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DELAYING CHANGE: EXAMINING HOW INDUSTRY AND MANAGERIAL TURBULENCE IMPACT STRUCTURAL REALIGNMENT

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This paper examines when firms pursue structural realignment through business unit reconfiguration, specifically by recombining business units. Our results refine and extend contingency theory and studies of organization design by drawing on theories of decision avoidance and delay to describe environmental conditions when firms pursue or postpone structural realignment. Our empirical analysis of 46 firms from 1978 to 1997, operating within the U.S. medical device and pharmaceutical sectors, demonstrates that while decision makers initiate structural recombination during periods of industry growth (i.e., munificence), they reduce their recombination efforts during periods of industry turbulence (i.e., dynamism), and managerial turbulence (i.e., growth in top management team size). We also find evidence that firms delay realignment and bide their time for better environmental conditions of declining turbulence and industry growth before pursuing more structural realignment. Together, these findings suggest that decision makers often delay initiating structural recombination until they can effectively process information and assess how structural changes will help them realign the organization to the environment.

INTRODUCTION

This paper asks a fundamental question in organization theory—how and when do firms align their structures with environmental changes? Contingency theory suggests that firms, when faced with changing external conditions, should realign to gain fit with their environment and better capture market opportunities (Donaldson, 1987; Duncan, 1972; Hofer, 1975). One mechanism by which to achieve this realignment is to redesign the structure of the organization (Burns & Stalker, 1961; Miller & Friesen, 1984; Thompson, 1967; Woodward, 1965). The perspective we develop in this paper builds on the conceptualization of organization design (i.e., and its redesign) "as something that organizations *do*, rather than merely as something they *have*" (Orton & Weick, 1990: 218; italics added by authors). Although contingency theory's expectations of *how* to realign (e.g., through structural change) are generally supported in the literature, our understanding of when firms make these decisions is less well established. In this paper, we address this issue by examining a series of factors that influence *when* firms choose to initiate and enact structural realignment decisions. We draw upon decision-making and group dynamics research to inform contingency theory about expectations relating to the speed of decision making and consensus-building within executive teams.

We examine this general, theoretical question about structural realignment by evaluating when and how firms recombine their business units (Eisenhardt & Brown, 1999; Karim, 2006). In developing and modifying their organizations' designs through structural

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recombination, decision makers attempt to create or enhance value by reconfiguring their firms' existing resources (Karim, 2009; Karim & Kaul, 2015; Karim & Capron, 2015). A "recombined" unit is any unit that has experienced a change in boundaries through some addition or deletion of activities and resources that have been moved within the firm. We focus on structural recombination in this paper because firms routinely use this mechanism to redistribute resources inside the organization in order to regain congruence or alignment with changes in environmental conditions. Unit boundaries expanding and contracting indicate a firm's efforts to reallocate existing resources (Karim, 2012). Thus, examining structural recombination allows us to take a close look at the processes behind organization design changes.

Because structural recombination can often represent costly and risky initiatives, it is important to understand what factors influence decision makers to use this mechanism to achieve realignment with their environments (Helfat & Karim, 2014). Drawing on existing contingency theory studies, we expect that decision makers' perceptions of environmental industry growth should increase recombination initiatives. However, whereas classic contingency theory suggests that industry turbulence may also trigger this realignment, we identify information processing challenges that inhibit executives from engaging in structural recombination during periods of environmental industry turbulence (i.e., when relationships between key performance antecedents and indicators change very rapidly).

We use research from the decision-making literature (Dobrajska, Billinger, & Karim, 2015) on decision avoidance and delay to explain these dynamics (Anderson, 2003). Specifically, we argue that because strategic decision makers in turbulent industry environments are unable to collect and process the information necessary to assess cause-and-effect relationships, they cannot develop decision-making strategies to effectively predict how structural changes can positively influence firm performance. The resulting difficulties they experience in identifying organizational forms that are appropriate for environmental contingencies decrease their overall willingness to engage in structural recombination during periods of environmental turbulence (Davis, Eisenhardt, & Bingham, 2009; Siggelkow & Rivkin, 2005).

Because structural realignment decisions are usually made by the top management team (TMT) Galunic & Eisenhardt, 2001; Helfat & Karim, 2014), we also examine how factors within these collectives may foster or inhibit firms' tendencies to recombine business units. We specifically demonstrate how executive turnover and increases in overall TMT size decrease the overall level of structural recombination that firms engage. Here, we translate research on decision delays in groups to theorize how these two factors limit the capacities of TMTs to build the levels of consensus and commitment necessary to identify appropriate organizational forms and initiate structural recombination (Amason & Sapienza, 1997; Bavelas, 1951; Dooley, Fryxell, & Judge, 2000; Eisenhardt, 1990).

By examining the influences of both external industry (i.e., market) turbulence and internal managerial (i.e., within TMTs) turbulence on firms' tendencies to initiate structural recombination, our theory refines arguments put forth by contingency theorists and organization design scholars about how and when firms align their structures with their environments (Duncan, 1972; Lawrence & Lorsch, 1967; Thompson, 1967). While general contingency theory suggests that firms initiate structural realignment to adapt to environmental changes, our research demonstrates that firms tend to delay the initiation of structural recombination until industry turbulence lessens and decision makers are able to more effectively assess how these structural changes may benefit the firm (Burns & Stalker, 1961; Miles & Snow, 1978; Miller, 1988; Mintzberg, 1979; Siggelkow & Rivkin, 2005). Further, we find that turbulence in TMTs created by overall size increases leads to less realignment activity. We suggest that this happens because executives are less able to process environmental information and build consensuses around key organizational design decisions (Bourgeois & Eisenhardt, 1988; Shank, Zeithaml, Blackburn, & Boyton, 1988; Sutcliffe, 1994).

The empirical setting for this study is the medical marketplace and includes 28 (4-digit North American Industry Classification System [NAICS]) market segments within the medical device and pharmaceutical sectors. We observe 46 firms over the period 1975–1997. For each firm we track its structural evolution noting how the firm adds, deletes, and recombines its business units; we also trace the movement of executives into and out of a firm's TMT. To evaluate environmental change, we examine the growth and turbulence present in the industries in which these firms are active, as well as changes in their TMTs.

The paper is organized as follows. It begins by drawing from literatures on contingency theory, decision making and organization design to develop several hypotheses about the conditions under which firms facing turbulence will initiate structural recombination. This is followed by a description of our methods and measures which outline the data and sample, the operationalization of variables, and the methodology of this study. Finally, the paper concludes with a presentation of results and a discussion of our findings.

LITERATURE AND HYPOTHESES

Structural Realignment

The question of how best to organize firms has long held the interest of organization design scholars (Galbraith, 1977; Lawrence & Lorsch, 1967; Thompson, 1967). Because "organizational design is one of the key levers available for top managers to affect how decisions are made within organizations" (Siggelkow, 2011: 1130), a significant amount of research in organization theory has been dedicated to understanding how decision makers can navigate their firms through changing environments to achieve an optimal organization design. Classic organization design studies were built on the premise that efforts to coordinate work (or tasks) should be integrated into a common structure (or unit) to facilitate information processing and the effective implementation of strategic initiatives (Chandler, 1962; Galbraith, 1973; Mintzberg, 1979; Tushman & Nadler, 1978).

Contingency theorists interested in organization design depict the challenge that firms face by describing how they adapt their structures to better align with changes in external environments (Duncan, 1972; Lawrence & Lorsch, 1967; Thompson, 1967). Classic contingency theory proposes that firms perform better when they align themselves to better fit key factors in their environments, and that environmental changes should lead firms to initiate structural changes (Donaldson, 1987; Duncan, 1972; Hofer, 1975). Related studies adopting this perspective have highlighted how different design characteristics are more or less appropriate for different strategic environments (Burns & Stalker, 1961; Miles & Snow, 1978; Miller, 1988; Mintzberg, 1979; Siggelkow & Rivkin, 2005), either because they allow firms to better utilize resources (Lawrence & Lorsch, 1967; Thompson, 1967) or process information (Galbraith, 1973; Tushman & Nadler, 1978).

Structural Realignment as Business Unit Recombination

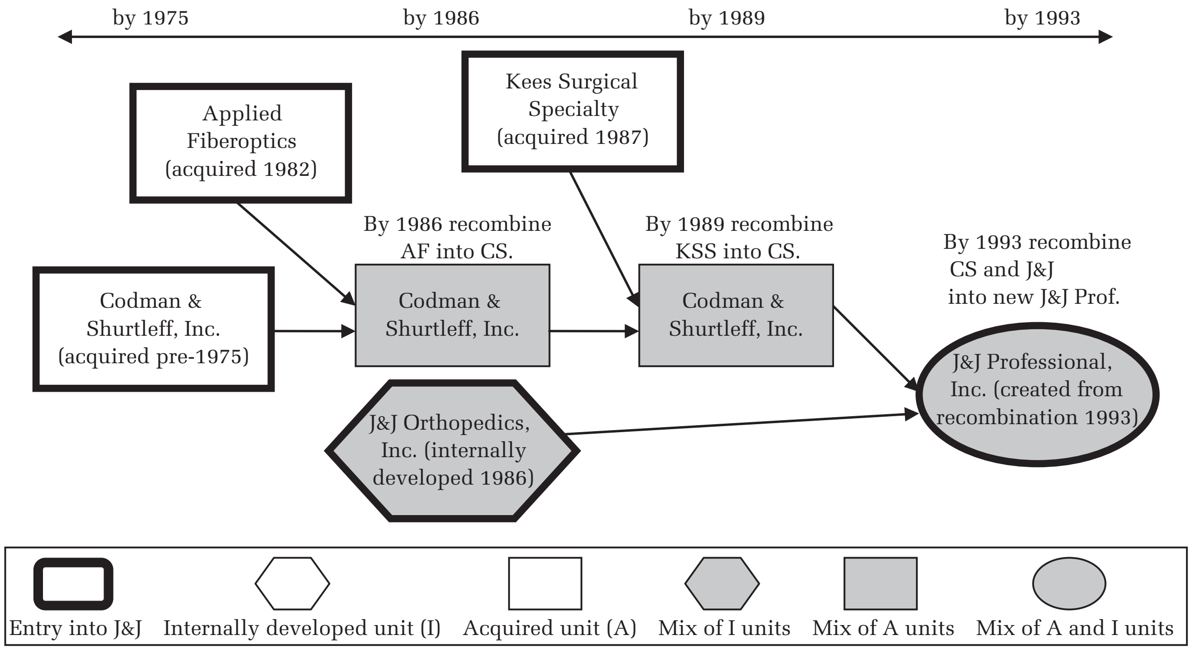
While scholars have made significant progress in understanding how organizations can achieve an appropriate fit with their environment, we know much less about the processes that organizations take to get there. Over the past decade, however, scholars who have examined how organizations respond to changes in their environments have devoted increasing levels of attention to understanding how firms use structural recombination to capitalize on new market opportunities (Karim, 2009; Karim & Kaul, 2015; Karim & Mitchell, 2004). In contrast to more traditionally defined restructuring activities where firms attempt to enter into or exit from markets by adding (i.e., acquiring) or deleting (i.e., divesting) business units (Bowman & Singh, 1990; Hoskisson & Johnson, 1992; Porter, 1987),[1] structural recombination describes initiatives that firms undertake to reorient how they organize their existing resources and activities (Karim, 2006, 2009).

