insurance industry to capture underwriting quality and cost, which can influence firm performance. The loss ratio was calculated by dividing the sum of a firm's incurred losses and underwriting expenses by the gross premiums written (Fiegenbaum et al. 1990).

With regard to firm strategies, the *business scope* captures the relative importance of an insurance firm's property and liability (P&L) business compared with its life insurance business, which may impact its performance. Business scope is measured by dividing the P&L business's gross premiums written by the total gross premiums written (Fiegenbaum and Thomas 1990). We also included controls for a firm's degrees of *diversification* and *internationalization* (Jacquemin and Berry 1979), which have been found to impact insurance firms' performance (Fiegenbaum and Thomas 1990). Moreover, an insurance firm's *investment strategy* can affect its performance (Fiegenbaum and Thomas 1995). The investment strategy is operationalized as the ratio of equity holdings over the total investments, including the equity and fixed income investments. Finally, an insurance firm's *reinsurance strategy* is generally perceived as a factor impacting its performance (Fiegenbaum et al. 1990). The variable is measured by means of the ratio between the absolute amount of premiums transferred to reinsurers and the total gross premiums written.

To capture contextual influences, we included *CEO turnover*, since this might change firms' exploration–exploitation orientation (Cao et al. 2006) and influence

their performance. *CEO turnover* is a binary variable that takes a value of 1 if there has been a change and 0 otherwise (Puffer and Weintrop 1991). Second, we included *competitive pressure* because it might impact firms' exploration–exploitation balance (Jansen et al. 2006). *Competitive pressure* is measured as the aggregate number of actions taken by a firm's rivals, which reflects the pressure rivals exert on a firm to take competitive action (Yu and Cannella 2007). Finally, we controlled for fixed *time effects*.

The control variable data were drawn from the COMPUSTAT and A.M. BEST databases. A.M. BEST provides the most fine-grained accounting data on global insurance firms.

Data Analysis

Our data are structured as a panel data set; that is, we observe multiple insurance firms over multiple points in time. In comparison with previous organizational ambidexterity studies, which predominantly adopted a cross-sectional research design (Junni et al. 2013), the panel design lessens the risk of confounding correlation with causation. Despite this advantage, autocorrelation may affect the panel design. This is due to most social phenomena being—at least to some extent—stable over time. Moreover, the problem of heteroscedasticity affects the panel design (Andrews 1991), which means that our residuals' variance is dependent on the values of our independent variables. We therefore conducted a Wooldridge (2010) test to control for autocorrelation and a Breusch and Pagan (1979) test to assess the heteroscedasticity. Since these tests indicated the need to account for autocorrelation and heteroscedasticity, we used generalized least square (GLS) regression analysis (STATA: *xtgls*

corr(ar1) panels(hetero)) (Wooldridge 2010).⁹ In addition, we checked for multicollinearity by computing the variance inflation factors (VIFs). As indicated in Tables 4, 6, and 7, the maximum VIF of the variables in our models was 3.16, which is below the rule-of-thumb cutoff value of 10 (Neter et al. 1985). We mean-centered the component variables in all the interaction tests.

In terms of our data's temporal structure, we principally prefer quarterly observations. These observations enable a more precise identification of our main variables (i.e., *exploration–exploitation change* and *ambidexterity*) and also decrease the risk of confounding effects¹⁰ driving our results because firms usually engage in multiple exploration and exploitation related activities throughout the year.¹¹ Nevertheless, quarterly observations might sometimes—specifically, in the case of Hypotheses 1 and 2—be too short to fully capture the self-reinforcing effects we assume. We consequently also analyzed these hypotheses in an annual data structure.

Results

Table 2 presents the descriptive statistics and correlations of the models testing the evolution of firms' exploration–exploitation orientation (Hypotheses 1 and 2), whereas Table 3 presents the descriptive statistics and correlations of the models testing long-term performance outcomes (Hypotheses 3A and 3B). None of the correlation coefficients exceeds the critical cutoff value of 0.7, and together with the low VIF values, this indicates that multicollinearity is not a major threat.

Hypothesis 1

Hypothesis 1 suggests that organizational ambidexterity has a self-reinforcing effect. When examining such

Table 2. Descriptive Statistics and Correlation Matrix (H1 and H2; Quarterly Data; N = 1,185)

