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# THE CONTINGENT EFFECTS OF DIFFERENTIATION AND INTEGRATION ON CORPORATE ENTREPRENEURSHIP

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## ABSTRACT

This paper develops a contingency view regarding the effects of structural differentiation and integration on levels of corporate entrepreneurship. Integrating notions of benefits and costs resulting from integration with structural contingency theory, we argue that the joint effects of structural differentiation and integration on corporate entrepreneurship levels are moderated by organizational size and environmental dynamism. Our findings from a time-separated sample demonstrate that in smaller organizations and more dynamic environments, the positive effects of integration on the structural differentiation-corporate entrepreneurship relationship strongly diminish. As such, with this research we begin to identify contingencies that influence the corporate entrepreneurship levels observed among firms striving to balance the needs for structural differentiation and integration.

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***Keywords:*** *corporate entrepreneurship; ambidexterity; differentiation; integration; structural contingency*

## INTRODUCTION

A key premise of corporate entrepreneurship (CE) theory and practice is that mainstream and CE activities require fundamentally different organizing principles (Burgelman, 1985; Garrett and Covin, 2013). An acknowledged way to facilitate CE, defined as the sum of a firm's innovation, venturing, and strategic renewal activities (Ling *et al.,* 2008; Zahra, 1996) is to set up organizational structures that provide autonomy to CE activities (Block and MacMillan, 1993; Burgelman, 1983; Gilbert, 2006). Nonetheless, this so-called structural differentiation invites a set of coordination problems such as a lack of between-unit knowledge transfer and agency risks of the differentiated CE unit not acting in the organization's best interest (Carlile, 2004; Shimizu, 2012).

Complementing structural differentiation with targeted integration may enable organizations to overcome these problems, but findings are ambiguous regarding how much inter-unit integration is needed relative to the level of structural differentiation (Raisch and Birkinshaw, 2008). Organization design theory posits that integration offers benefits as well as carries costs, and effective organizational design is a matter of balancing the two (Puranam, Singh and Chaudhuri, 2009; Tushman and Nadler, 1978). The question that arises, then, is *when* do the benefits of the interaction between structural differentiation and integration outweigh the costs resulting from integration when it comes to promoting CE?

We answer this question through structural contingency theory (Donaldson, 2001). We advance three-way interaction hypotheses in that the moderating effects of integration

devices on the structural differentiation – CE relationship are posited as contingent on organizational size and environmental dynamism. We revisit the pivotal role of three organizational-level integration mechanisms strongly present in differentiation-integration literatures with regards to their abilities to achieve between-unit coordination for structurally-differentiated units. These integration mechanisms are shared vision, senior team social integration, and cross-functional interfaces (cf. Burgers *et al.*, 2009; Jansen *et al.,* 2009; O'Reilly and Tushman, 2008). We test our hypotheses using a time-separated sample of 240 firms in a variety of industries.

The current study contributes to recent research that has moved beyond investigating differentiation and integration separately to modeling the collective interaction of differentiation and integration (Burgers *et al.*, 2009; Foss, Lyngsie and Zahra, 2013; Raisch and Birkinshaw, 2008). We advance prior research by providing insights into how organizational size and environmental dynamism influence the costs and benefits resulting from integration devices regarding the structural differentiation – CE relationship. To understand the causal mechanisms underlying these costs and benefits, we utilize the complementary lenses of knowledge transfer and agency. We posit that in smaller organizations and more dynamic environments costs start to outweigh the benefits of integration devices. We argue that these contingencies may resolve some of the tensions in the literature about the extent of integration needed and provide more nuanced insight regarding how to organize for CE.

## THEORETICAL BACKGROUND AND MODEL

Studies of CE and, in particular, corporate venturing have traditionally focused on the new venture division as the unit of analysis, with high levels of structural autonomy being depicted as an integral part of the new business creation process (cf. Block and MacMillan, 1993; Burgelman, 1985; Fast, 1979; Hill and Birkinshaw, 2014). Others recognized that

managers can employ a wide range of structural choices to promote CE activities (Keil *et al.*, 2008; Miles and Covin, 2002). In their review of the CE literature, Sharma and Chrisman (1999) concluded that the level of autonomy provided to an entrepreneurial unit has become a variable with a material influence on the level and performance of CE, rather than CE being defined as necessitating a certain level of independence. This paper is positioned in the latter stream, focusing on the antecedents of the *level of CE activity* in organizations (cf. Ling *et al.*, 2008; Simsek and Heavey, 2011; Zahra, 1996).

Structural differentiation, or the degree of 'separation of exploitative and explorative activities into distinct organizational units' (Raisch *et al.,* 2009: 685), allows each unit to most effectively execute its tasks (Lawrence and Lorsch, 1967). It prevents intrusion of CE into mainstream activities and provides managers of exploratory units with the autonomy to set up organizational structures and modes of management conducive to CE (Block and MacMillan, 1993; Burgelman, 1985). Members of differentiated organizational units may, however, experience difficulty understanding members from other units (Carlile, 2004), and the novelty of CE initiatives that fall outside current conceptions of the corporate strategy exacerbates the misunderstanding (Burgelman, 1983). Such effects may reduce the number and quality of ideas, as CE often results from the intersection of different thought worlds (Fiol, 1995). Structural differentiation may also lead to agency problems with members of differentiated units pursuing interests that do not align with the overall objectives of the organization, thereby decreasing the quality and value of CE to the organization (Shimizu, 2012).