While comprising one common way that firms reconfigure themselves to react to their environment (Karim & Capron, 2015), firms also use structural recombination to proactively seek opportunities and realign their structures with environmental demands in ways that allow their business units to better utilize resources and organize activities (Karim, 2012; Karim & Williams, 2012). Although these activities can be disruptive to organizations, previous research has shown how firms can use structural recombination as dynamic capabilities to adapt to their environments and allow them to increase levels of innovation and overall firm performance (Karim, 2009; Karim & Kaul, 2015).

To illustrate how these activities impact firm evolution, we describe a segment of Johnson and Johnson's (J&J's) history where the firm engaged in structural realignment activities through a series of recombinations (Karim & Mitchell, 2004). Figure 1 depicts a sequence of structural recombinations within (J&J) as it reconfigured its structural organization to respond to market demands over a 20-year period. Between 1982 and 1989, J&J recombined its units Applied Fiberoptics and Kees Surgical Specialty with Codman & Shurtleff to bolster its market position in neurostimulators and orthroscopes. Then, to have greater impact in the general orthopedic market as a whole, in 1993 J&J recombined Codman & Shurtleff with J&J Orthopedics to form the division J&J Professional. Through these realignment activities, J&J succeeded in growing its overall presence and market share in orthopedics.

[1] Note that we are not directly examining why firms add or shed activities since there is an established body of work on corporate restructuring that already addresses these issues. We do, however, account for these other forms of structural change (i.e., adding and shedding) in our study and explain more about this in our Methods section.

FIGURE 1
Examples of Business Unit Reconfiguration (including recombination) at J&J, Inc. (modified from Karim, 2009)



Industry Growth and Structural Realignment

Classic contingency theory proposes one way to generalize these dynamics by suggesting that firms that do not align with the demands or volatility of their industries should alter their structures and attempt to regain and maintain an effective "fit" with their environment (Donaldson, 1987; Duncan, 1972; Hofer, 1975). Building from this proposition, scholars have demonstrated that firms facing more dynamic environments are most effective when they enable flexibility and experimentation by using more organic structures, while firms facing less dynamic environments are more successful when they adopt more routinized structures that encourage stability and consistency (Burns & Stalker, 1961; Miller & Friesen, 1984; Thompson, 1967; Woodward, 1965).

Prior work developed from this perspective describes how firms use structural recombination to bring resources and activities together in ways that reveal new synergies and address strategic prospects (Eisenhardt & Brown, 1999; Galunic & Eisenhardt, 1996; Galunic & Rodan, 1998). For example, Galunic and Eisenhardt (1996) found that firms' decision makers often used recombination as a means of moving "charter" (i.e., market) responsibilities between business units to foster a "dynamic realignment" between a firm and its market opportunities. In addition, Eisenhardt and Martin (2000), in describing a "patching" process that is similar to structural recombination, observe that firms will attempt to develop their dynamic capabilities through "processes that use resources…to match and even create market change" (p. 1107).

Building from these observations, we expect that executives will consider industry growth, labeled "munificence," as a favorable, but dynamic environmental condition that encourages them to initiate increased numbers of structural recombinations. As a common characteristic highlighted in studies of environmental change (Dess & Beard, 1984; Nadkarni & Barr, 2008; Sutcliffe, 1994), munificence represents a strong and clear indicator of industry growth (Bergh, 1998; Dess & Beard, 1984; Sharfman & Dean, 1991) that can serve to signal that market conditions are abundant with opportunities for firms that adapt and capitalize on them. Thus, we expect that firms in industries that are growing will be proactive in using structural recombination to adapt in ways that enable them to capture potential economic gains that are present in these markets.

Hypothesis 1. Industry growth experienced by a firm in its environment has a positive relationship with the firm's degree of structural recombination.

Industry Turbulence and Structural Realignment

Having established that firms in munificent environments will tend to recombine their structures in ways that allow them to capitalize on perceived opportunities, we now turn our attention to how firms experience turbulent environments. While Hypothesis 1 outlines a positive relationship between industry growth and structural recombination, the arguments below describe that, while predictable, the process by which firms engage in structural recombination is neither linear nor continuous.

In Hypothesis 2, we predict that firms will less frequently engage in structural recombination during periods of environmental turbulence (Bourgeois & Eisenhardt, 1988; Duncan, 1972; Nadkarni & Barr, 2008; Perlow, Okhuysen, & Repenning, 2002). Environmental turbulence describes how rapidly the links between particular actions and key performance indicators can change (Siggelkow & Rivkin, 2005). This can occur, for example, in environments where a number of important contingencies evolve so rapidly that the information decision makers require to formulate strategic decisions is routinely incomplete or obsolete (Eisenhardt & Bourgeois, 1988).

Our ideas on this build from decision-making research on avoiding and delaying decisions (Anderson, 2003). This research suggests that actors tend to avoid decisions when selecting an appropriate course of action becomes too complicated or difficult for them (Dhar & Sherman, 1996; Tversky & Shafir, 1992). These "selection difficulties" (Anderson, 2003) tend to occur when option sets change so rapidly that they hamper actors' capacities to identify appropriate decision-making strategies and formulate clear preferences. Under these conditions, decision makers cannot effectively evaluate the range of potential options that they must consider in formulating potential solutions to problems (Beattie, Baron, Hershey, & Spranca, 1994; Dhar, 1996, 1997). As a result, they tend to defer decisions, exhibit omission biases (prefer decisions that do not require actions), and act to maintain the status quo (Anderson, 2003).

Prior research on strategic change describes factors in turbulent environments that are consistent with these dynamics and generate decision avoidance and delays. As Bourgeois and Eisenhardt (1988) suggest, "Strategic decision making is problematic in this kind of (i.e., turbulent) environment not only because change is so dramatic, but also because it is difficult to predict the significance of a change as it is occurring (Sutton, Eisenhardt, & Jucker, 1986). As a result, it is particularly easy to make poor strategic judgments. A traditional way to avoid strategic errors is to simply wait to see how events unfold. . ." (1988: 817).

We anticipate that firms facing such environmental turbulence will respond to the relatively high level of uncertainty they face either by making only incremental design changes or by delaying entirely the initiation of structural recombination to alter their designs (Nickerson & Zenger, 2002). Several studies on decision making in turbulent and high velocity environments propose factors that may combine to retard or delay the tendencies of key decision makers to initiate structural recombination (Davis et al., 2009; Dess & Beard, 1984; Sharfman & Dean, 1991). Overall, they suggest that designing components of organizational structures during periods of environmental turbulence is "an attention-consuming and mistake-prone process (Hatch, 1998; Weick, 1998)" (Davis et al., 2009: 414) that requires time-intensive efforts at sense-making (Weick, 1993). Decision makers in turbulent environments often find it difficult to identify robust cause-and-effect relationships because critical decision variables are either unreliable or unavailable (Aldrich, 1979; Fredrickson, 1984; Galbraith, 1973; Nutt, 1976; Thompson, 1967). In addition, even when decision makers are able to gather and analyze information, they may often lack the time to identify and process the sometimes large amounts of information necessary to decide how their firms' designs should be altered (Bourgeois & Eisenhardt, 1988; Fredrickson, 1984; Perlow et al., 2002; Quinn, 1980).

Several other studies highlight how these factors may combine and increase unpredictability to such a level that firms delay because decision makers are paralyzed in making structural realignment decisions. Decision makers in these environments can suffer from "threat-rigidity," which tends to make them more risk-averse and contributes to their tendencies to avoid decisions (Bergh, 1998; Keats & Hitt, 1988; Rivkin & Siggelkow, 2003). Under these conditions, both their willingness and their ability to process non-routine information will significantly decrease (Chattopadhyay, Glick, & Huber, 2001; Gilbert, 2005; Staw, Sandelands, & Dutton, 1981). As a result, executives will tend to process information using familiar perspectives, rely more on authority and control mechanisms to reinforce existing structures, and experiment less with changing their organization's design through structural recombination (Bourgeois & Eisenhardt, 1988; Bourgeois, McAllister, & Mitchell, 1978; Chattopadhyay et al., 2001; Gladstein & Reilly, 1985; Hambrick & Mason, 1984; Thomas, Clark, & Gioia, 1993).

Scholars who acknowledge the information processing challenges present in turbulent (i.e., high "dynamism"[2]) environments have observed that these factors can specifically hinder the capacity of decision makers to develop timely changes to the overall design of their firms (Davis et al., 2009; Dess & Beard, 1984; Sharfman & Dean, 1991).[3] For example, Davis and colleagues (2009) who examine the influence of environmental changes on organizational structures conclude that optimal "amounts" of organizational structure decrease as environments become less predictable. Under these conditions, environmental turbulence compromises decision makers' capacities to identify the factor patterns that are critical to determining which structural recombinations may be most effective within a particular strategic environment.

Building on this discussion, our second hypothesis describes how environmental industry turbulence can decrease a firm's tendency to engage in structural recombination. Because these activities may be disruptive (Karim, 2009; Karim & Kaul, 2015), we expect that firms facing increased turbulence may be less likely to try these organization design initiatives.[4] Thus, as decision makers facing turbulent environments question whether realignment via structural recombination will produce long-lasting, positive effects on firm performance, we expect that they will be less likely to initiate these types of structural changes.

Hypothesis 2. Industry turbulence experienced by a firm in its environment has a negative relationship with the firm's degree of structural recombination.