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) <i>Exploration–exploitation change</i>	0.280	0.239	1												
(2) <i>Ambidexterity</i>	0.164	0.091	−0.06*	1											
(3) <i>Unabsorbed slack</i>	1.177	0.134	0.07*	0.05	1										
(4) <i>Reinsurance strategy</i>	0.152	0.161	−0.02	0.03	0	1									
(5) <i>Short-term firm performance</i>	0.030	0.027	0	−0.11*	−0.02	−0.08*	1								
(6) <i>Financial leverage</i>	0.036	0.036	−0.03	−0.04	0.11*	0.21*	−0.07*	1							
(7) <i>Firm size</i>	8.391	1.176	−0.07*	0.06	−0.55*	0.05	0.09*	−0.02	1						
(8) <i>Loss ratio</i>	0.793	0.222	−0.07*	0.05	0.10*	0.09*	−0.26*	−0.15*	−0.28*	1					
(9) <i>Business scope</i>	0.470	0.429	0.02	0.13*	0.60*	0.26*	−0.03	0.15*	−0.40*	0.14*	1				
(10) <i>Diversification</i>	0.454	0.201	−0.06*	0.10*	−0.14*	−0.17*	0.16*	0.05	0.11*	−0.13*	−0.09*	1			
(11) <i>Internationalization</i>	0.470	0.324	0	0.03	0.23*	−0.27*	0.13*	−0.09*	−0.33*	−0.02	0.30*	0.19*	1		
(12) <i>CEO turnover</i>	0.029	0.167	−0.05	−0.02	−0.03	0.02	−0.05	−0.02	0.03	0.01	0.01	0.02	0.03	1	
(13) <i>Competitive pressure</i>	547.217	173.851	−0.02	0.14*	0.15*	−0.11*	−0.10*	−0.04	0.03	−0.20*	0.05	0.05	0.09*	0.02	1
(14) <i>Firm-level ambidexterity fixed effect</i>	0.003	0.038	−0.08*	0.35*	−0.01	0.13*	−0.21*	−0.12*	0.25*	0.25*	0.24*	−0.17*	−0.15*	0	−0.13*

* $p < 0.05$.

Table 3. Descriptive Statistics and Correlation Matrix (H3A and H3B; Quarterly Data; $N = 937$)

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Long-term firm performance	0.031	0.022	1										
(2) Maintaining high levels of ambidexterity	0.156	0.068	−0.03	1									
(3) Environmental dynamism	0.031	0.020	0.02	−0.13*	1								
(4) Financial leverage	0.036	0.036	0.01	0	−0.05	1							
(5) Firm size	8.335	1.226	0.06*	0.14*	−0.09*	−0.08*	1						
(6) Loss ratio	0.811	0.209	−0.22*	0	0.11*	−0.05*	−0.23*	1					
(7) Unabsorbed slack	1.177	0.131	0	0	−0.15*	0.15*	−0.56*	0.08*	1				
(8) Business scope	0.516	0.430	−0.07*	0.05*	0.03	0.09*	−0.26*	0.21*	0.45*	1			
(9) Diversification	0.463	0.208	0.16*	0.06*	−0.03	0.08*	0.01	−0.05	−0.08*	−0.02	1		
(10) Internationalization	0.508	0.338	0.09*	−0.03	−0.02	−0.05*	−0.29*	0.10*	0.17*	0.27*	0.17*	1	
(11) Reinsurance strategy	0.136	0.161	−0.11*	0.08*	0.04	0.17*	−0.03	0.09*	0.03	0.06*	−0.11*	−0.20*	1
(12) CEO turnover	0.027	0.161	−0.02	−0.05	0.03	−0.01	0.01	0.02	−0.03	0	0.02	0	0.02

* $p < 0.05$.

dynamics, two rival explanations may apply: general firm-level inertial tendencies in ambidexterity and the specific theoretical arguments described in Hypothesis 1. To account for general firm-level inertial tendencies in ambidexterity, we applied a two-step estimation approach besides correcting for autocorrelation (Eggers et al. 2016). Specifically, we first estimated firms' average level of ambidexterity (with *ambidexterity* as our DV), using the same set of control variables as indicated in Model 1 (see Table 4). From this equation, we predicted firms' fixed effects share of ambidexterity. This fixed effects share (*firm-level ambidexterity fixed effect*) was then included in a second-step equation predicting the change in firms' exploration–exploitation allocation (see Models 1–4 in Table 4).¹² The two-step approach shows that the level of organizational ambidexterity has a significant negative influence on the subsequent exploration–exploitation change ($p < 0.001$) and that this effect goes beyond firms' general inertial tendencies.

In addition to this two-step approach, we ensured that the chosen temporal structure and the set of control variables did not affect our results. Table 5 presents the descriptive statistics and correlations for the annual data. We could reproduce the results displayed in Table 4 when switching from a quarterly to an annual structure (see Table 6) as well as when excluding insignificant control variables (i.e., financial leverage, firm size, loss ratio, investment strategy, and CEO turnover) from the equation.¹³ Finally, our argument used in Hypothesis 1 suggests that inertial tendencies in ambidexterity require time to develop. We therefore calculated two- and three-period averages of our independent variable. The results of the two- and three-period averages of ambidexterity ($p < 0.001$) are consistent with the main results reported in Table 4.

Hypothesis 2

Hypothesis 2 suggests that unabsorbed slack allows for “performance smoothing,” providing a “buffer against

bad times” (Bourgeois 1981, p. 30), and, hence, amplifies the effect of Hypothesis 1. Our data indicate support for this suggestion with regard to the quarterly (see Table 4, Model 3, $p < 0.05$) and annual structures (see Table 6, Model 3, $p < 0.05$). In the specific case of insurance firms, the share of premiums ceded to reinsurance (i.e., reinsurance strategy) may have a similar effect as the effect observed regarding unabsorbed slack. The higher the share of premiums ceded to reinsurance, the greater the hedge against performance declines (which often originate from major disasters and the related large claims) and the lower the adaptation pressure on firms. To assess this effect, we conducted an alternative test for Hypothesis 2 by studying the interaction effect of ambidexterity and firms' reinsurance strategy on the exploration–exploitation change. This alternative test suggests further support for Hypothesis 2 in the quarterly (see Table 4, Model 4, $p < 0.001$) and annual (see Table 6, Model 4, $p < 0.001$) data structure.