**Managing differentiation - integration**

Integration devices promote the effectiveness of differentiation as a structural choice because they facilitate the coordination and synthesis of diverse and essential tasks that require

specialized processes, knowledge or other resources (Galbraith, 1973; Lawrence and Lorsch, 1967). Integration facilitates the coordination of knowledge flows and mitigates agency conflicts across units and as such may increase CE-outcomes (Shimizu, 2012). A fundamental challenge is that differentiation and integration are both complementary and inconsistent (Boumgarden, Nickerson and Zenger, 2012). In their review of the ambidexterity literature, O'Reilly and Tushman (2008: 193) identified three ways in which senior teams can manage this apparent contradiction of differentiation and integration. They can develop (1) a common identity through a shared vision, (2) the ability to synchronize actions and unity of purpose through senior team integration, and set up (3) targeted structural linking mechanisms such as periodic cross-unit meetings. We follow O'Reilly and Tushman (2008) by investigating the integrating roles of shared vision, senior team social integration and cross-functional interfaces.

A *shared vision* embodies the extent to which members of an organization share collective goals and aspirations (Tsai and Ghoshal, 1998). Shared meanings facilitate knowledge sharing across structurally-differentiated units (Fey and Furu, 2008), and the common desire for the pursuit of particular organizational outcomes mitigates the agency issue of loosely coupling units (Mills and Ungson, 2003; Nohria and Ghoshal, 1994). It is the degree of agreement on a common identity that facilitates intra-organizational knowledge sharing and mitigates agency conflicts rather than the actual content of the vision (Voss, Cable and Voss, 2006). The assertion of a positive interaction effect between the degree of structural differentiation and shared vision is corroborated for a variety of outcomes such as corporate venturing (Burgers *et al.*, 2009), innovation (Dougherty, 1992), and ambidexterity (O'Reilly and Tushman, 2011). More nuanced views suggest that strong identification with the organizational identity may in certain circumstances reduce creativity and the pursuit of

new opportunities (cf. Ashforth, Harrison and Corley, 2008; Mihalache *et al.*, 2012; Rotondi, 1975; Voss *et al.*, 2006).

*Senior team social integration* represents 'the attraction to the group, satisfaction with other members of the group, and social interaction among the group members' (O'Reilly, Caldwell and Barnett, 1989: 22). Senior team social integration may facilitate knowledge transfer across structurally-differentiated units, as top management is in the best position to oversee relevant connections between units (O'Reilly and Tushman, 2004). Social integration increases the feeling that the organization operates as a coherent group (O'Reilly *et al.*, 1989) and, thus, the willingness of members to resolve conflicts between structurally-differentiated units (Smith and Tushman, 2005). Indeed, social integration has been found to have positive effects on the successful development of corporate ventures (Gilbert, 2006) and ambidexterity (Jansen *et al.,* 2009). Still, others present evidence that a more modest level of integration via senior teams is desirable for enhancing the positive effect of structural differentiation on corporate entrepreneurial outcomes (Burgers *et al*., 2009; O'Reilly and Tushman, 2011).

*Cross-functional interfaces* provide direct, lateral relations between units through, for example, liaison roles, cross-unit teams and task forces (Galbraith, 1973). Such formal mechanisms act as boundary-spanners that connect the different thought worlds formed through increased structural differentiation (Carlile, 2004). Cross-functional interfaces enhance knowledge in- and outflows of autonomous subsidiaries (Gupta and Govindarajan, 2000), reduce agency-type conflict amongst differentiated units (Daft and Lengel, 1986), and juxtapose diverse bodies of knowledge, thereby facilitating the creation of CE (Fiol, 1995). Studies confirm the positive effects on managerial and firm-level ambidexterity of complementing structural differentiation with cross-functional interfaces (Jansen *et al.*, 2009; Mom, Van den Bosch and Volberda, 2009). Nonetheless, several scholars have expressed

caution against extensively using cross-functional interfaces in combination with structural differentiation, as it may interfere with the benefits of structural differentiation as a driver of CE (Burgers *et al.*, 2009; Foss *et al.*, 2013; Gilbert, 2006; Raisch, 2008).

The mixed findings regarding the value of integration mechanisms in differentiated organizations led Boumgarden *et al*. (2012: 606) to question the generalizability of the observation 'that the benefits of crafting somewhat conflicting organizational structures exceed the costs of doing so.' There is little understanding of why these costs resulting from integration are outweighing benefits in some cases, but not in others. The remainder of this paper investigates how contingencies – namely, organizational size and environmental dynamism – influence the benefits-costs trade-offs of shared vision, senior team social integration and cross-functional interfaces as integrators that affect CE levels in structurally-differentiated firms.

**Balancing benefits and costs resulting from integration: a contingency view**

To fully appreciate the effects of integrative devices, the benefits of between-unit coordination need to be understood in relation to the costs associated with integration. Two types of costs can be distinguished. The first is the *cost of organizing integration*, including 'setup costs to configure the set of design elements, as well as administrative costs to maintain and operate them' (Boumgarden *et al.*, 2012: 593). In line with previous studies, we acknowledge the existence of integration organizing costs but focus our research on a second type of costs, the *costs resulting from integration* (cf. Boumgarden *et al.,* 2012; Puranam *et al.,* 2009). These costs are negative externalities of integration mechanisms in the context of differentiation that suppress the level of corporate entrepreneurial activities in organizations. They include loss of autonomy (Puranam *et al.*, 2009), slower decision-making that can hamper the flexibility of CE units to adapt to changing demands (Siggelkow and Rivkin, 2005), and reduced diversity of ideas and conflicting expectations between the differentiated

unit and the organization (Soda and Zaheer, 2012). High levels of integration may also induce groupthink and organizational inertia, suppressing the likelihood that entrepreneurial opportunities will be identified and pursued (Burgelman, 2002).