Drawing further on contingency arguments that firms benefit by evolving with their environments, we also argue that firms will engage in higher levels of structural recombination once the level of environmental turbulence they face begins to lessen (Bourgeois et al., 1978: 508; Davis et al., 2009; Rivkin & Siggelkow, 2003). As the volatility of markets lessens, the information collected by decision makers becomes more consistent and stable, allowing for faster information processing and decision making (Galbraith, 1973, 1977). Under these conditions, decision makers increase their relative capacity to analyze the strategic environment and gain greater confidence in their analysis of their organizational structure. With this confidence, decision makers will gain a greater capacity to develop decision strategies and a willingness to evaluate decision options. These developments will decrease the perceived value of maintaining the status quo and increase the perceived connections that decision makers see between structural realignments and firm performance gains. Because these actors will be more inclined to believe that structural realignment will have a longer-term, positive impact on firm performance, they will be more willing to initiate structural change through recombination. Stated differently, in some contrast to Hypothesis 2 where we argue that the *absolute* level of market turbulence will negatively impact structural recombination, we also expect (in Hypothesis 3a) that a *rate of decline* in this turbulence will positively impact structural recombination initiatives.

Even in situations where environmental turbulence is relatively high, a reduction in turbulence represents a positive signal about the future predictability of one's environment (Nadkarni & Barr, 2008; Sutcliffe, 1994). Thus, in addition to expecting that reductions in turbulence will be associated with increased structural recombination, we anticipate that these reductions will also dampen the negative relationship between the absolute levels of industry turbulence that firms encounter and their tendencies to engage in structural recombination.

[2] Please see Sharfman and Dean (1991) for an overview of classifications of organizations' environments.

[3] Based on prior research, we assume that decision makers are aware of their external environment (Daft, Sormunen, & Parks, 1988; Eisenhardt, 1989; Garg et al., 2003; Nadkarni & Barr, 2008), thus deterrence is not due to lack of awareness.

[4] Also noteworthy is empirical evidence that demonstrates how delays in organizational design decisions can result in relatively higher levels of firm performance. For example, in a simulation of structural change and performance, Nickerson and Zenger (2002) found that higher levels of inertia could result in higher levels of performance when that inertia prevented managers from making premature changes to their structures. In addition, Rivkin and Siggelkow (2003) who model the interdependence of elements of organization design (including design of hierarchy, divisionalization, and limits on the ability of managers to process information), observe that while higher performing firms actively search for good strategic solutions, they do not prematurely implement their decisions. Consistent with these observations, Davis and colleagues (2009) surmise that "...adding structure is ineffective in [a turbulent] environment because there is little predictable pattern in the flow of opportunities that managers can use to adjust their organizational structures to the environment" (Davis et al., 2009: 436).

Hypothesis 3a. Reductions in industry turbulence experienced by a firm in its environment have a positive relationship with the firm's degree of structural recombination.

Hypothesis 3b. Reductions in industry turbulence experienced by a firm in its environment will dampen the negative relationship between industry turbulence and the firm's degree of structural recombination.

In addition to explicit reductions in industry turbulence, we also expect that executives will consider industry growth (i.e., munificence) as a favorable signal of environmental conditions. Thus, we expect that for conditions of both high industry turbulence and high industry growth, munificence will dampen the negative relationship between industry turbulence and structural recombination. The primary reason for this is that executives in growing industries will perceive environmental turbulence as relatively less threatening when compared to executives in firms that face stagnant or shrinking demand. They will, thus, be more motivated to develop and implement decision strategies that enable them to evaluate options around initiating structural realignments (Dhar, 1996, 1997).

As a common characteristic highlighted in studies of environmental change (Dess & Beard, 1984; Nadkarni & Barr, 2008; Sutcliffe, 1994), munificence represents a strong and clear indicator of industry growth (Bergh, 1998; Dess & Beard, 1984; Sharfman & Dean, 1991) that can serve to signal that market conditions are abundant with favorable opportunities. As we argued earlier in advance of Hypothesis 1, munificence signals to decision makers that they are not in "danger" (Bourgeois et al., 1978), and that opportunities to capture additional market share are available. Even if the overall level of turbulence that firms experience is high, we expect that firms will react positively to conditions of industry growth and be relatively more proactive in realigning their structures to capture these opportunities for economic gains.

Hypothesis 4. Industry growth experienced by a firm in its environment will dampen the negative relationship between industry turbulence and the firm's degree of structural recombination.

Managerial Turbulence and Structural Realignment

While our discussion so far highlights the environmental conditions external to the firm that may hinder that ability and willingness of decision makers to pursue structural recombination, it is also logical to conclude that turbulence *within* the firm may also delay these realignment processes. Below, we build on decision avoidance and group dynamics research to specifically describe how changes in TMT size and composition may lead firms to delay the initiation of their structural recombination efforts.

We focus on these issues because research highlights how the interests and perceptions of executives directly influence how a firm directs its attention, conducts searches, evaluates problems, and generates solutions (Child, 1972; Cyert & March, 1963; Hambrick, 1994; Hambrick & Mason, 1984; March & Simon, 1958; Ocasio, 1997). As previous studies of organization design have shown, executives play a critical role in reshaping organizations to create better alignment with their environments (Brown & Eisenhardt, 1998; Galunic & Eisenhardt, 1996; Nadler & Tushman, 1997). For example, Galunic and Eisenhardt comment that ". . .because executives are more likely than others to have broad architectural knowledge of their firm and are arguably the only ones with the formal power and clout to effect such changes, their involvement is key" (2001: 1246). Child (1972) also stressed the role of executives in formulating and implementing strategic choices by identifying them as key mediators between structural alignment decisions and environmental conditions (such as the allocation of resources or whether to split the firm into smaller units).

Bourgeois and Eisenhardt note that while "decisions should be a product of management team involvement and consensus (Bavelas, 1951; Bourgeois, 1980; Leavitt, 1951). . .particularly under conditions of high uncertainty" (1988: 818), it takes time to generate the consensus necessary to initiate these structural changes. Several computational studies evaluating group decision making have shown how personnel changes within decision making groups can affect the breadth of the search and solution alternatives that groups consider (Siggelkow & Rivkin, 2005) and the overall number of strategic initiatives pursued by the firm (Csaszar, 2012). Because firms tend to value efforts to generate consensus among members of the TMT (Dooley et al., 2000), we expect that turbulence in the form of executive turnover and growth of the TMT will delay the extent to which they will realign their structures with environmental contingencies and reduce the overall degree to which firm will engage in structural recombination.

Managerial turbulence as TMT turnover. "One of the most frequently occurring but daunting challenges for teams is personnel turnover" (Thompson, 2004: 96). As members enter and exit the TMT, both the expertise and the interpersonal dynamics of the group change (Wiersema & Bantel, 1992). Because the process of formulating and implementing structural recombination comprises a complex set of tasks that occurs between often highly interdependent individuals, the entry and exit of TMT members often significantly compromises the overall capacity and speed with which these teams process information relevant to the initiation of structural recombination (Argote, Insko, Yovetich, & Romero, 1995; Briggs & Naylor, 1965).

Changing preferences that are introduced by the loss or gain of members force TMTs to engage in the often time-consuming activity of reformulating decision strategies. This can increase the perceived difficulty of selecting appropriate responses to environmental contingencies which can lead TMT members to delay the initiation of structural changes in favor of upholding the status quo (Anderson, 2003). Under these conditions, TMTs find it more difficult to generate the robust levels of consensus and commitment that are necessary to initiate and effectively implement structural recombination (Dooley et al., 2000).

Hypothesis 5a. Managerial turbulence—in the form of TMT turnover—has a negative relationship with the firm's degree of structural recombination.

Managerial turbulence as TMT growth. Hambrick and D'Aveni (1992: 1449) also argue that TMT size is an important consideration because "at a basic level, the resources available to a team result from how many people are on it." As TMT size increases, the growing numbers of members tend to generate and actively consider a larger number and a more diverse set of issues (Cho & Hambrick, 2006; Weick, 1987). While important for fostering creativity and decision comprehensiveness (Weick, 1987), larger TMTs tend to generate greater numbers of opinions and perspectives (Dearborn & Simon, 1958) on key strategic issues which retards the capacity of these collectives to build consensuses around potential sets of structural solutions (Hambrick, Cho, & Chen, 1996; Shank et al., 1988; Sutcliffe, 1994).

As numbers of members increase, the capacity of the TMT to resolve issues around key points of contention also tends to decrease. Through often prolonged debates over issues, larger TMTs tend to generate higher levels of cognitive and affective conflicts that further erode their capacity to agree on appropriate responses to environmental contingencies (Amason & Sapienza, 1997; Eisenhardt, 1999; Eisenhardt & Schoonhoven, 1990). In addition, the negative effect produced by these conflicts can significantly increase the perceived risks of proposed structural changes to the status quo which will augment the perceived value of inaction and further delay the initiation of structural recombination (Anderson, 2003).

Hypothesis 5b. Managerial turbulence—in the form of executive TMT growth—has a negative relationship with the firm's degree of structural recombination.

In summary, although contingency theory proposes that firms will realign to match their changing environments, a theory of group dynamics on decision making supports the idea that this realignment may be deterred or postponed until more opportune times. When observing industry turbulence, we argue that efforts to pursue structural realignment may occur when there are reductions in turbulence or when firms experience industry growth. Further, we highlight that turbulence among decision makers may also delay how rapidly firms align to their environments and hypothesize that executive turnover and growth of top management team size will inhibit building consensus around decision making and deter the extent to which firms engage in structural recombination activities. The hypotheses we present that describe these relationships are summarized in Figure 2.

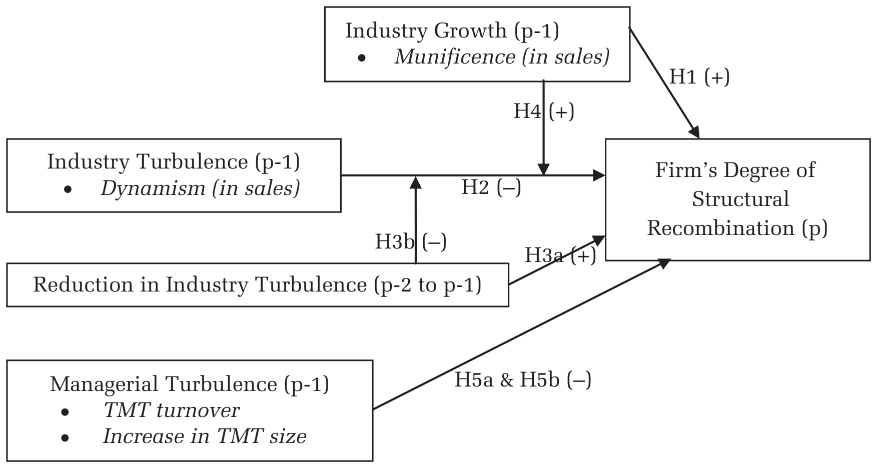
METHODS AND MEASURES

Data and Sample

Studying structural recombination and its relationship with turbulence requires a longitudinal sample (Miles, Snow, & Pfeffer, 1974). We gathered data from several editions of the *Medical & healthcare marketplace guide*, namely those published in 1978, 1983, 1986, 1989, 1993, and 1997.[5] The guides include information concerning U.S. and non-U.S. firms operating in the U.S. medical marketplace. For each firm, the

[5] "*The medical & healthcare marketplace guide*" was published by International Bio-Medical Information Services, Inc. (Acton, MA, and Miami, FL; ed. Adeline B. Hale and Arthur B. Hale) in 1975, 1978, 1983, 1986, and 1989. Subsequent editions have been published by MLR Publishing Company (Philadelphia, PA) and by Dorland's Biomedical Publications (Philadelphia, PA). We froze our data collection at 1997 since afterward the recombination data are no longer as detailed and eventually stop completely (by early 2000s).