Hypotheses 3A and 3B

Table 7 illustrates the performance outcomes of maintaining high values of ambidexterity over time in the initial period (1999–2005) marked by discontinuous environmental change (Model 2) and, in the subsequent period (2006–2014), characterized by incremental environmental change (Model 4). We find evidence that maintaining high values of ambidexterity in a period of discontinuous change is negatively related to long-term firm performance ($p < 0.05$), whereas it is positively related to long-term firm performance in a period of incremental change ($p < 0.05$). To further substantiate these results and to ensure that the sample split does not materially affect our results, we conducted a supplementary analysis of the full sample. We calculated the environmental dynamism by using a standardized measure of the volatility of the industry sales growth rate (Boyd 1995). Specifically, we scaled the standard error of the industry

Table 4. Regression Results H1 and H2 (DV: *Exploration–Exploitation Change*)

Variable	Model 1	Model 2	Model 3	Model 4
<i>Ambidexterity × Reinsurance strategy</i>				−1.7377*** (0.4943)
<i>Ambidexterity × Unabsorbed slack</i>			−0.9766* (0.4098)	
<i>Ambidexterity</i>		−0.5678*** (0.0800)	−0.5688*** (0.0800)	−0.5966*** (0.0801)
<i>Short-term firm performance</i>	−0.8089** (0.2966)	−0.8164** (0.2902)	−0.8176** (0.2895)	−0.7737** (0.2883)
<i>Financial leverage</i>	−0.6247** (0.2172)	−0.5899** (0.2121)	−0.5676** (0.2117)	−0.6087** (0.2093)
<i>Firm size</i>	−0.0018 (0.0090)	−0.0034 (0.0088)	−0.0031 (0.0088)	−0.0049 (0.0087)
<i>Unabsorbed slack</i>	0.1332 (0.0813)	0.1401+ (0.0792)	0.1626* (0.0797)	0.1320+ (0.0777)
<i>Loss ratio</i>	−0.0780+ (0.0399)	−0.0791* (0.0389)	−0.0793* (0.0388)	−0.0822* (0.0384)
<i>Business scope</i>	0.0311 (0.0232)	0.0284 (0.0227)	0.0278 (0.0225)	0.0269 (0.0223)
<i>Diversification</i>	−0.0130 (0.0401)	0.0186 (0.0394)	0.0195 (0.0392)	0.0170 (0.0388)
<i>Internationalization</i>	−0.0363 (0.0278)	−0.0343 (0.0271)	−0.0340 (0.0269)	−0.0338 (0.0266)
<i>Investment strategy</i>	0.1043 (0.0693)	0.1100 (0.0676)	0.1170+ (0.0673)	0.1094+ (0.0664)
<i>Reinsurance strategy</i>	0.0185 (0.0540)	0.0359 (0.0527)	0.0354 (0.0524)	0.0714 (0.0527)
<i>CEO turnover</i>	−0.0481 (0.0398)	−0.0574 (0.0390)	−0.0574 (0.0390)	−0.0597 (0.0389)
<i>Competitive pressure</i>	−0.0000 (0.0001)	−0.0000 (0.0001)	−0.0000 (0.0001)	−0.0000 (0.0001)
<i>Firm-level ambidexterity fixed effect</i>	−0.7597** (0.2421)	−0.1773 (0.2498)	−0.1739 (0.2485)	−0.1535 (0.2458)
Constant	0.2759 (0.2046)	0.3229 (0.1998)	0.2874 (0.2000)	0.3597+ (0.1975)
Time effects	Included	Included	Included	Included
VIFs	3.07	3.11	3.16	3.16
Observations	1,185	1,185	1,185	1,185
Number of firms	49	49	49	49
χ^2	114.5***	170.1***	173.9***	185.3***

Notes. All independent and control variables are lagged by one period. Standard errors are in parentheses.

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; + $p < 0.1$.

sales growth slope coefficient by its mean value. We then aggregated the environmental dynamism variables of each firm according to its two-digit Standard Industrial Classification code sales fractions in different business segments. In Model 6 of Table 7, we included the interaction effect between maintaining ambidexterity and environmental dynamism. This interaction term's negative association with long-term performance ($p < 0.001$) provides further support for Hypotheses 3A and 3B.