The influential work of Lawrence and Lorsch (1967) revealed that not only are the effects of structural differentiation contingent upon the level of integration, but also on environmental uncertainty. Others have shown how the effects of organizational design are contingent on organizational size (cf. Pugh *et al.*, 1969). The recent resurgence in understanding the outcomes of differentiation and integration in ambidexterity-focused research has largely ignored the role of these organizational and environmental contingencies (Raisch and Birkinshaw, 2008). Taking into account such contingencies is key to understanding the cost-benefit balance of differentiation-integration design choices. We address the role of organizational size and environmental dynamism as contingencies affecting how particular differentiation-integration combinations relate to CE levels.

*Organizational size* as reflected in number of employees is a key organizational design contingency (cf. Donaldson, 2001; Vaccaro *et al.,* 2012). Dealing with a larger number of employees places increasing pressures on management to create more complex organizational structures that allow for increased specialization in differentiated units and to coordinate between those units (Child, 1975; Pugh *et al.*, 1969). Smaller organizations face less severe organizational impediments to coordinate across units, as managers tend to be closer to each other in a structural and/or physical sense and experience more frequent contact (Lubatkin *et al.*, 2006). We expect that integration devices will have more positive effects on the relationship between structural differentiation and CE in larger organizations.

*Environmental dynamism* refers to the degree of change and instability of the environment (Dess and Beard, 1984; Jansen, Van den Bosch and Volberda, 2006). In situations of higher dynamism, there is a greater need to obtain knowledge from beyond the

unit's boundaries (Tushman and Nadler, 1978). Yet firms in dynamic environments face ever-changing interdependencies and it may become impossible for an organizational architect to design sustainable 'fit' into organizational linkages (Puranam, Raveendran and Knudsen, 2012). Costs such as reduced flexibility, slower decision-making and the predetermined knowledge flows associated with integration (Siggelkow and Rivkin, 2005; Soda and Zaheer, 2012) diminish an agent's ability to develop CE initiatives in line with the changing demands of the competitive environment. We argue that in more dynamic environments, integration mechanisms will have less positive effects on the structural differentiation – CE relationship.

## HYPOTHESES

### Organizational size

*Shared vision, organizational size, and structural differentiation.* In structurally-differentiated organizations, knowledge sets and norms start to converge around organizational units, resulting in a wide variety of meanings across the organization (Carlile, 2004). CE often results from the juxtaposition of these thought worlds (Fiol, 1995). A shared vision provides the common lexicon that facilitates communication across those thought worlds to leverage the diversity into CE. Larger organizations are inherently more diverse and there will be a higher need for a shared vision to facilitate knowledge flows across units when they are structurally differentiated. The lower heterogeneity in smaller organizations and the more direct contact between employees suggests there is less benefit of a shared vision as a common language to facilitate knowledge flows (Vaccaro *et al.*, 2012).

Given the more specialized nature of units in larger organizations and the frequent weakness of social control mechanisms that cross differentiated organizational units, there is a higher risk of opportunistic behavior in structurally-differentiated units when the size of the organization increases. Managers of units in large structurally-differentiated organizations

may face more ambiguity as to whether and which types of CE activities are needed for the organization (Shimizu, 2012). A higher level of agreement on organizational goals reduces this ambiguity, resulting in increased likelihood of managers in differentiated units engaging in CE. Employees in smaller organizations have a more intimate understanding of each other and this reduces the likelihood of opportunistic behavior (Lewicki and Bunker, 1996). This reduces the need for a shared vision across structurally-differentiated units in smaller organizations as a means to alleviate the agency risks constraining engagement in CE activities. In short, increases in organizational size increase the benefits of having a shared vision when CE is promoted via structurally-differentiated units, suggesting the following hypothesis:

HYPOTHESIS 1A: *The moderating effect of shared vision on the structural differentiation-CE relationship is more positive for larger organizations.*

*Senior team social integration, organizational size, structural differentiation.* Structural differentiation leads to increased fragmentation when organizations grow larger. This constrains CE, as employees may be unaware of the existence of relevant knowledge within their firm. Senior team social integration may facilitate knowledge transfer, as top management is in the best position to oversee relevant connections for differentiated units (O'Reilly and Tushman, 2004). This connection of different thought worlds will raise the novelty, quality, and number of new ideas put forward (Shimizu, 2012) as well as the speed and efficiency with which CE activities operate. Conversely, lower levels of bureaucracy and complexity can enable members of differentiated units in smaller organizations to more easily access intra-organizational knowledge, reducing the need for senior team cohesion as a mechanism to facilitate CE-enhancing knowledge flows.

Higher levels of structural differentiation increase the likelihood of inter-unit agency conflicts that lessen the levels of CE (Shimizu, 2012). Growing organizations tend to become

increasingly complex and diverse in their thought worlds, further increasing the likelihood of conflicts. Findings suggest organizational size is positively correlated with disagreements amongst senior management (Iaquinto and Fredrickson, 1997) and between structurally-differentiated units and the senior team (Corwin, 1969). Members of socially-integrated senior teams are more likely to address these conflicts in an efficient way due to their attractiveness to the group (Beal *et al.,* 2003; Smith *et al.*, 1994). Therefore, in particular in larger organizations, constructively embracing these conflicts through higher levels of senior team social integration may further enhance the positive relationship between structural differentiation and CE. A downside of higher levels of social integration is that senior teams become more susceptible to groupthink, creating a consensus around mainstream activities at the expense of CE (Jansen *et al.*, 2008; Smith and Tushman, 2005). The increased departmentalization of larger organizations may attenuate the tendency towards groupthink amongst top management (Baunsgaard and Clegg, 2013). In short, the growth in organizational size creates a stronger need for senior teams to socially integrate and at the same time diminishes the negative effects emanating from socially cohesive teams in attempts to facilitate conflict reduction and knowledge sharing in support of CE.