FIGURE 2
Firm Realignment through Structural Recombination



guide denotes the business units that exist each year. A business unit is a structural component whose identity is recognized by the firm with a unique address and some responsibility for one or several product markets. The guide includes descriptions and histories of firms and their units. At the unit-level, there is information concerning the unit's product market activities, executives, location, origin (i.e., internally developed or acquired), and any recombination experienced by a unit. The firm-level information includes descriptions of unit divestitures, key personnel, key financials, nationality, date of incorporation, public or private status, as well as other characteristics.

The sample for this study is 46 firms of a mixed variety. To avoid sample bias, we initially began with 250 firms which exist in the 1978 panel, starting with letters A, B, and C.[6] These initial 250 firms were comprised of medical device, pharmaceutical, and healthcare service firms. This sample was reduced to 212 firms as we chose to focus on product firms only,[7] excluding the healthcare service firms. Next, because STATA requires at least two observations for fixed-effects models and the models include lagged terms (explained further in the Methodology section), this reduced the sample further to 111 firms.[8] To study our dependent variable (i.e., degree of structural recombination), we were only interested in firms with multiple units. This further reduced our sample to 48 firms. Of these 48 firms, ten firms did not survive to the end of the study period (1997) (i.e., eight were acquired and two dissolved). To avoid any bias from failure, we excluded the two failed firms from the study. However, because we do not view acquisitions as firm failures (Graebner & Eisenhardt, 2004), we included the eight firms that were acquired over the entire period studied. Thus, our final sample consists of 171 firm-period observations from 46 firms.

While this sample size may seem small for scholars that are used to working with a large "n," it is relatively large and unique for the granular study of structural change. Current studies in this area have utilized either simulation models or case-based examinations representing at most a handful of firms. In contrast, our sample includes several dozen firms,

[6] Randomly selecting 250 firms from the 1978 guide was considered to be as random as starting from the beginning of the alphabet. The only noticeable yet negligible bias of sampling from the beginning of the alphabet is that there are a greater number of domestic firms (27 firms starting with the term "American") and firms practicing in the medical device category (23 firms starting with the term "Bio" of which 19 were medical device firms, and ten firms starting with the term "Cardiac" of which nine were medical device firms). We do not have any reason to believe that the name of a firm should bias our results in any way.

[7] The guides had far more granular levels of categorization for product firms than for service firms.

[8] A minimum of two observations and lagged independent variables meant that we had to shrink our sample to the 111 firms that remained in 1989 of the 250 that we began with in 1978. For these firms, we were able to capture a first observation of reconfiguration between 1986–1989 with lagged independent variables between 1983–1986, and a second observation of reconfiguration between 1983–1986 with lagged independent variables between 1978–1983. If these firms survived beyond 1989, then we had more than two observations.

which allows us to attribute a relatively high level of generalizability for our findings. The descriptive statistics (see Table 1) of this sample support claims of its diversity; of the 46 firms, about half are diversified outside of the medical sector (21), about a third are private (17), and about a quarter have foreign parents (13), are not acquisition-active (14), and are active in pharmaceuticals (14) (versus medical devices). Lastly, we collected external, industry data on the 28 market segments (based on 4-digit NAICS codes) in which the 46 firms were active from Compustat (1973–1997 yearly)[9]—we describe these data more in the section on explanatory variables.

Variables and Operationalization

Dependent variable. The dependent variable for our hypotheses is "*degree of recombination*" within a period. This is a count variable of the number of unit boundary changes (i.e., expansion or contraction from moved resources and activities) that occur in a firm within a time period. If two units were combined then both had been structurally altered and this was counted as two recombination events. If product market activities were moved out of a unit and moved to another unit, this also was counted as two recombination events since the boundary of the initial unit became smaller and the other unit became larger. This exemplifies that in our setting it is appropriate to study both expansion and contraction of business units since both are indicative of the firm attempting to reallocate resources within the firm of the resources already at hand (Karim, 2012). A simple view of our operationalization is to imagine that all of the units of a firm were charted over the period of the study with arrows indicating when a unit boundary changed, and that the degree of recombination is the count of these arrows within a particular period. As an example, in Figure 1, for the period 1983–1986 we would calculate that there are two recombination events: (1) the boundary of Applied Fiberoptics changed as its unit was merged into Codman and Shurtleff, Inc, and (2) the boundary of Codman and Shurtleff, Inc also changed and grew to encompass the resources and activities of Applied Fiberoptics. Given that we have six panels of data, we observe five periods in our study: 1978–1983, 1983–1986, 1986–1989, 1989–1993, and 1993–1997.

Unit acquisitions and divestitures (during period "p"), which are choices made by firms to obtain new or discard existing resources and activities, were not considered recombination events in this study, as we are only interested in the redesign (i.e., redeployment, reallocation, redistribution) within the firm of what the firm *already* has to work with and continues to work with as it realigns. However, if a target that was acquired in period "p" is recombined into another unit in the *future* (e.g., during time period "p+1"), this would be considered a recombination event in that future period (e.g., during time period "p+1") since the target belonged to the firm for some period of time. Thus, the study acknowledges and tracks the eventual recombination of acquired units. In the example given in Figure 1, when Applied Fiberoptics was acquired by J&J in 1982, this event was not considered a recombination event when calculating our dependent variable for the period 1978–1983. However, this acquired unit was later combined with the Codman and Shurtleff unit by 1986, thus, this recombination was counted as an event when calculating our dependent variable for the period 1983–1986.

Explanatory variables. For Hypotheses 1, 2, and 4, our measures of external, industry growth and turbulence are drawn from Dess and Beard's (1984) commonly cited operationalization of industry "*munificence*" and "*dynamism*," respectively. Dynamism has been commonly referred to as industry instability, unpredictability, or turbulence (Sharfman & Dean, 1991; Wholey & Brittain, 1989). We chose to use these operationalizations since they are widely used by scholars (Garg, Walters, & Priem, 2003; Nadkarni & Barr, 2008; Sutcliffe, 1994) and we wanted to remain consistent with past studies on structural change (e.g., restructuring) (Bergh, 1998; Keats & Hitt, 1988). These constructs were originally comprised by Dess and Beard from Census data using four industry variables (namely industry sales, margin, value added, and total employment) and captured changes within industries (based on Standard Industrial Classification [SIC] codes)(Dess & Beard, 1984). Taking five-year Census data, they regressed each variable against time (the past five years) to determine the slope of the relationship:

$$y_t = b_0 + b_1 t + a_t \tag{1}$$

Munificence (i.e., growth) is the time coefficient estimate (β_1) (i.e., regression slope) from Equation 1

[9] We also collected industry data from the U.S. Bureau of the Census (1972–1996 in five year intervals), however because the periods did not match exactly with our reconfiguration periods, we present analysis in this paper of the more accurately matched data collected from Compustat.

divided by the variable's mean value (Bergh, 1998). Dynamism (i.e., turbulence) is the standard error of the time coefficient (β_1) divided by the variable's mean value. For Dess and Beard (1984), who used four Census variables to construct their measure, the munificence (or dynamism) construct was the *sum* of these four variables' munificence (or turbulence) measures. Because the Census data periods (1977–1982–1987–1992–1997) with five-year gaps do not often match scholars' study periods, it is common for scholars to use only industry sales—a measure that can be observed outside of Census data—instead of a four variable sum (Garg et al., 2003; Nadkarni & Barr, 2008; Sutcliffe, 1994). Similarly, we collected data on munificence and dynamism in industry sales from Compustat to match our study periods (i.e., 1978–1983–1986–1989–1993–1997).

After the munificence and dynamism measures were calculated for each of the 28 market segments (based on 4-digit NAICS codes) in our sample for the periods of our study, we then created a weighted munificence and weighted dynamism measure for each firm per period that averaged the munificence (or dynamism) felt by the firm in all of its markets (i.e., representing all of the 4-digit markets a firm is active in within that period). If a firm was only active in one market during period "p", then its level of industry growth (or turbulence) for that period "p" was simply the munificence (or dynamism) of that market for period "p". If a firm was active in five markets in period "p", we averaged the growth (or turbulence) of all five markets during that period. See Table 2 for an example of the dynamism calculations for external, industry turbulence experienced by a firm. We construct a "weighted" average of both industry growth and turbulence per firm per period. Recall that the guides are extremely granular in listing the product markets of firms; this allows us to also be more precise in creating overall industry growth and turbulence measures for a firm for any period "p". It may be the case that a firm is active in five product markets (as listed by the guides; see Table 2, the fifth column that depicts "1978–1983 Dynamism") two of which happen to fall under the same NAICS 4-digit market segment. In such an instance, as depicted in Table 2, we would include that 4-digit market turbulence (or munificence) measure twice in our average in order to properly represent that the firm is more involved in that 4-digit market sector. In our example in Table 2, the firm's total level of industry turbulence for 1978–1983 is the average of five product markets' turbulence levels; notice that both "Diagnostic Test Kits" and "Surgical Instruments" fall under the 4-digit NAICS market segment 3391 of "instruments and apparatus" so this market segment's dynamism (calculated as 0.0134) is counted twice in the industry turbulence average that is calculated for the firm. Since we do not have data on firms' revenue per product market, this weighting is an attempt to signify the salience of each market's turbulence (or growth) to the firm.

For Hypotheses 3a and 3b, we operationalized the change in industry turbulence as the "*amount dynamism reduction*". This was calculated as the difference between dynamism in an earlier period and dynamism in a latter period (e.g., amount dynamism reduction (p) = dynamism(p-1) − dynamism(p)). Note that if dynamism reduction is positive this means that dynamism is declining (i.e., it was higher before and is less now). If the reduction value is negative, it means that dynamism is *not* declining but actually increasing (i.e., it was less before and is higher now). Recall, that we expect that as the amount of "dynamism reduction" increases, this signals diminishing turbulence and we expect decision makers to initiate greater amounts of structural realignment through recombination.