Post Hoc Tests

There are endogeneity concerns regarding the hypotheses predicting a change in firms' exploration–exploitation allocation (H1 and H2) as well as regarding those

predicting long-term firm performance (3A and 3B). First, regarding an exploration–exploitation change, unobserved heterogeneity at the firm level—for example, with regard to firms' long-term strategies—may simultaneously affect their current exploration–exploitation allocation and a subsequent adaptation to this allocation. To account for such potentially omitted variables, we created alternative time dummies, ranging from two to four periods, which we included in the models evaluating H1 and H2. We also included either firm fixed effects or firm-level ambidexterity fixed effects and the interaction between the new time variable and either of the firm fixed effects. The interaction component reflects a potential firm-level variable changing in the longer term that the existing

Table 5. Descriptive Statistics and Correlation Matrix (H1 and H2; Annual Data; $N = 355$)

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) <i>Exploration–exploitation change</i>	0.162	0.157	1												
(2) <i>Ambidexterity</i>	0.194	0.073	−0.31*	1											
(3) <i>Unabsorbed slack</i>	1.163	0.128	−0.02	0.05	1										
(4) <i>Reinsurance strategy</i>	0.141	0.165	0	0.09	0.05	1									
(5) <i>Short-term firm performance</i>	0.030	0.034	−0.04	0.02	0.01	−0.05	1								
(6) <i>Financial leverage</i>	0.059	0.063	0.11	0.03	−0.16*	0.15*	−0.09	1							
(7) <i>Firm size</i>	9.606	1.309	−0.07	0.03	−0.59*	−0.14*	0.02	0.16*	1						
(8) <i>Loss ratio</i>	0.768	0.241	−0.01	0.04	0.1	0.09	−0.31*	0.07	−0.33*	1					
(9) <i>Business scope</i>	0.477	0.422	0	0.11	0.46*	0.15*	0.06	−0.20*	−0.35*	0.14*	1				
(10) <i>Diversification</i>	0.495	0.236	−0.09	0.11	−0.24*	−0.15*	0.16*	−0.02	0.15*	−0.07	−0.12	1			
(11) <i>Internationalization</i>	0.457	0.349	0.04	0.02	0.20*	−0.30*	0.12*	−0.18*	−0.22*	0.03	0.23*	0.16*	1		
(12) <i>CEO turnover</i>	0.096	0.300	−0.02	−0.08	−0.1	0.05	−0.11	0.09	0.01	0.04	−0.01	−0.01	0.03	1	
(13) <i>Competitive pressure</i>	512.134	190.273	−0.09	0.16*	0.17*	−0.11	0	−0.24*	0.02	−0.11	−0.04	0.05	0.13*	−0.03	1
(14) <i>Firm-level ambidexterity fixed effect</i>	0.000	0.033	−0.14*	0.41*	−0.08	0.14*	−0.20*	0.17*	0.25*	−0.17*	−0.05	−0.05	−0.41*	−0.04	0.02

* $p < 0.05$.

covariates do not yet cover (e.g., a strategy changing every two to four periods or long-term adaptations to firms' exploration–exploitation allocation). Across a large variety of model specifications, we find continued support for H1 and H2.¹⁴

Second, regarding H3A and H3B, performance not only may be the outcome of exploration and exploitation but may also feed back and influence these activities (Levinthal and March 1993, March 1991). For the following reasons, we, however, do not expect these reverse causality concerns to pose a significant threat to our findings' validity: First, in the case of Models 2–4 and 6–8 (see Table 7), exploration–exploitation allocation decisions are taken well before senior managers become aware of their respective long-term accounting returns. This argument is further supported because including time lags between ambidexterity and long-term performance in these models confirmed our initial findings. In these lagged models, performance effects are captured several periods after the initial exploration–exploitation decision was taken, which means they cannot affect these decisions. Second, we followed an approach utilized by Yu (2008) and created a proxy for ambidexterity that is uncorrelated to the firm's prior financial performance. We estimated a model in which *maintaining high levels of ambidexterity* is the dependent variable and lagged firm performance is the main explanatory variable.¹⁵ We used the residuals from these models as proxies for our ambidexterity variable to test Hypotheses 3A and 3B. The residuals can be considered a component of ambidexterity that is uncorrelated to prior firm performance (Yu 2008). These residuals thus help alleviate potential endogeneity between firms' ambidexterity and prior reported financial performance. The Yu (2008) test enabled us to reproduce the results indicated in Table 7.¹⁶

Discussion

This study takes a dynamic perspective on balancing exploration and exploitation. Building on, and integrating, ambidexterity (O'Reilly and Tushman 2008) and formal modeling (Posen and Levinthal 2012) arguments on the exploration–exploitation tension, we extend theory on how ambidexterity evolves over time to clarify its promises and boundaries. We conclude our study by discussing its main contributions to the ambidexterity literature as well as its larger implications regarding the theoretical integration and extension of the ambidexterity and formal modeling perspectives.

A Dynamic Perspective on Balancing Exploration and Exploitation

By studying ambidexterity over time, we contribute to the emerging conversation about the temporal processes underlying exploration and exploitation (Raisch and Tushman 2016; Zimmermann et al. 2015, 2017). Most prior ambidexterity studies have focused on investigating how firms implement structures, contexts, and processes to simultaneously explore and exploit (Lavie et al. 2010). While these more static considerations provide excellent explanations of how firms become ambidextrous, we contribute a more dynamic perspective on how their ambidextrous ability and performance outcomes evolve over time. Our empirical findings have several theoretical implications for the debate on ambidexterity.