HYPOTHESIS 1B: *The moderating effect of senior team social integration on the structural differentiation-CE relationship is more positive for larger organizations*.

*Cross-functional interfaces, organizational size, structural differentiation.* Cross-functional interfaces have a capacity to transfer large amounts of knowledge across units, but are also associated with significant costs (Tushman and Nadler, 1978). Direct, lateral relations and task forces facilitate knowledge sharing across the different thought worlds formed through spatially separating explorative and exploitative units (Jansen *et al.,* 2009). The anticipated positive relationship between structural differentiation and observed CE levels may be more pronounced among large organizations that emphasize cross-functional

interfaces because of the higher complexity and more diverse bodies of knowledge that exist in larger organizations. In smaller organizations, members are likely to already have connections amongst each other that promote the cross-unit fertilization of knowledge, and such common ground reduces the need to integrate formally (Puranam *et al.*, 2009).

Structural differentiation also creates information asymmetries that are stronger for larger organizations. These information asymmetries constrain CE in two ways: (1) through encouraging self-interested behavior among individuals/units and (2) through creating greater difficulty in evaluating and approving initiatives (Shimizu, 2012). An important role of cross-functional integrators is to remove the equivocality created through asymmetric information (Daft and Lengel, 1986; Galbraith, 1973). Considering the reduced need for cross-functional interfaces in smaller organizations, we expect the moderating effect of cross-functional interfaces to become weaker or even negative for such organizations. Consistent with this point, research on a sample of predominantly SMEs by Foss *et al.* (2013) revealed that the interaction of cross-functional coordination and decentralized units has a negative impact on the exploitation of entrepreneurial opportunities. Similar findings were obtained by Burgers *et al.* (2009) who reported a negative moderation effect of differentiation and cross-functional interfaces on corporate venturing activity levels.

HYPOTHESIS 1C: *The moderating effect of cross-functional interfaces on the structural differentiation-CE relationship is more positive for larger organizations*.

**Environmental dynamism**

*Shared vision, environmental dynamism, and structural differentiation.* A shared vision provides direction that guides and coordinates the actions of diverse organizational units (Sinkula, Baker and Noordewier, 1997). Shared meaning and purpose facilitate knowledge transfer and mitigate conflicts across structurally-differentiated units (Nohria and Ghoshal, 1994). A shared vision is engrained in employees through long socialization processes and is

not easily changed (Van Maanen and Schein, 1979). This works well for organizations operating in stable environments, as the predictability of the environment allows managers to develop an organizational identity commensurate with the known demands of the environment. In more dynamic environments, the rate of obsolescence of products and strategies increases (Sorenson and Stuart, 2000), requiring more exploratory innovations deviating from the organizational core (Jansen *et al*., 2006). A higher level of structural differentiation provides agents with the autonomy to engage in such exploratory behavior.

Still, a strongly shared identity narrows the window of opportunities being considered by managers and employees throughout the organization (Mihalache *et al.*, 2012; Rotondi, 1975), and the effects of sharing a vision may be particularly detrimental to the CE output emanating from the structurally-differentiated units of firms operating in dynamic environments. Findings from Kellogg, Orlikowski and Yates' (2006) case study of a firm facing high levels of environmental dynamism suggest that a shared corporate meaning constrained their 'Creative' unit responsible for delivering innovative breakthrough designs. Conflicts over the appropriateness of the common identity led Creative members to withhold important information, and they felt that this identity slowed decision-making in an environment where speed is essential. Members of the Creative unit expressed that developing new ideas was much easier to accomplish when the corporate identity was not embraced as a guiding force within their unit (Kellogg *et al.*, 2006).

HYPOTHESIS 2A: *The moderating effect of shared vision on the structural differentiation-CE relationship is less positive for organizations facing higher levels of environmental dynamism.*

*Senior team social integration, environmental dynamism, structural differentiation.* Senior team social integration is an efficient mechanism for sharing knowledge across units and resolving agency conflicts (Jansen *et al.*, 2009). These benefits are important when

structurally-differentiated units are being employed to facilitate CE. Structural differentiation provides the needed autonomy for CE, while senior team social integration ensures that information is being shared and the norm of cooperation prevails among the senior managers. Still, the benefits of pairing structural differentiation with senior team social integration as a means to facilitate CE will likely be diminished among firms operating in more dynamic environments.

Specifically, in dynamic environments, organizations are often best served by a looser coupling of differentiated units, allowing key operating decisions to be made at the unit level (Benner and Tushman, 2003). Dynamic environments require higher levels of information-processing capability from the senior team if they do want to coordinate across units. However, bounded rationality predicts that senior managers may increasingly struggle to make sense of dynamic environments, with information overload decreasing decision-making performance (O'Reilly, 1980). Senior managers operating in dynamic environments will often mitigate conflict between mainstream and differentiated CE activities by concentrating resources on mainstream business activities (Burgelman, 2002; Jansen *et al.*, 2008; Smith and Tushman, 2005). Moreover, efforts to maintain unity in senior teams facing dynamic environments can create slow-responding organizations (Smith *et al.*, 1994), resulting in decreased CE levels.

HYPOTHESIS 2B: *The moderating effect of senior team social integration on the structural differentiation-CE relationship is less positive for organizations facing higher levels of environmental dynamism.*

*Cross-functional interfaces, environmental dynamism, structural differentiation.* Stable environments have a level of predictability that may allow managers to structure organizations in a way that best facilitates CE. The stability and predictability of inter-unit interdependence often seen in stable environments makes the use of cross-functional

interfaces an efficient way to provide structurally-differentiated units access to the wealth of organizational knowledge, thereby stimulating cross-boundary CE initiatives (Kleinbaum and Tushman, 2007). Consistent with this point, research by Miller (1992) reveals that high levels of structural differentiation are most likely to be productively matched with the use of integration devices in low uncertainty environments.