For Hypotheses 5a and 5b, we examine management as corporate executives at headquarters (HQ). Note that the number of executives at HQ represents corporate team size. Following Romanelli and Tushman (1994) who operationalized changes in power distribution within organization design as executive turnover, we represent management turbulence by calculating two variables that signify turnover. Corporate executive turnover at period "p" is labeled "*Actual HQ turnover*" and is the count of the number of executives who were added to and removed from the TMT from period "p-1" to "p". "*Amount increase in corporate team size*" is the change in the total number of corporate executives in headquarters from period "p-1" to "p" where a positive value indicates an increase in the team size by that amount, and a negative value indicates a decrease in the team size by that amount.

Control variables. There are several other firm, industry, and time-level controls included in the study. We acknowledge that decision makers may want to initiate structural change but be unable to due to inertial constraints. Thus, for our firm-level controls, we control for this by including size and age of firms in our models. Firm-level controls[10] include "log of medical sales" (to proxy size), "percent medical sales" (to evaluate diversified firms), and "log of age". We expect

[10] We had to exclude "*number of employees*" to avoid multicollinearity with other variables; it was highly correlated with medical sales and age.

TABLE 1
Sample Firms' Descriptive Statistics

Summary of 46 firms:

Survive to 1997?	38 survive	8 acquired
Public?	29 public	17 private
Foreign?	13 foreign parents	33 U.S. parent/firm
Industry?	32 medical devices	14 pharmaceuticals
Acquisition-active?	32 acquisition-active	14 no acquisition activity
Diversified?	21 diversified	25 only medical

Summary of variables in analyses from 46 firms:

	OBS	MEAN	*SD*	MIN	MAX
Degree of recombination (p)	171	3.02	5.99	0	46
Log medical sales (p-1)	171	5.00	1.06	3.00	6.96
Percent medical sales (p-1)	171	0.69	0.36	0.00	1.00
Log firm age (p-1)	171	1.72	0.31	0.90	2.20
Percent turnover of product markets (p-1)	171	0.58	0.92	0	6
Percent of acquired units (p-1)	171	0.30	0.29	0	0.88
Percent increase in total units (p-1)	171	0.15	0.50	−0.67	3.00
Percent increase in total sales (p-1)	171	1.04	4.38	−0.87	44.50
Actual HQ turnover (p-1)	170	0.92	1.65	0	13
Amount increase in corp team size (p-1)	170	0.09	1.67	−13	6
Industry munificence (p-1)	171	0.11	0.09	−0.12	0.32
Industry dynamism logged (p-1)	171	−1.67	0.32	−2.32	−0.70
Amount dynamism reduction (p-1)	171	−0.00	0.04	−0.15	0.19
Dummy dynamism reduction (p-1)	171	0.45	0.50	0	1
Acquisition activity in industry (p-1)	171	77.20	66.22	2.00	342.67
Change in rivalry in industry (p-1)	171	59.42	141.13	−100	516.60

that firms that are more focused on the medical sector may find more opportunities for recombination due to their specialization and knowledge of the markets. Older firms, though they may have more resources at their disposal to pursue change, often suffer from inertial constraints deterring structural change (Nickerson & Zenger, 2002).

Complementing Hypothesis 5a and 5b, scholars have identified several other internal core elements (along with management) that, when turbulent, may be associated with structural realignment (Nadler & Tushman, 1997; Romanelli & Tushman, 1994; Tushman & Romanelli, 1985). There is consensus within organization design literature that organizational effectiveness is enhanced when an organization's design not only matches its external environment, but also when the firm maintains a fit, congruence, or alignment between its external environment and its internal elements (Burton, Lauridsen, & Obel, 2002; Miller & Friesen, 1984; Romanelli & Tushman, 1994). These internal elements include power and people distribution (i.e., what we proxy as management), a firm's market strategies, control systems and work coordination, performance and growth, and a firm's culture (Nadler & Tushman, 1997; Tushman & Romanelli, 1985). Nadler and Tushman highlight how disruptions in these internal elements represent "several situations that typically justify a major redesign" (1997: 49), thus we control for turbulence in these areas.[11]

Market strategies are represented by both the number of product markets in which a firm is active, as well as how acquisition active a firm is during a period "p" (Karim & Mitchell, 2000). For turbulence in market activities, we operationalize "*percent turnover of product markets*" as the percent change in the total number of product markets the firm is active in during period "p" as compared to "p-1". To capture turbulence from relative acquisition activity, we include "*percent of acquired units*" during a period "p" to signify level of acquisition activity as compared to internal development. Work coordination is represented by the number of total units operated by the firm during a period "p" (Mintzberg, 1979); turbulence in work coordination is calculated as the "*percent increase in total units*" operated by the firm from period "p-1" to "p" (and may be positive indicating an increase or negative indicating a decrease). Finally, performance is characterized by a firm's total sales for

[11] We were unable to identify an indicator of culture in our data source so we cannot include cultural disruption as a control.

TABLE 2
Example of Calculations for Industry Dynamism[a]

Product Market (in Guides)	4-digit NAICS Industry	4-digit NAICS Industry	1973–1978 Dynamism	1978–1983 Dynamism	1983–1986 Dynamism	1986–1989 Dynamism	1989–1993 Dynamism
Biochemicals	Chemicals	3259	0.0163	0.0268	0.0541	0.0211	0.0180
Biologicals	Biological products	3254	0.0039	0.0085	0.0048	0.0045	0.0056
Diagnostic Test Kits	Surgical, medical, laboratory instruments and apparatus	3391	0.0107	0.0134	0.0864	0.0254	0.0103
Separation Equipment	Electromedical equipment	3345	0.0129	0.0324	0.0059	0.0132	0.0079
Surgical Instruments	Surgical, medical, laboratory instruments and apparatus	3391		0.0134	0.0864	0.0254	
Firm's Level of Industry Dynamism (weighted average)			0.01095	0.01890	0.04752	0.01792	0.01045

[a] for Accurate Chemical and Scientific Corp.

Note: Dynamism in Market 3259 (for *1978*) = 0.0163 = $\frac{Std.Err.(B_1)}{IndustrySales}$ where "B_1" is the estimated coefficient from the regression model $y_t = b_0 + b_1 t + a_t$ in which "y" represents Industry Sales, and "t" represents time from *1973–1977*. (Bergh, 1998; Dess & Beard, 1984; Garg et al., 2003; Nadkarni & Barr, 2008; Sharfman & Dean, 1991; Sutcliffe, 1994; Wholey & Brittain, 1989)

Firm's Level of Industry Dynamism (for 1978) = $\overline{Markets'Dynamism}$ = average(0.0163, 0.0039, 0.0107, 0.0129) = 0.01095

Firm's Level of Industry Dynamism (for 1983) = $\overline{Markets'Dynamism}$ = average(0.0268, 0.0085, 0.0134, 0.0324, 0.0134) = 0.01890

a period "p", and thus performance turbulence is calculated as the "*percent increase in total sales*" for a period "p" compared to "p-1" reflecting *relative* performance change at the firm (and may be positive indicating an increase or negative indicating a decrease).[12] Lastly, all models include panel period dummies (with the period 1993–1997 omitted) to control for any time-sensitive heterogeneity that may have occurred during our study period.

[12] Note that this variable denotes both increase or decrease (as in positive or negative values) as well as magnitude (in the percentage amount change from a former period to a latter period). For example, if a firm's sales change from \$100 million to \$200 million between two periods, it will have a percent change of +100%. If the sales change from \$100 million to \$150 million, it will have a percent change of +50%. Alternatively, if the sales go from \$100 million to \$50 million, it will have a percent change of −50%. We expect, based on performance expectations and problemistic search, that decision makers facing declining percent changes in performance will initiate more structural realignment. Thus, to state the inverse, as this variable (the percent value) increases reflecting that performance change is positive, we expect firms to recombine less. In our examples given here, when the firm has −50% increase it would be expected to pursue more recombination then when it has +50% increase, and similarly the firm with +50% increase would be expected to pursue more recombination than when it has +100% increase in sales.

Methodology

Our hypotheses predict that both industry characteristics (of growth and turbulence) and managerial turbulence will be associated with the firm's degree of structural recombination. Because this dependent variable is a non-negative count variable of recombination events during a period "p", a linear model's assumptions of homoskedasticity (where variance of the residuals is constant) and normally distributed errors are violated producing inconsistent, inefficient, and biased coefficient estimates. In such cases, one should use either a negative binomial or Poisson model (Long, 1997). Recent econometric advances advocate using quasi maximum likelihood fixed-effects Poisson models to control for unobserved firm heterogeneity and because it provides consistent estimates (compared to the negative binomial) under general conditions (Rysman & Simcoe, 2008; Wooldridge, 1999). Further, we run Poisson models that apply robust standard errors to our estimates using the STATA command "xtpqml",[13] as well as models that do not

[13] For fixed-effects models, STATA requires a minimum of two observations per group (i.e., firm) and dropped groups with zero reconfigurations across all time periods. The command "xtpqml" produces estimates that are robust to "both heteroskedasticity and arbitrary serial correlation in the dependent variable" (Rysman & Simcoe, 2008: 22).

apply robust standard errors to compare our results with prior research. Note that when applying robust standard errors the standard for finding significance in our coefficient estimates is much more stringent than past literature that has typically used traditional Poisson models without robust standard errors.

To minimize issues of endogeneity (and in particular reverse causality), we model the effect that turbulence has on *future* recombination, and thus use lagged values of our explanatory variables as regressors in the estimated equation (see Equation 2) (Ahuja & Katila, 2001; Judge, Hill, Griffiths, Lutkepohl, & Lee, 1988). This technique is appropriate for panel data. In this study, a group is a firm (j), "X" represents control variables, and our lagged explanatory variables are noted. Thus, at the level of analysis of firm-year observations, one of our models resembles:

$$\begin{aligned}\text{Recombination}_{j,p} &= \exp(b_0 + b_1\text{Munificence}_{j,p-1} \\ &+ b_2\text{Dynamism}_{j,p-1} + b_3\text{Amt\_Dyn\_Reduction}_{j,p-1} \\ &+ b_4(\text{Amt\_Dyn\_Reduction}_{j,p-1}{*}\text{Dynamism}_{j,p-1}) \\ &+ b_5\text{Management\_Turb}_{j,p-1} + \ldots + b_n X_{j,p-1})\end{aligned} \tag{2}$$

Thus, recombination at firm "j" during period "p" is evaluated as a function of growth and turbulence during period "p-1", and controls for period "p-1". Recall that the study is comprised of six panels (1978, 1983, 1986, 1989, 1993 and 1997) of firm-level data from the guides, with a total of five periods of data observed (1978–1983, 1983–1986, 1986–1989, 1989–1993, 1993–1997). For any explanatory variables that are not captured over a duration of time (period "p-1"), we measure the variable at the end of period "p-1"; for example, when we observe a firm's market entry and exit over the period 1989–1993, the variable is measured over the period 1986–1989 but some control variables such as age are captured at the end of that time period at 1989. Because we include a period lag there are at most four observations per firm (j).