First, ambidexterity research highlights the self-reinforcing effects of either exploration or exploitation (Levinthal and March 1993) and hails the ambidexterity concept's ability to overcome these inertial tendencies (Tushman and O'Reilly 1996). In this study, we find evidence that merely maintaining a balance

Table 6. Regression Results H1 and H2 (DV: *Exploration–Exploitation Change*, Annual Data)

Variable	Model 1	Model 2	Model 3	Model 4
<i>Ambidexterity × Reinsurance strategy</i>				−3.3111*** (0.8944)
<i>Ambidexterity × Unabsorbed slack</i>			−0.0389* (0.0182)	
<i>Ambidexterity</i>		−0.3116* (0.1238)	−0.3648** (0.1255)	−0.4571*** (0.1277)
<i>Short-term firm performance</i>	−0.4301+ (0.2363)	−0.4154+ (0.2346)	−0.4151+ (0.2329)	−0.3699 (0.2306)
<i>Financial leverage</i>	−0.0032 (0.2540)	−0.0458 (0.2500)	−0.0286 (0.2499)	−0.1152 (0.2448)
<i>Firm size</i>	−0.0043 (0.0079)	−0.0055 (0.0078)	−0.0064 (0.0078)	−0.0076 (0.0076)
<i>Unabsorbed slack</i>	0.0010 (0.0011)	0.0011 (0.0010)	0.0023+ (0.0012)	0.0014 (0.0010)
<i>Loss ratio</i>	−0.0428 (0.0370)	−0.0354 (0.0366)	−0.0351 (0.0365)	−0.0332 (0.0358)
<i>Business scope</i>	−0.0022 (0.0207)	−0.0021 (0.0202)	0.0002 (0.0203)	−0.0122 (0.0199)
<i>Diversification</i>	−0.0664+ (0.0373)	−0.0575 (0.0369)	−0.0530 (0.0368)	−0.0563 (0.0361)
<i>Internationalization</i>	0.0035 (0.0279)	0.0155 (0.0279)	0.0115 (0.0279)	0.0248 (0.0273)
<i>Investment strategy</i>	0.0063 (0.0630)	0.0107 (0.0619)	0.0069 (0.0618)	−0.0077 (0.0606)
<i>Reinsurance strategy</i>	0.0209 (0.0533)	0.0312 (0.0526)	0.0384 (0.0526)	0.1121* (0.0558)
<i>CEO turnover</i>	−0.0182 (0.0197)	−0.0232 (0.0197)	−0.0227 (0.0196)	−0.0131 (0.0196)
<i>Competitive pressure</i>	0.0001* (0.0001)	0.0001+ (0.0001)	0.0001 (0.0001)	0.0001* (0.0001)
<i>Firm-level ambidexterity fixed effect</i>	−0.5715+ (0.3068)	−0.1745 (0.3396)	−0.2523 (0.3410)	−0.0786 (0.3326)
Constant	0.2938** (0.1098)	0.3566** (0.1110)	0.3743*** (0.1110)	0.3910*** (0.1089)
Time effects	Included	Included	Included	Included
VIFs	2.36	2.71	2.87	2.91
Observations	355	355	355	355
Number of firms	46	46	46	46
χ^2	45.58***	52.79***	57.96***	68.60***

Notes. All independent and control variables are lagged by one period. Standard errors are in parentheses.

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; + $p < 0.1$.

between exploration and exploitation fails to effectively protect firms from being locked in. Our arguments suggest that firms that align their visions, strategies, and structures to enable ambidexterity (O'Reilly and Tushman 2008) can also promote defensive managerial actions, organizational inertia, and complementary performance outcomes that eventually cause self-reinforcing effects or path dependencies. This new insight suggests that self-reinforcing effects do not only loom at the extremes of the exploration–exploitation continuum but also at the balanced allocations at which ambidexterity aims. In other words, any relatively static equilibrium (Lavie et al. 2010),

regardless of its exact position on the exploration–exploitation continuum, may come with inertial forces that exacerbate firms' ability to further adapt their exploration–exploitation allocation.

Second, we argue that these self-reinforcing effects can enable learning from experience, permitting organizations to build and refine their ambidextrous capabilities over time. This dynamic perspective on ambidexterity as a capability-building process is an alternative to prior formal models of exploration and exploitation that describe a sequential process with repeated adaptations (Posen and Levinthal 2012). Our empirical findings suggest that learning from

Table 7. Regression Results H3A and H3B (DV: Long-Term Firm Performance)