Yet, boundary-spanners tend to specialize in particular boundaries across units (Tushman and Scanlan, 1981). Faraj and Xiao (2006) found that such pre-identified interdependencies are rendered ineffective when individual units need to rapidly respond. Given the changing interdependencies under conditions of high environmental dynamism, the extensive use of cross-functional interfaces may channel knowledge searches in outmoded directions, thereby hampering CE levels. Boundary spanners may also inappropriately influence CE activities in cases where those activities would benefit from flying under the radar (Burgelman, 1983) and the interdependency created through higher levels of cross-functional interfacing slows the decision-making of structurally-differentiated units (Galbraith, 1973; Siggelkow and Rivkin, 2005). The resulting diminished adaptive capacity of differentiated units connected via cross-functional interfaces may reduce the level of CE activity. As documented by Benner and Tushman (2003), the absence of constraints on differentiated units facilitates rapid response to environmental changes in the form of newly-launched entrepreneurial initiatives. In short, the need for adaptive capacity in dynamic environments, calls for lower rather than higher levels of cross-functional interfaces.

HYPOTHESIS 2C: *The moderating effect of cross-functional interfaces on the structural differentiation-CE relationship is less positive for organizations facing higher levels of environmental dynamism.*

## DATA AND METHODS

### Research setting and data

A sample of 4,000 firms in the Netherlands was randomly selected from Reach, the most comprehensive database of Dutch companies. A questionnaire with our independent variables was administered to the executive directors of each of the 4,000 firms, yielding 452 responses, representing a response rate of 11.3 percent. To time-separate the independent and dependent variables, a survey with our dependent variable, level of CE, was administered to the same 452 executive directors. Completed surveys were received from 240 firms, representing 6.0 percent of the original sample. The data are described in more detail in earlier work (Burgers *et al.,* 2009).

The average number of full-time employees was 495.39 (s.d. = 3098.15) and the average firm age was 40.56 years (s.d. = 34.97). The firms were operating in a broad range of industries covering manufacturing (52%), construction (17%), trade (6%), transportation (5%), financial services (7%), and professional services (12%). The respondents of these 240 firms had an average company tenure of 13.57 years (s.d. = 10.17), indicating that the selected respondents were experienced and knowledgeable about the firm.

To address method variance, the response of one additional top management team member in each responding company was sought for both surveys (Podsakoff *et al.*, 2003). The first survey resulted in 36 responses from the 240 firms in our final sample, and the follow-up survey received 57 responses from additional top management team members. To statistically demonstrate how consensual raters were within a single organizational context, we calculated the average $r_{wg}$ for each organization (Kozlowski and Hults, 1987). The $r_{wg}$ for organizations ranged from 0.72 to 0.99 with a mean 0.92 for the independent variables survey, and ranged from 0.78 to 0.99 with a mean of 0.95 for the follow-up survey pertaining

to the dependent variables. Following the procedure of James, Demaree and Wolf (1984), we also calculated the average $r_{wg}$ per variable for our constructs, which ranged from 0.88 to 0.94. Values for each construct can be found in the measures section. Overall, the $r_{wg}$ values indicate sufficient agreement within organizations for both the independent and dependent variables and minimize concerns about single-rater bias.

To mitigate concerns about potential non-response bias, non-respondents and respondents were compared on firm age, number of employees and revenue. Next, early and late respondents were compared in terms of demographic characteristics and model variables. The comparisons did not reveal any significant differences ($p>0.05$). Finally, we controlled for effects of potential non-response bias by applying a Heckman-procedure (see Burgers *et al.*, 2009 for details). The direction and significance of all our main independent and moderating variables remained the same, indicating that non-response bias is not of concern in our study.

**Measures**

Measures for the independent and dependent variables were based on multi-item scales derived from prior literature (see Appendix).

**Dependent variable**

The level of *corporate entrepreneurship* was measured with 14 items ($\alpha = 0.88$; $r_{wg} = 0.94$) based on Zahra (1996). Following recent insights, CE was modeled as a meta-construct consisting of the sum of a firm's innovation, venturing, and strategic renewal activities (cf. Ling *et al.*, 2008; Simsek, Veiga, Lubatkin, 2007). CFA was employed to test the validity of the second-order model. Dropping two items produced good fit: $\chi^2$ (195, n=240, $p<0.001$), CFI (0.93), TLI (0.92), IFI (0.93), RMSEA (0.08). This is comparable to results obtained in previous studies (cf. Simsek and Heavey, 2011). The chi-square difference test showed the

second-order model was a significant improvement over the independent first-order factor model $\chi^2$ (116, df=3, p<0.001). The significant correlations of CE with R&D investments as a percentage of sales (r= 0.31, p<0.01), percentage of revenue in the last 3 years due to new products and services (r=0.34, p<0.01), and sales growth (r=0.22, p<0.01) further demonstrate the construct validity of CE.