RESULTS AND DISCUSSION

We test the relationship of internal and external turbulence on structural recombination. Table 3 shows the correlations between our measures. A glance at the correlation matrix of the turbulence variables (Table 3) highlights that turnover of corporate executives (corr = 0.644) is positively correlated with recombination, which provides a preliminary indication that Hypothesis 5a may not be supported. The high correlation between medical sales and age (corr = 0.533) indicates that, in our sample, older firms generally earn greater revenue than younger firms. Further, growing industries are associated with less industry turbulence (corr = –0.508). Since several of our correlations are high, we also test for multicollinearity and find that our data meet the standard criteria required indicating the multicollinearity does not unduly affect the relationships we observe.[14]

In Table 4,[15] we show our analysis of how industry growth and turbulence, as well as managerial turbulence, may influence a firm's choice to pursue structural recombination. Model 1 includes only control variables. In Model 2 we add the variable for managerial turbulence. Finally, in Model 3 we add the industry measures of munificence (growth) and dynamism (turbulence). Model 3 may be considered the full model before testing further moderating effects and robustness checks. In Table 4 we show the regression estimates for the Poisson models as well as those that apply more stringent robust standard errors. In latter tables we sometimes show results only with robust standard errors if coefficient estimates of interest are significant. If only a Poisson model is shown and a model with robust standard errors is not shown, it means that the coefficient estimates of interest were *not* significant in the robust case but were only for the regular Poisson. For brevity we have excluded them from some tables.

Industry Conditions and Structural Realignment

The results in Table 4 Model 3 show support for Hypothesis 1 which predicts that industry growth will be positively related to a firm's degree of structural recombination; the coefficient estimate on "munificence" is significant for the Poisson model and it still has weak significance when applying robust standard errors. Model 3 also provides strong support for Hypothesis 2, which predicts that industry-level,

[14] We test for multicollinearity (where correlated predictors may inflate standard errors) by calculating variance inflation factors (VIFs) and condition indices for predictors of each model. None of the individual VIFs exceed the accepted threshold of 10 (they are all under 2 in our models), and no condition index exceeds 30; Belsley, Kuh, and Welsch (1980) suggest that higher metrics indicate collinearity problems. Our Model 3 has a condition number (highest condition index) of 26.80 and a mean VIF of 1.41, indicating that multicollinearity is not a significant problem (Belsley, 1991).

[15] In the model regressions the sample was reduced from 46 firms to 34 firms since STATA dropped 12 firms due to their having no variance in the dependent variable.

TABLE 3
Pearson Pairwise Correlation Matrix (* $p < .05$)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Degree of recombination (p)	1.0000															
2. Log medical sales (p-1)	0.4758*	1.0000														
3. Percent medical sales (p-1)	−0.0420	−0.0908	1.0000													
4. Log firm age (p-1)	0.2604*	0.5325*	−0.2166*	1.0000												
5. Percent turnover of product markets (p-1)	0.0331	−0.0451	−0.0884	−0.1167	1.0000											
6. Percent of acquired units (p-1)	0.2636*	0.2936*	−0.2620*	0.1202	0.2153*	1.0000										
7. Percent increase in total units (p-1)	0.0626	−0.0605	0.0644	−0.1308	0.4928*	0.2618*	1.0000									
8. Percent increase in total sales (p-1)	−0.0543	0.1004	0.0916	−0.0206	0.1989*	−0.0043	0.0642	1.0000								
9. Actual HQ turnover (p-1)	0.6441*	0.4942*	0.0417	0.2655*	−0.0388	0.1923*	−0.0134	−0.0657	1.0000							
10. Amount increase in corp team size (p-1)	−0.1713*	−0.0439	0.0349	−0.0507	0.0814	0.0807	0.1026	0.0077	−0.2766*	1.0000						
11. Industry munificence (p-1)	0.0773	−0.0510	0.0366	−0.0571	0.1154	−0.0720	−0.0861	0.0463	−0.0532	−0.0197	1.0000					
12. Industry dynamism logged (p-1)	0.0235	−0.0646	0.0388	−0.0713	0.0052	0.0381	0.0955	−0.0526	0.0571	0.0407	−0.5075*	1.0000				
13. Amount dynamism reduction (p-1)	0.1792*	0.0612	0.0151	0.0527	−0.0660	−0.0044	−0.1968*	−0.0141	0.0743	−0.0205	0.6390*	−0.6006*	1.0000			
14. Dummy dynamism reduction (p-1)	0.1627*	0.1089	0.0176	0.1095	−0.1588*	0.0054	−0.2155*	−0.0209	0.1354	−0.0483	0.4419*	−0.5680*	0.7015*	1.0000		
15. Acquisition activity in industry (p-1)	−0.0180	0.2971*	−0.0287	0.1691*	−0.1128	−0.0951	−0.1957*	−0.0140	0.0984	−0.0916	0.0580	−0.4780*	0.2303*	0.5548*	1.0000	
16. Change in rivalry in industry (p-1)	−0.0705	0.0768	−0.0424	0.0694	0.0730	−0.0453	−0.0939	0.0505	0.0117	−0.0106	0.1373	−0.6054*	0.1004	0.3033*	0.7027*	1.0000

TABLE 4
Relationship of Firm-level and Industry-level Turbulence(p-1) with Structural Recombination(p) Quasi maximum likelihood fixed-effects poisson regression (without and with robust standard errors)

	Model 1		Model 2		Model 3	
	poisson	**robust *SE***	**poisson**	**robust *SE***	**poisson**	**robust *SE***
Controls						
Log of medical sales (p-1)	0.125 (0.291)	0.125 (0.290)	−0.074 (0.449)	−0.074 (0.487)	−0.353 (0.455)	−0.353 (0.496)
% medical sales (p-1)	1.256 (1.032)	1.256 (1.213)	**2.171*** (1.114)	**2.171~** (1.315)	**2.935**** (1.120)	**2.935*** (1.278)
Log of age (p-1)	−3.760 (3.101)	−3.760 (5.288)	−0.935 (3.347)	−0.935 (4.314)	2.092 (3.668)	2.092 (4.393)
% turnover of product markets (p-1)	0.044 (0.102)	0.044 (0.169)	−0.014 (0.103)	−0.014 (0.186)	−0.001 (0.106)	−0.001 (0.164)
% of acquired units (p-1)	**2.048***** (0.444)	**2.048***** (0.527)	**1.851***** (0.462)	**1.851***** (0.554)	**2.132***** (0.482)	**2.132**** (0.759)
% increase in total units (p-1)	0.021 (0.148)	0.021 (0.296)	**0.391*** (0.188)	0.391 (0.460)	**0.553**** (0.188)	0.553~ (0.314)
% increase in total sales (p-1)	**−0.085~** (0.052)	−0.085 (0.066)	−0.043 (0.040)	−0.043 (0.036)	−0.042 (0.043)	−0.042 (0.038)
Managerial Turbulence						
Actual HQ turnover = Entry and exit of corporate executives at HQ (p-1)			−0.013 (0.050)	−0.013 (0.054)	−0.010 (0.052)	−0.010 (0.068)
Amount increase in corporate team size (p-1)			**−0.069**** (0.024)	**−0.069*** (0.032)	**−0.086***** (0.025)	**−0.086**** (0.033)
Environmental Change						
Sales munificence (growth)(p-1)					**6.430*** (2.825)	6.430~ (3.904)
Sales dynamism logged (turbulence)(p-1)					**−2.332***** (0.621)	**−2.332**** (0.788)
Panel Period Dummies	yes	yes	yes	yes	yes	Yes
Number of Observations	132	132	131	131	131	131
Number of Groups	34	34	34	34	34	34
Wald chi2	84.57	62.38	90.55	156.26	119.32	220.77
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000

Significant estimates: $\sim p < 0.1$, $* p < 0.05$, $** p < 0.01$, $*** p < 0.001$

external, turbulence is associated with *less* structural recombination. We find that the industry dynamism estimates are negative and highly significant, and maintain significance when applying robust standard errors.

For further insight into our negative coefficient result when testing Hypothesis 2 we turn to the literature on organization design, and specifically on restructuring. Although many papers have theoretically linked external, industry attributes to structural change, we found only two studies that empirically investigated this relationship with the same explanatory variable (of industry turbulence) as in our study (but slightly different dependent variables regarding structure). In one paper, Bergh (1998), drawing on the information-processing logic of contingency theory, hypothesized that if a rationale of efficiency is attributed to restructuring, then during times of external environmental uncertainty firms will shed unrelated businesses and acquire related ones as it is easier to integrate and coordinate businesses that are understood. Interestingly, he found that this logic alone did not hold true since during times of uncertainty firms also significantly acquired unrelated businesses, indicating some logic of managing risk (e.g., in this case by diversification) as an economic rationale for driving structural change. This general idea is supported in a study by Keats and Hitt (1988) who examined how external environmental dimensions of instability and complexity were linked to structural characteristics of divisionalization and size. In a structural equation model using data from manufacturing firms, they found that external instability was associated with lower levels of structural divisionalization (i.e., fewer number of units), where divisionalization represents decentralization and specialization in decision making. This finding implies that during times of external industry turbulence firms are more likely to organize into fewer, larger units—again reiterating a rationale of managing risk (e.g., in this case by pooling activities). We view these risk-averse behaviors as analogous to our findings that when faced with similar environmental turbulence, firms pursue less structural realignment initiatives.

Delaying Change

Biding time for a better environment. In Hypotheses 3a, 3b and 4 we propose that firms faced with better environmental conditions will initiate more structural realignment. In Table 5 we test Hypothesis 3a and 3b by examining whether there is a relationship between the amount of dynamism reduction and structural recombination. In Model 4 we include only the dynamism reduction variable, and in Model 5 we include both the level of dynamism as well as dynamism reduction, and find support for Hypothesis 3a. Even when controlling for the level of dynamism, if firms face a decline in dynamism from the previous period they are more likely to have recombinations in the current period. In Model 5 we test whether this dynamism reduction moderates the direct negative influence of dynamism on recombination, but the estimate is not significant. If we relax the granularity of the measure and operationalize dynamism reduction as a dummy variable (equaling 1 if there is a reduction in dynamism), as in Model 7, we continue to find support for Hypothesis 3a (as expected) and find only weak support for Hypothesis 3b since the interaction term is significant in the Poisson model but not when applying robust standard errors.