Variable	1999–2005		2006–2014		Full sample	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Maintaining high levels of ambidexterity</i> × <i>Environmental dynamism</i>						−0.0279*** (0.0080)
<i>Environmental dynamism</i>						0.0018 (0.0024)
<i>Maintaining high levels of ambidexterity</i>		−0.0153* (0.0062)		0.0160* (0.0064)		−0.0034 (0.0050)
<i>Financial leverage</i>	−0.0105 (0.0299)	−0.0132 (0.0300)	0.0107 (0.0110)	0.0095 (0.0118)	0.0129 (0.0127)	0.0115 (0.0127)
<i>Firm size</i>	0.0011 (0.0007)	0.0011 (0.0007)	0.0009 (0.0008)	0.0007 (0.0009)	0.0010 (0.0007)	0.0010 (0.0007)
<i>Loss ratio</i>	0.0023 (0.0035)	0.0020 (0.0035)	−0.0083** (0.0025)	−0.0076** (0.0025)	−0.0056* (0.0022)	−0.0052* (0.0022)
<i>Unabsorbed slack</i>	0.0023 (0.0083)	0.0011 (0.0083)	0.0152* (0.0071)	0.0162* (0.0070)	0.0071 (0.0063)	0.0069 (0.0063)
<i>Business scope</i>	−0.0016 (0.0018)	−0.0015 (0.0018)	−0.0014 (0.0022)	−0.0014 (0.0022)	−0.0015 (0.0017)	−0.0015 (0.0017)
<i>Diversification</i>	0.0060 (0.0038)	0.0063+ (0.0037)	−0.0024 (0.0027)	−0.0025 (0.0028)	−0.0016 (0.0023)	−0.0009 (0.0026)
<i>Internationalization</i>	0.0063* (0.0025)	0.0061* (0.0025)	0.0035 (0.0023)	0.0030 (0.0023)	0.0024 (0.0019)	0.0023 (0.0019)
<i>Investment strategy</i>	0.0143* (0.0065)	0.0128* (0.0062)	0.0090+ (0.0052)	0.0099+ (0.0052)	0.0076 (0.0047)	0.0074 (0.0046)
<i>Reinsurance strategy</i>	−0.0054+ (0.0030)	−0.0054+ (0.0030)	0.0017 (0.0044)	0.0009 (0.0045)	−0.0031 (0.0031)	−0.0031 (0.0032)
<i>CEO turnover</i>	0.0008 (0.0014)	0.0012 (0.0014)	−0.0010 (0.0018)	−0.0008 (0.0018)	0.0003 (0.0013)	0.0005 (0.0013)
Constant	−0.0012 (0.0168)	0.0022 (0.0167)	−0.0018 (0.0136)	−0.0051 (0.0136)	0.0050 (0.0131)	0.0047 (0.0130)
Time effects	Included	Included	Included	Included	Included	Included
VIFs	2.76	2.82	2.8	2.81	2.55	2.72
Observations	739	739	811	811	1,475	1,475
Number of firms	53	53	47	47	57	57
χ^2	220.6***	228.7***	185.8***	194.0***	445.4***	469.0***

Notes. The temporal sample split (i.e., the year 2005) concerns the independent variables. Standard errors are in parentheses.

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; + $p < 0.1$.

experience to refine their ambidextrous ability may be a superior strategy for firms facing environments characterized by incremental change when compared with constantly vacillating between more focused exploration and exploitation orientations. Ambidexterity may therefore be more than a mere episode in the larger cycles of exploration and exploitation (Boumgarden et al. 2012). Dependent on the industry context, there may be relatively long periods of incremental change (Tushman and Anderson 1986) that make ambidexterity—even in its more static form—a promising strategy. In such relatively stable times, ambidextrous firms build their capability over time and therefore increasingly benefit from exploration and exploitation's complementary effects (Farjoun 2010, Smith and Lewis 2011). At the same time, they avoid the escalating restructuring and transition costs that

vacillation between alternative alignments can cause (O'Reilly and Tushman 2013). Not investing in ambidextrous abilities would therefore mean that these firms accept inferior performance outcomes.

Third, we clarify the temporal boundaries of ambidexterity. Whereas prior studies found that ambidexterity's utility varies across contexts (Jansen et al. 2006), we show that its performance effect can also increase or decrease over time. While ambidexterity as a capability-building process works well in periods of incremental change, it also gives rise to inertia that is particularly harmful in times of more radical change. Maintaining ambidexterity in discontinuous contexts implies the risk of misalignment with the environmental context, which has negative performance implications (Jansen et al. 2006). A key insight is therefore that ambidexterity's initially positive performance

effects can turn negative over time if firms face discontinuous change in their environments, which makes learning from experience difficult (March 1991). In these contexts, firms may benefit more from shifting away from their ambidextrous orientation toward a more focused exploration or exploitation strategy (Gulati and Puranam 2009). This implies that building ambidextrous structures, contexts, and processes (O'Reilly and Tushman 2008) is generally insufficient to ensure superior long-term performance outcomes because most firms, even those experiencing long cycles of incremental development, eventually face discontinuous environmental changes that force them to fundamentally change their alignment.

Integrating and Extending the Ambidexterity and Formal Modeling Perspectives

Our combined insights suggest that neither the ambidexterity nor the formal modeling perspective captures the full complexity of managing exploration–exploitation tensions. Nevertheless, each perspective contributes valuable insights that, taken together, provide solid foundations for future organizational research. In this section, we build the foundations for an integrative perspective. We start by defining ambidexterity more dynamically to integrate the formal modeling perspective's contributions. We subsequently draw on both perspectives to identify the underlying capabilities and discuss the long-term performance outcomes of managing exploration–exploitation dynamically.