**Independent variables**

*Structural differentiation* was measured with a six-item scale ($\alpha = 0.78$; $r_{wg} = 0.89$) from Jansen *et al.* (2009). The items captured the extent to which organizations separate entrepreneurial and efficiency activities in separate organizational units. *Shared vision* taps into the extent to which there is a common purpose and organizational members' agreement and commitment to it. The five-item scale ($\alpha = 0.87$; $r_{wg} = 0.93$) is based on Sinkula *et al.* (1997). *Senior team social integration* ($\alpha = 0.85$; $r_{wg} = 0.94$) was measured by five items adapted from Smith *et al.* (1994). The items reflect the attraction to the top management team, satisfaction with other top management team members, and the social interaction among team members. *Cross-functional interfaces* gauges the extent to which firms use formal boundary-spanning integration mechanisms such as task forces, cross-departmental teams and coordination of knowledge flows. This variable was measured with a five-item scale ($\alpha = 0.74$; $r_{wg} = 0.91$) appearing in Jansen *et al.* (2009). *Environmental dynamism* pertains to the rate of change of the competitive environment and was captured by a four-item measure ($\alpha = 0.80$; $r_{wg} = 0.88$) from Jansen *et al.* (2006). *Organizational size* was measured by the number of employees, log transformed for normality. Because of our use of organizational size as an independent variable as opposed to a covariate, we took extra steps to ensure its validity. First, the data for number of employees was gathered from the Reach database, as opposed to self-reported measures. Second, the highly significant correlation with annual revenue (r=0.92, p<0.001) suggests convergent validity.

**Covariates**

*Firm age,* measured by the log of the number of years since the firm's founding, may control for older firms having a different propensity to engage in CE than younger firms. *Past performance* ($\alpha = 0.82$; $r_{wg} = 0.94$), an indicator of the presence of organizational slack that could be used to stimulate CE, was measured on a Likert scale that compared firm performance over the past three years relative to competitors in the industry on ROI, sales growth, profit growth, attracting new customers and market share growth (cf. Lubatkin *et al.*, 2006). Firms in certain industries may be more prone to engage in CE relative to those in other industries. Seven dummies controlled for additional *industry* effects: manufacturing, construction, trade, transportation, financial services, professional services, and other industries.

## RESULTS

Table 1 presents an overview of the means, standard deviations and correlations of our main variables. To test our hypotheses, our hypothesized variables and controls were regressed on CE (see Tables 2 and 3). Models 1a–6a are the base models with the control variables, direct effects, and all possible two-way interactions. Models 1b–3b add the three-way interaction terms pertaining to organizational size (hypotheses 1A–C), and models 4b–6b include the three-way interaction terms pertaining to environmental dynamism (hypotheses 2A–C). The independent variables were mean centered prior to creating the interaction terms. Variance inflation factors (VIF) stayed well below 10, indicating that multicollinearity is not of concern. Following the recommendations of Dawson and Richter (2006), we conducted slope difference tests using Stata 13's Margins command. Test values were set at one standard deviation below and above the mean.

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Insert Tables 1, 2, and 3 here

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Past performance and structural differentiation, as expected, have strong positive effects on CE. The results support hypothesis 1A, in that the effect of shared vision on the structural differentiation-CE relationship is positively influenced by organizational size ($\beta = 0.121$, $p<0.05$). Consistent with our arguments, Figure 1A shows that shared vision enhances the positive effect of structural differentiation on CE to a greater extent in larger organizations than smaller organizations. The slope difference test revealed that lines 2 and 1 are significantly different from each other ($t=-2.54$, $p<0.05$). Furthermore, the influence of the extent of shared vision is more pronounced in larger organizations (slope difference lines 3 and 1, $t=-2.53$, $p<0.05$). In smaller organizations, the degree of shared vision does not differentially affect the structural differentiation – CE relationship, as the slope difference between lines 4 and 2 is insignificant ($t=1.05$, $p=0.29$).

Hypothesis 1B, suggesting an interaction effect of structural differentiation, senior team social integration, and organizational size on CE, is not supported by our regression results ($\beta = 0.071$, n.s.). However, the slope differences test revealed that high levels of senior team social integration enhances the positive effect of structural differentiation on CE to a greater extent in larger organizations relative to smaller organizations ($t=-2.18$, $p<0.05$). This test also revealed that within smaller organizations, higher levels of senior team social integration nullify the positive effects of structural differentiation on CE to such an extent that smaller firms would be better not pursuing social integration in senior teams ($t=1.67$, $p<0.1$). These results provide some support for our argument that senior team social integration is more beneficial to CE in structurally-differentiated larger organizations.

The analyses corroborate our contention that the interaction effect of structural differentiation and cross-functional interfaces on CE is more positive in larger organizations ($\beta = 0.082$, $p<0.01$). Figure 1B shows that cross-functional interfaces enhance the positive effect of structural differentiation on CE to a greater extent in larger organizations than

smaller organizations (slope difference lines 2 and 1, t=-2.85, p<0.01). In line with our arguments regarding the cost resulting from cross-functional interfaces in smaller organizations, the slope differences test reveals a significant difference between lines 4 and 2 (t=4.04, p<0.001). This suggests that in smaller organizations CE is better facilitated by combining structural differentiation with low rather than high levels of cross-functional integration. Taken together, the results support hypotheses 1C.

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Insert Figures 1A and 1B here

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The results for hypotheses 2A–C on the effects of environmental dynamism are presented in Table 3 and Figures 2A–C. Model 4b shows marginal support for hypothesis 2A ($\beta$ = -0.072, p<0.10). In more dynamic environments, the joint effect of a shared vision and structural differentiation on CE is attenuated. The plot in Figure 2A indicates that the use of a shared vision as an integrating mechanism across structurally-differentiated units is an effective way to stimulate CE in both stable and dynamic environments. Yet, a low degree of shared vision seems to attenuate the effect of structural differentiation on CE in stable environments, but enhance the effect in dynamic environments (slope difference lines 4 and 3, t=-1.66, p<0.1).

Our argument that the interaction effect of structural differentiation and senior team social integration on CE is negatively affected by environmental dynamism (hypothesis 2B) is supported by our results ($\beta$ = -0.102, p<0.05). Figure 2B reveals that highly integrated senior teams attenuate the positive effect of structural differentiation on CE in dynamic environments (slope difference lines 3 and 1, t=2.73, p<0.01). The significant slope difference between lines 4 and 3 (t=-2.07, p<0.05) suggests that lower levels of senior team social integration have a more positive effect on the structural differentiation-CE relationship in dynamic environments.