Although we found support for Hypothesis 1 in Table 4 Model 3 and observe that munificence has a positive relationship with structural recombination, in Table 5 we see that this significance is lost (but estimates are still positive) once we take into consideration dynamism reduction. When both characteristics of a "better" environment are tested in a model, recombination has a stronger significant relationship with dynamism reduction than with industry growth. This sheds insight into which environmental condition is more salient for executives as they consider structural realignment. To test Hypothesis 4, we include the interaction term of munificence and dynamism in Table 6 Model 8 and find only weak support (as the estimates are significant in the regular Poisson model but lose significance when applying robust standard errors).

Comparatively, our findings indicate weaker support for Hypotheses 1 and 4—that decision makers initiate more structural realignment when there is more industry growth—and stronger support for Hypotheses 3a and 3b—that executives initiate realignment when the environment signals greater reductions in turbulence.

Biding time until the environment is "really bad." Although our findings indicate support for the risk-averse behavior of decision makers to pursue less structural realignment when faced with industry turbulence, a contingency framework suggests that executives may be biding time not just for better environmental conditions, but for when they feel the environment is really bad and the firm is excessively misaligned. In other words, decision makers may have some threshold of external turbulence, or a "tipping point," after which they consider initiating recombination. This salient tipping point was the basis of Miller's (1982) "quantum

TABLE 5
Relationship of Firm-level and Industry-level Turbulence(p-1) with Structural Recombination(p) Quasi maximum likelihood fixed-effects poisson regression (without or with robust standard errors)

	Model 4	Model 5	Model 6	Model 7	
	robust *SE*	robust *SE*	robust *SE*	poisson	robust *SE*
Controls					
Log of medical sales (p-1)	−0.239 (0.496)	−0.266 (0.484)	−0.308 (0.494)	−0.113 (0.464)	−0.113 (0.524)
% medical sales (p-1)	**2.798*** (1.311)	**2.849*** (1.311)	**3.034*** (1.449)	**2.706*** (1.117)	2.706* (1.323)
Log of age (p-1)	−0.547 (4.128)	0.655 (4.185)	0.847 (4.114)	1.640 (3.622)	1.640 (4.368)
% turnover of product markets (p-1)	−0.154 (0.147)	−0.115 (0.157)	−0.111 (0.160)	−0.003 (0.107)	−0.003 (0.162)
% of acquired units (p-1)	**1.496**** (0.560)	**1.611**** (0.616)	**1.558**** (0.596)	**2.141***** (0.485)	**2.141**** (0.783)
% increase in total units (p-1)	**0.872***** (0.268)	**0.834**** (0.282)	**0.843**** (0.280)	**0.601**** (0.189)	**0.601*** (0.308)
% increase in total sales (p-1)	−0.040 (0.038)	−0.042 (0.038)	−0.040 (0.037)	−0.057 (0.047)	−0.057 (0.039)
Managerial Turbulence					
Actual HQ turnover = Entry and exit of corporate executives at HQ (p-1)	−0.049 (0.062)	−0.040 (0.064)	−0.040 (0.062)	−0.021 (0.053)	−0.021 (0.076)
Amount increase in corporate team size (p-1)	**−0.100***** (0.029)	**−0.101***** (0.030)	**−0.105***** (0.033)	**−0.078**** (0.025)	**−0.078*** (0.034)
Environmental Change					
Sales munificence (growth)(p-1)	2.286 (4.240)	1.942 (3.978)	2.711 (4.780)	4.974 (3.190)	4.974 (4.001)
Sales dynamism logged (turbulence)(p-1)		**−1.412~** (0.867)	−1.525 (1.013)	**−3.155***** (0.793)	**−3.155**** (1.091)
Amount dynamism reduction (p-1)	**14.145***** (3.478)	**11.157**** (4.005)	2.906 (21.394)		
Interaction: Sales dynamism * Amount dynamism reduction			−4.678 (11.193)		
Dummy dynamism reduction (p-1)				**4.141*** (1.712)	**4.141~** (2.279)
Interaction: Sales dynamism * Dummy dynamism reduction				**2.336*** (0.976)	2.336 (1.491)
Panel Period Dummies	yes	yes	yes	yes	yes
Number of Observations	131	131	131	131	131
Number of Groups	34	34	34	34	34
Wald chi2	239.40	256.00	257.91	121.71	173.64
Prob > chi2	0.000	0.000	0.000	0.000	0.000

Significant estimates: $\sim p < 0.1$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

TABLE 6
Relationship of Firm-level and Industry-level Turbulence(p-1) with Structural Recombination(p) Quasi maximum likelihood fixed-effects poisson regression (without or with robust standard errors)

	Model 8		Model 9	Model 10
	poisson	robust *SE*	robust *SE*	robust *SE*
Controls				
Log of medical sales (p-1)	−0.326 (0.465)	−0.326 (0.504)	−0.479 (0.590)	−0.173 (0.553)
% medical sales (p-1)	**2.649*** (1.135)	**2.649*** (1.321)	**4.162**** (1.362)	**3.389**** (1.239)
Log of age (p-1)	2.378 (3.686)	2.378 (4.481)	0.589 (5.560)	−0.442 (4.218)
% turnover of product markets (p-1)	−0.028 (0.107)	−0.028 (0.164)	0.001 (0.159)	−0.133 (0.154)
% of acquired units (p-1)	**2.055***** (0.480)	**2.055**** (0.748)	**2.194***** (0.608)	**1.774**** (0.637)
% increase in total units (p-1)	**0.652***** (0.195)	**0.652*** (0.324)	**0.604**** (0.239)	**0.849***** (0.258)
% increase in total sales (p-1)	−0.041 (0.043)	−0.041 (0.037)	−0.063 (0.043)	−0.055 (0.039)
Managerial Turbulence				
Actual HQ turnover = Entry and exit of corporate executives at HQ (p-1)	−0.016 (0.053)	−0.016 (0.075)	−0.023 (0.058)	−0.010 (0.057)
Amount increase in corporate team size (p-1)	**−0.085***** (0.025)	**−0.085*** (0.035)	**−0.092***** (0.029)	**−0.106***** (0.029)
Environmental Change				
Sales munificence (growth)(p-1)	**20.484**** (7.853)	20.484 (12.756)	5.884 (4.295)	5.393 (4.086)
Sales dynamism logged (turbulence)(p-1)	**−3.577***** (0.911)	**−3.577***** (0.998)	**−1.872*** (0.951)	**−2.405**** (0.849)
Interaction: Sales dynamism * Sales munificence	**11.837*** (5.939)	11.837 (8.437)		
Acquisition activity in industry (p-1)			**−0.020***** (0.005)	
Change in rivalry in industry (p-1)				**−0.009***** (0.003)
Panel Period Dummies	yes	yes	yes	
Number of Observations	131	131	131	131
Number of Groups	34	34	34	34
Wald chi2	119.41	185.30	203.14	244.13
Prob > chi2	0.000	0.000	0.000	0.000

Significant estimates: $\sim p < 0.1$, $* p < 0.05$, $** p < 0.01$, $*** p < 0.001$

view of structural change". In his view, Miller proposed that because incremental, frequent structural change is costly, firms should pursue "quantum or revolutionary" structural change only after "a critical state of incongruence with the environment is reached" (p. 133). This view complements contingency theory's expectation that firms may choose to tolerate some degree of external turbulence until enough evidence of a misfit accumulates to produce a perceived state of non-equilibrium significant enough to motivate firms to pursue structural change (Romanelli & Tushman, 1994).

We explored this second rationale for biding time—waiting until a "critical state of incongruence"—by testing both a U-shape quadratic relationship between industry-level dynamism and structural recombination, as well as a split-sample analysis of low and high dynamism groups. The results are shown in Table 7. Model 11 includes a quadratic term, but we do *not* find support for a U-shape relationship in which the negative effect of turbulence on recombination is followed by a positive effect. The coefficient on the square term is negative and insignificant. The split-sample analysis in Models 12 and 13 sheds some light on our analysis; these models split the sample around the median level of industry turbulence. We find that in cases of lower dynamism the effect of dynamism on recombination is negative and significant, and for cases of higher dynamism the effect is still negative and significant but less negative. Thus, decision makers may be more prone (i.e., less negative) to initiate structural recombination in the case of higher dynamism *as compared to* lower dynamism, *but overall the influence is still negative*; this indicates that the relationship observed is somewhat comparable to the left-side of a U-shape relationship where the steepness of the negative effect declines from lower to higher dynamism,[16] but we do not find the right

[16] Note that we do not find evidence of a quadratic relationship between turbulence and recombination, so our findings of the split-sample results indicate more of a tilted-step function. On the "left side" of the graph with lower dynamism there is a steep negative slope. On the "right side" of the graph when there is higher dynamism the slope is less steep but still negative. We never see a tilt upwards with a positive slope.

side of the U-shape with a positive effect that would indicate a tipping-point.

Together, the prior studies' showing risk-averse behaviors of executives (Bergh, 1998; Keats & Hitt, 1988) as well as our finding a lack of a tipping-point indicate that decision makers seem to be biding time for environmental conditions to improve before they pursue structural realignment. These findings give us greater confidence that our negative coefficient estimate on the influence of external turbulence on recombination is indicative of behavioral choices made by executives, not inertial constraints. Recall, also, that in our models we control for inertia through firm size (as sales) and age. Thus, our findings suggest that it is not so much that decision makers are unable to structurally change as it may be that they are delayed by the environment and choose to wait for better conditions.

Robustness checks. To further test the robustness of our results that indicate a negative direct influence of turbulence on recombination, we examined several other indicators of industry turbulence.[17] First, we captured the level of "*acquisition activity*" in the industries studied as an indicator of consolidation and gathered data from the Securities Data Company (SDC) database on the industries in our sample for the number of acquisitions that took place during our study period. Second, we captured the level of competition (i.e., rivalry) in industries by gathering data from Compustat for the number of public firms that existed during the periods in our study; as another form of industry turbulence, we added "*change in rivalry*" to our model. Building on the model specifications of Model 3, our results are shown in Table 6 in Model 9 and Model 10. Both of these additional industry turbulence measures are highly significant and have a negative relationship with structural change, reinforcing our confidence in our original (commonly used) industry sales dynamism measure.