First, prior studies have defined ambidexterity as the *ability to simultaneously explore and exploit* (Raisch et al. 2009). Our findings suggest that this definition is insufficient to fully capture the challenge that firms face when managing exploration–exploitation tensions. We know from studies applying a paradox lens to ambidexterity (Andriopoulos and Lewis 2009, Farjoun 2010, Smith and Lewis 2011) that the implementation of ambidextrous designs can enable organizations to temporarily reconcile exploration–exploitation tensions but fails to permanently resolve these tensions. When the environmental conditions change, these tensions become salient again, and organizations have to adopt adequate measures to manage them (Schad et al. 2016). The formal modeling perspective suggests that these measures include adaptive search to realign the organization's activities with the altered environmental conditions (Stieglitz et al. 2016). These adaptations may even include moving away from an ambidextrous orientation toward a more focused exploration and exploitation orientation (Gulati and Puranam 2009). Balancing is thus a dynamic concept that requires continuous managerial attention (Smith and Lewis 2011). From an integrative perspective, ambidexterity could thus be defined as the *ability to dynamically balance exploration and exploitation*.

Second, given this definition, the essential question is how ambidextrous firms can dynamically balance exploration and exploitation. While we did not analyze this question empirically, our theoretical arguments indicate that for ambidexterity to be effective in the long run, firms need to combine *capability-building processes* (to balance exploration and exploitation) and *capability-shifting processes* (to adapt this balance to the changing requirements). While balancing capabilities are well developed in the ambidexterity literature (Raisch and Birkinshaw 2008), further research is needed to identify the complementary adaptation capabilities at various organizational levels. At the individual level, managers and employees may require not only the ability to deal with conflicting elements in their task environments but also the ability to monitor their external environments in order to proactively adapt their exploration–exploitation activities (Boumgarden et al. 2012). At the team level, considerations regarding the team compositions, demographics, and processes, all of which enable ambidexterity (Lubatkin et al. 2006), may have to be expanded to include more dynamic aspects, such as the strategic use of member changes, rotational role assignments, and team boundary-spanning behavior to adapt a given exploration–exploitation balance. Finally, at the organizational level, top management teams may have to develop the ability to shift their attention and resource allocation in a timely manner while maintaining the checks and balances to avoid an excessive alignment with either of the extremes.

Finally, our dynamic perspective suggests that ambidextrous firms may benefit from two distinct effects on long-term performance. Prior ambidexterity studies accentuate exploration and exploitation's *complementary returns* (O'Reilly and Tushman 2013, Smith and Lewis 2011). The pursuit of exploration and exploitation over time can enable synergies between the dual learning processes (Farjoun 2010), which contribute positively to long-term performance (Raisch et al. 2009). However, ambidextrous firms can also benefit from *coalignment returns* (Gulati and Puranam 2009, Posen and Levinthal 2012). If they have the ability to adapt their exploration–exploitation balance to changing environmental conditions, such firms could ensure their activities' dynamic fit or alignment with the contextual requirements, which has been related to superior long-term performance (Miller 1992). Our theoretical arguments and empirical evidence in this study suggest that most firms maximize their long-term performance if they have the ability to leverage both of these performance drivers rather than focusing on just one.

Overall, the essence of a more integrative conception of managing exploration and exploitation dynamically is that organizations have the ability to operate

in and move flexibly between capability-building and capability-shifting modes. This dual capability provides them with the full arsenal of strategies required to master evolutionary times as well as to survive episodes of discontinuous change. This special breed of ambidextrous firms not only benefits from exploration and exploitation's mutually enabling forces (Farjoun 2010) but also reaps the returns from dynamic alignment with their shifting contexts (Zajac et al. 2000). As much as they engage in adaptive learning over time, these firms walk a tightrope between stability and change to enable learning from experience (Levinthal and March 1993).

Limitations and Future Research

We acknowledge limitations to our study, which open up interesting areas for future research. First, despite our efforts to account for endogeneity, unobserved variables or selection effects may still affect the validity of our results. For example, unobserved constructs related to organizations' structure (e.g., modularity) could affect firms' exploration–exploitation balance as well as its stability or change over time. The optimal approach to deal with such limitation—randomly assigning different exploration–exploitation allocations to firms in an experimental setting—is not feasible given the nature of ambidexterity as an endogenous firm-level capability. We therefore encourage future research to examine any alternative explanations for the evolution of firms' exploration–exploitation balance.

Second, this paper studies ambidexterity in the insurance industry and at the organizational level. In keeping with this context, we operationalized exploration, exploitation, and ambidexterity by means of a content analysis of press releases. While we applied multiple methods to ensure that our operationalization does not have a systematic bias, our measurement nevertheless has limitations. For example, firms might withhold information on exploratory actions for confidentiality reasons. Future research could therefore review the robustness of our findings and use an alternative operationalization—for example, patent or other domain-specific measures (Katila and Ahuja 2002, Lavie and Rosenkopf 2006). Furthermore, future research could apply such alternative operationalizations to industry settings other than insurance.