Our findings provide some support for hypothesis 2C. The interaction effect of structural differentiation and cross-functional interfaces on CE is negatively affected by environmental dynamism ($\beta = -0.054$, $p<0.10$). Figure 2C highlights that in more dynamic environments, structural differentiation has a more positive effect on CE when combined with lower degrees of cross-functional interfaces rather than higher degrees of cross-functional interfaces (slope difference lines 3 and 1, $t=3.20$, $p<0.01$). The slope difference test further reveals that the positive effect of structural differentiation on CE is more strongly enhanced by low cross-functional interfaces in dynamic environments than by high cross-functional interfaces in stable environments (slope difference lines 3 and 2, $t=2.29$, $p<0.05$).

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Insert Figures 2A, 2B and 2C here

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**Supplementary analyses**

The correlation results indicate that cross-functional integration is positively associated with both organizational size ($r=0.177$; $p<0.01$) and environmental dynamism ($r=0.156$; $p<0.05$), which may suggest that the use of integration mechanisms is a function of organizational size rather than its effects being moderated by size. Supplementary analysis of the variance in cross-functional integration among subgroups composed of (1) larger vs. smaller firms and (2) firms in dynamic vs. stable environments revealed that cross-functional integration still exhibits considerable within-group variation and limited between-group variation, with standard deviations approaching or exceeding 1.0 in each case/subgroup. An alternative explanation is that cross-functional integration would have a curvilinear rather than an interaction effect, which can be controlled for by adding the curvilinear term prior to the three-way interaction (Cortina, 1993). The direction and significance level of the three-way interaction terms remained the same when including the curvilinear term of cross-functional integration.

In light of our literature review positing that several studies viewed high levels of autonomy as inherent to corporate venturing, we conducted sensitivity analyses in which we removed the five items pertaining to venturing from our dependent variable. The regression results rejected the possibility of conceptual overlap between corporate venturing and structural differentiation driving our results, as the simple slopes and the slope differences remained very similar in terms of effect sizes and significance levels. This confirms our assumption that decisions on organization design should be seen as distinct from the level of corporate venturing/entrepreneurship activity.

Finally, to further explore potential negative effects of integration mechanisms, we conducted post-hoc tests in which we ran the same three-way interactions models as per Tables 2 and 3, but replaced structural differentiation with one of the other integration mechanisms. In line with our arguments regarding costs resulting from integration, we would expect that in smaller organizations and more dynamic environments, high levels on two integration mechanisms simultaneously would be the most negative of the four regression lines. This was largely supported for environmental dynamism but not for organization size.

## DISCUSSION

In this research, we sought to gain insight into how organizational size and environmental dynamism operate as contingencies affecting the value of integration mechanisms — namely, shared vision, senior team social integration, and cross-functional interfaces ─ as potential facilitators of the structural differentiation–CE relationship. Prior studies have debated about the extent to which structurally-differentiated units should be integrated (Raisch and Birkinshaw, 2008). Utilizing a contingency perspective on the benefits, such as cross-unit knowledge sharing and agency-conflict reduction, and costs resulting from integration, our results suggest refining this question to consider *when* integration should take place across differentiated units.

Specifically, our findings based on a time-separated sample of 240 companies reveal that higher levels of integration in combination with structural differentiation is more important for enhancing CE in larger than in smaller organizations. This confirms prior notions that the benefits of integration and differentiation increase with the size of the organization (Child, 1975; Vaccaro *et al.*, 2012). In smaller organizations the costs resulting from integration outweigh the benefits when attempting to overcome coordination problems via cross-functional interfaces and senior team integration. Similarly, among firms operating in dynamic environments the structural differentiation–CE relationship is more positive for low levels of senior team and cross-functional integration. These results should not be interpreted as implying that firms operating in dynamic environments require less knowledge sharing to realize CE-activities. Instead, consistent with recent case studies investigating the limits of integration in more dynamic environments (cf. Faraj and Xiao, 2006; Kellogg *et al.*, 2006), they call for questioning the effectiveness of the hypothesized integration mechanisms as facilitators of knowledge sharing and CE in more dynamic environments.

That the three integration mechanisms exhibit similar interaction effects with structural differentiation across comparable organizational size and environmental dynamism conditions helps reconcile prior notions arguing for lower (Benner and Tushman, 2003; Burgers *et al.*, 2009) and higher (Jansen *et al.*, 2009) levels of integration. The proposed contingency view extends prior studies that often implicitly assumed that organizational designs are either conducive to CE or not, regardless of organizational size or state of the environment (cf. Burgers *et al.*, 2009; Garrett and Covin, 2013). Our findings give rise to rethinking — or at least qualifying — this assumption and suggest investigating the consistency of design effects on CE in different types of environments and organizations. Finally, this study lends support for Raisch and Birkinshaw's (2008) call for investigating

contingencies regarding the effect of structural antecedents on organizational ambidexterity. Our developed contingency framework provides guidance for designing such future studies.