Managerial Conditions and Structural Realignment

We now turn our attention to turbulence among decision makers. Hypotheses 5a and 5b expect that turbulence in management in the form of executive turnover at corporate headquarters and growth in the TMT may hinder structural realignment due to their inability to process information and build consensus around structural recombination decisions. Although the coefficient estimates are negative, our analysis finds that the turnover of corporate executives does *not* significantly affect recombination, thus there is no support for Hypothesis 5a. We do find, however, that change in the corporate team size *does* have a significant and negative relationship with structural recombination, giving support to Hypothesis 5b. Interestingly, when doing robustness checks of simple magnitudes, we find that team size itself (not *change* in team size) is not significant.[18] Thus, it is not simply the size of a team (i.e., a larger team) that deters recombination, but the *increase* in the size of the team from the prior period. Let's imagine four scenarios for a firm. In Scenario A, the firm grew from having four corporate executives to eight, thus the change in corporate team size is the addition of four executives. In Scenario B, the firm grew from having a TMT of six to eight, changing the corporate team size by two executives. In both scenarios A and B, the corporate team size is ultimately eight. Now consider Scenario C in which the firm's corporate team size grew from ten to 14 executives, a change of four. In Scenario D the firm grew from a TMT of 12 to 14, a change of two. In both scenarios C and D the corporate team size is 14. Regardless of whether the firm has a TMT size of eight versus 14, according to our findings this will *not* have a significant impact on the degree of structural recombination in the next period. However, both scenarios A and C are examples in which the firm had a *change* in team size of *four* executives, and both scenarios B and D are examples of situations where firms had a *change* in team size of *two* executives. Based on our analysis in Table 4, if the firm experienced a scenario like A or C (i.e., as compared to scenarios B or D), this *will* have a significant and negative impact on the number of business unit recombinations in the next period. These

[17] Recall that our operationalization of external industry turbulence is based on a dynamism measure of industry *sales* (Dess & Beard, 1984; Garg et al., 2003; Nadkarni & Barr, 2008; Sutcliffe, 1994). As a robustness check, we also operationalized dynamism based on industry *operating income* and industry *net income*; these data were also gathered from Compustat for our 28 4-digit NAICS segments and a weighted dynamism measure was calculated for each firm in each panel depending on which markets it was active in. Our results were robust; coefficient estimates were still negative and significant.

[18] To fully understand the relationship between our constructs, we also conducted regression analyses for the *magnitude* measures of our variables. We show in the paper only the tables with turbulence measures (i.e., *relative change* in our variables) for the sake of brevity. These additional models of magnitude are available upon request.

TABLE 7
Relationship of Firm-level and Industry-level Turbulence(p-1) with Structural Recombination(p) Quasi maximum likelihood fixed-effects poisson regression (without or with robust standard errors)

	Model 11		Model 12	Model 13	
			Sample With Lower Dynamism	Sample With Higher Dynamism	
	poisson	robust *SE*	poisson	poisson	robust *SE*
Controls					
Log of medical sales (p-1)	−0.330 (0.458)	−0.330 (0.495)	1.116 (2.164)	**3.205**~ (1.795)	**3.205**~ (1.947)
% medical sales (p-1)	**2.981**** (1.116)	**2.981*** (1.294)	**27.611***** (7.719)	1.168 (4.709)	1.168 (4.897)
Log of age (p-1)	1.766 (3.640)	1.766 (4.285)	**94.392***** (27.324)	**–54.658*** (21.914)	**–54.658***** (16.984)
% turnover of product markets (p-1)	−0.010 (0.106)	−0.010 (0.162)	−0.192 (0.966)	−0.100 (0.270)	−0.100 (0.353)
% of acquired units (p-1)	**2.138***** (0.484)	**2.138**** (0.808)	**9.847*** (4.148)	**6.303*** (2.686)	**6.303***** (1.495)
% increase in total units (p-1)	**0.567**** (0.187)	**0.567**~ (0.309)	**1.447*** (0.661)	−0.078 (0.616)	−0.078 (0.459)
% increase in total sales (p-1)	−0.045 (0.045)	−0.045 (0.037)	**–5.236**** (1.717)	**0.620**~ (0.343)	0.620 (0.493)
Managerial Turbulence					
Actual HQ turnover = Entry and exit of corporate executives at HQ (p-1)	−0.003 (0.053)	−0.003 (0.070)	−0.653 (0.665)	0.083 (0.085)	0.083 (0.138)
Amount increase in corporate team size(p-1)	**–0.079**** (0.026)	**–0.079*** (0.034)	0.056 (0.429)	**–0.124*** (0.059)	−0.124 (0.081)
Environmental Change					
Sales munificence (growth)(p-1)	4.365 (3.558)	4.365 (3.784)	9.175 (41.013)	**11.777**~ (6.436)	**11.777*** (5.281)
Sales dynamism logged (turbulence)(p-1)	−6.886 (4.659)	−6.886 (5.898)	**–18.370*** (9.273)	**–2.939**~ (1.544)	**–2.939**** (1.102)
Square (Sales dynamism logged)	−1.436 (1.450)	−1.436 (1.846)			
Panel Period Dummies	yes	yes	yes	yes	yes
Number of Observations	131	131	45	48	48
Number of Groups	34	34	19	19	19
Wald chi2	119.75	235.72	29.04	60.01	530.21
Prob > chi2	0.000	0.000	0.010	0.000	0.000

Significant estimates: $\sim p < 0.1$, $* p < 0.05$, $** p < 0.01$, $*** p < 0.001$

results have potential implications to decision making in the TMT; the greater the addition of executives to the team, the more difficult it may be for them to reach consensus or form a dominant logic around structural realignment decisions (Cyert & March, 1963, Prahalad & Bettis, 1986). Inversely, the greater the deletion of executives from the corporate team, the easier it may be for the team to reach a consensus that supports structural change.

When examining our controls, note that we control for turbulence in firms' other core elements, namely market strategies, work coordination, and performance (Nadler & Tushman, 1997; Tushman & Romanelli, 1985). Of these controls, we find a significant influence of turbulence from increased acquisition activity within the firm to be positively related to structural realignment. This is consistent with prior work on acquisitions and recombination (Karim, 2006; Puranam, Singh, & Chaudhuri, 2009), and structural change in general (Capron, Dussauge, & Mitchell, 1998; Capron & Mitchell, 1998; Johnson, 1996). We also find a positive relationship between percent increase in number of total units (i.e., a sign of greater divisionalization of work) and recombination. This is consistent with research that has shown that firms may recombine structures to form fewer, larger units to enable better coordination or consolidation (Argyres, 1996; Johnson, 1996). In our models, although the coefficient estimates for "percent increase in total sales" are negative, they are not significant. Of our panel period dummies, only the period 1986–1989 had significantly more recombination activity compared to the period 1993–1997 across firms in our sample.

CONCLUSION

The goal of this paper was to build upon contingency theory and organization design literatures to better understand when and how decision makers pursue structural realignment to regain fit with changing environments. We drew on decision-making and group dynamics theories to inform our understanding of more nuanced contingencies that may drive or hinder structural change.

Though a general prescription of contingency theory may be to realign structure when there is industry growth, we hypothesized that external environmental change in the form of industry turbulence may deter alignment (i.e., until other opportune conditions arise) for several reasons. Specifically, we argued that during industry turbulence, the inability of decision makers to collect or process information related to how to realign their structures will lead them to delay or avoid making these decisions. Their tendencies to do this may be exacerbated by predictions that any benefits from recombination will be unattainable or will at least be less than what can be obtained by maintaining the status quo. This negative relationship between industry turbulence and structural recombination abates under better environmental conditions of industry growth and declining turbulence, where decision makers are able to develop decision strategies and more effectively evaluate the benefits of structural alignments through recombination.

We also explored whether it was only better external environments that would trigger structural change, or whether it could be that firms were waiting for a critical state of misfit before pursuing recombination. We did not find evidence of this tipping-point but did find evidence of a less negative effect for higher versus lower levels of industry turbulence, resembling something comparable to the left-side of a U-shape relationship that is not smooth (i.e., a really steep negative slope, followed by a less steep negative slope). This finding further supports our contention that decision makers will delay attempting to structurally realign their organizations within turbulent external environments, and instead bide their time for better environmental conditions.

Our second focus was to draw attention to how internal turbulence among TMTs can also hinder decision making and structural realignment initiatives. When examining how management turbulence may impact structural realignment, we did not find a significant influence of executive turnover but did find that growth in TMT size is associated with less structural recombination. We attribute this negative effect to difficulties in evaluating data that hinders the capacities of TMTs to reach agreements on key issues. This finding informs organizational design theory in that not only size and diversity may impede TMT choices about organizational forms, but also that increases in the TMT size may lead to decision-making delays about changes in a firm's organizational structures.

Our study has several managerial implications. Given that we found an inclination for firms to bide time for better industry conditions (than excessively bad levels of turbulence) before initiating structural realignment, decision makers need to judge what industry conditions are considered favorable to them. Also, we did find a lessening negative influence for the firms facing greater versus lesser industry turbulence; though we did not find a tipping-point, firms may have changing external conditions (e.g., new regulatory oversight or rules) that do create an upswing in recombination. Executives should be aware of other factors in their environments that may emerge to trigger critical misfit and structural realignment. Finally, firms should be cognizant of not changing the team size radically from one period to the next so as not to exacerbate difficulties in processing information and potential delays in forming decision consensuses.

There are certainly limitations to our investigation and many potential extensions. A limitation to this study is that we do not explore the performance implications of structural realignment through recombination; do those firms that defy the norm and tackle the potential disruption of structural change even under "bad" environmental conditions perform better or worse than those that do not attempt it? It would also be interesting to examine what capabilities firms possess that make unit recombination successful and to explore if and how these capabilities are established. We observed that changes in team size has a relationship with structural change; it would also be particularly interesting to explore in greater detail the composition of such teams and the executives' histories to see whether these make a difference in how teams reach consensus. Our sample size was limited to 46 firms in two medical sectors (pharmaceuticals and medical devices) due to the demands of intricate mapping of structural change over a 20-year period. Other sectors may reveal different patterns of organizational responses to turbulence; Hrebeniak and Snow (1980) did find that organizational responses to environmental uncertainty vary by industry. Undoubtedly, we will gain a better understanding of the generalizability of our findings if additional sectors are studied.

Our goal was to examine how firms react to environmental turbulence through structural realignment, specifically recombination. To our knowledge, there has not been an empirical analysis at this level of granularity on changing business unit boundaries, nor one that also considers the factors that may hinder decision makers in the process of realignment. By studying how both external industry forces and TMT changes within the firm impact decision makers' capacities to process information and form consensuses, we have aimed at providing organization design scholars with greater insights into factors that influence structural change.

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