Third, our study builds on the assumption that performance effects result from the fit or misfit of firms' exploration–exploitation allocation with their environmental conditions. Given prior work's findings (e.g., Jansen et al. 2006) and the contingency theory's contributions (e.g., Drazin and Van de Ven 1986), we deem this assumption adequate but emphasize that we did not test it empirically. Future research could test how firms adapt their exploration–exploitation balance

subsequent to environmental change and how such changes influence performance.

Conclusion

In this study, we analyzed the evolution of firms' exploration–exploitation balance. Our findings show ambidexterity's promise and perils. While we generally advise managers to balance exploration and exploitation, we also caution them to stay adaptive and continue to adjust their firm's exploration–exploitation allocation to the changing environmental conditions. However, balancing exploration and exploitation dynamically may be challenging, since it forces managers to simultaneously address multiple tensions: First, they need to host and harmonize the conflicting exploration and exploitation requirements. Second, they need to withstand the temptation to continue their current, successful paths in favor of (more challenging) adaptations. Third, they need to maintain their long-term focus on both exploration and exploitation while temporarily aligning and realigning their activities with the environmental requirements. However, we are confident that future research will shed more light on how organizations combine capability-building and capability-shifting processes to balance exploration and exploitation over time without being locked into self-reinforcing cycles that affect their performance negatively.

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Endnotes

¹ This differs significantly from the formal modeling perspective, which describes the exploration–exploitation tension as a trade-off or zero-sum game (March 1991, Posen and Levinthal 2012).

² One could equally use formal modeling arguments to develop theory on the evolution of firms' exploration–exploitation allocation (τ) over time, which we conceptualize as a policy choice made while firms face uncertainty regarding the optimal level of τ . Over sequential choices, firms experiment with different levels of τ and, therefore, accumulate more knowledge about the performance function underlying τ . Since prior work showed that, *ceteris paribus*, intermediate levels of τ are associated with superior performance (Posen and Levinthal 2012), the more knowledge firms accumulate over time about the performance function underlying τ and the more they move toward intermediate levels of τ (where performance effects are greatest), the lower the adaptation to this balance in the following period. Overall, formal modeling arguments thus also describe a self-reinforcing effect over time; however, this effect is explained by reinforcement learning processes but not by processes related to defensive leadership actions, organizational inertia, and complementary performance outcomes. The formal modeling literature therefore provides an additional argument in support of our proposed reinforcement effect.

³ We acknowledge that the single-industry design decreases the generalizability of our findings to contexts outside the insurance industry but deem it necessary to ensure our findings' validity. This is especially true as our measure for exploration and exploitation is highly dependent on industry-specific activities and disclosure standards.

⁴ Since firms' communication styles may also change over time, we calculated a three-year moving average of firms' exploration and exploitation words and subtracted it from the word count in each press release. This did not affect our results materially.

⁵ Compared with the coding results of Uotila et al. (2009), we obtain a higher Cohen's kappa. We assume that this is the case because relying on firm press releases (rather than on external newspaper articles) alleviates one source of potential coding error (i.e., press articles with a firm name in the headline may not necessarily, or exclusively, describe this firm's activities).

⁶ Given the scale correction in our exploration–exploitation word count in each press release, we reset the zero point to the most negative exploration/exploitation word count in respect of each firm.

⁷ According to the organizational learning literature (Haunschild and Sullivan 2002), aggregating three periods is a standard approach to measuring organizational learning, such as exploration and exploitation, in complex settings.

⁸ Short-term firm performance was operationalized in terms of a one-period RoE.

⁹ As a robustness check, we calculated firm fixed effects models by using the Huber–White sandwich estimator with robust clustered standard errors. The results of these fixed effects models were consistent with the ones obtained in the GLS models. See Tables A1 and A2 in the online supplement for further details.

¹⁰ This particularly applies to our firm performance models. If we adopt an annual structure and the recommended three-period approach (Haunschild and Sullivan 2002), our models span a total of six years (three-year averages for firms' explorative and exploitative actions and three-year averages for firms' long-term performance). Given the simultaneity of firms' diverse explorative and exploitative actions and prior conceptual arguments on exploration and exploitation in the financial services industry (Jansen et al. 2006), such a long time frame may lead to inaccurate results. We therefore expect the quarterly approach to be superior to the annual approach, especially when evaluating exploration and exploitation's performance outcomes over time.

¹¹ Our activity-focused exploration–exploitation measure (see also Table 1) indicates that, on average, insurance firms conducted 11 different exploration- or exploitation-related activities per year.

¹² In all the models predicting a change in firms' exploration–exploitation allocation, the independent and control variables are lagged by one period (i.e., $|\text{exploitation}_{t-1} - \text{exploitation}_t|$; independent and control variables in $t - 1$).

¹³ The significant homogeneity of the firms in our sample may explain the insignificance of several of our control variables. As mentioned earlier, this homogeneity ensures the validity of our exploration–exploitation measure.

¹⁴ For further details, see Table A3 in the online supplement.

¹⁵ This model also includes firm fixed effects and time effects.

¹⁶ For further details, see also Table A4 in the online supplement.

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