Interestingly, we observed a difference between the effects of senior team social integration and cross-functional interfaces on the one hand and shared vision on the other. Whereas all three integration mechanisms demonstrated similar effects when comparing *across* organizations of different size and levels of environmental dynamism, shared vision behaved differently *within* the context of smaller organizations and dynamic environments. Whereas for cross-functional interfaces and senior team social integration the structural differentiation-CE relationship benefited most from low as opposed to high levels of integration, this was not the case for shared vision. This suggests senior team social integration and cross-functional interfaces result in more significant costs regarding CE than does a shared vision. A shared vision may be less intrusive, as it focuses on creating a common language and objectives. The different thought worlds of structurally-differentiated units may prevent the shared vision from becoming too dominant. This resonates with findings from Voss *et al.* (2006) who observed that performance can be maximized when minor disagreements about the shared identity exist. An implication of our findings is that a stronger voice should be given to costs resulting from integration. In general, the impact of integration mechanisms can be best understood by adopting a balanced view that recognizes both the benefits *and* the costs of differentiation-integration in particular organizational and environmental contexts.

Our results also have implications for addressing the role of agency when studying CE (Jones and Butler, 1992; Shimizu, 2012). We show that integration mechanisms such as shared vision, senior team social integration and cross-functional interfaces are in larger organizations and more stable environments fruitful ways to mitigate the agency risks associated with CE in structurally-differentiated organizations. We build on calls from Mills

and Ungson (2003) by recognizing the value of employing non-traditional agency monitoring and control mechanisms when pursuing novel tasks. We argue that shared vision, senior team social integration and cross-functional interfaces may reduce conflict in larger organizations and stable environments, yet become part of the problem causing possible conflict in smaller organizations and dynamic environments. Thus, we extend works on agency in CE (cf. Shimizu, 2012) by demonstrating that the extent to which integration mechanisms can alleviate agency risks is contingent on organizational size and environmental dynamism.

The current results point to three managerial implications. First, the robust, positive effect of structural differentiation on CE implies that managers will be well served by employing dedicated, structurally-differentiated innovation units if their goal is to increase their firms' CE levels. Second, managers of large, innovation-seeking organizations are advised to invest in the development of integration mechanisms – shared vision, senior team social integration, and cross-functional interfaces – as means for extracting the most value from their structurally-differentiated innovation units. Managers of smaller organizations should exercise care in not investing too early or heavily in integration mechanisms, as such mechanisms may have minimal or possibly detrimental effects on the level of CE emanating from structurally-differentiated innovation units. Third, managers are encouraged to tightly integrate (via an emphasis on the creation of a shared vision, senior team social integration and cross-functional interfaces) structurally-differentiated innovation units as a means to promote CE levels when their firms are operating in stable environments, but to allow for looser coupling among such units when their firms are operating in more dynamic environments.

**Limitations and future research directions**

We employed a static perspective in that organizations are observed as having a certain configuration of differentiation and integration mechanisms which influences the level of CE.

While the chosen perspective arguably offers valuable insights into the costs and benefits *as a result* of integration, it neglects the costs associated with *setting up* integration mechanisms. For example, building integration mechanisms is often a lengthy and costly process (Galbraith, 1973), and the invested resources may result in less organizational slack being available for CE activities. Future research may benefit from adopting a more dynamic perspective in which the costs associated with changing configurations of differentiation and integration mechanisms are considered in addition to the costs and benefits resulting from integration.

In our research we focused on the effects of organizational-level integration and differentiation mechanisms on CE outcomes, and we identified organization size and dynamism as contingencies. Recent studies on the practice of boundary-spanning in units suggest that unit-level variables such as unit size may be an alternative contingency (Kleinbaum, Stuart and Tushman, 2013). Future research might explore whether, due to their more substantial resource bases, larger units have increased abilities to deal with the tasks at hand and thus are associated with diminished cross-unit integration needs. Another promising line of enquiry is to extend our contingency framework of the joint effects of differentiation and integration mechanisms on facilitating CE activity to understanding its influence on CE success. For example, recognizing that many organizations vacillate between periods of exploration and exploitation (cf. Boumgarden *et al.,* 2012), a fruitful avenue of research may be to investigate if and how the contingent effects of differentiation and integration differ across exploration phases aimed at increasing the level of CE activity and exploitation phases aimed at successfully growing and exploiting existing CE initiatives.

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## Appendix

Items and Constructs[a]

**Corporate entrepreneurship (Zahra (1996)**

Over the past three years…

We have pioneered the development of breakthrough innovation in our industry
Our organization is among the first to implement new processes
We are usually the first to recognize and exploit new markets in our industry.
Our organization is leading in the area of product and process innovations.
We have introduced a large number of new products and services to the market.
Our organization has entered many new industries
We have expanded our international operations significantly
We have acquired many companies in very different industries
Our organization has created various new lines of products and services
Our organization has established or sponsored various new ventures
We have focused on improving the performance of our current business rather than entering new industries® [b]
We have divested several unprofitable units[b]
Our organization has changed its strategy for each unit
We have initiated several programs to improve the productivity of our units
We have reorganized operations to ensure increased coordination and communication among units
Our organization has renewed the portfolio of activities within units

**Structural differentiation (Jansen *et al.*, 2009)**

Our organization has autonomous units to enhance innovation and flexibility
Innovation and production activities are structurally separated in our organization
We have departments that are either focused on the short term or the long term
Our organizational units are specialized in certain functions and/ or markets
We use distinct organizational units to serve different customer needs
Line and staff departments are clearly separated in our organization

**Shared vision (Sinkula *et al.*, 1997)**

There is commonality of purpose in my organization
There is total agreement on our organizational vision
All organizational members are committed to the goals of this organization
People are enthusiastic about the collective goals and mission of the whole organization
Our unit shares the same ambitions and vision with other units at work

**Senior team social integration (Smith *et al.*, 1994)**

The members of the top management team are quick to defend each other from criticism by outsiders[b]
Everyone's input is incorporated into most important company decisions
The members of the top management team get along together very well
The members of the top management team are always ready to cooperate and help each other
There is a great deal of competition between members of the top management team ®
The members of the top management team really stick together

**Cross-functional interfaces (Jansen *et al.*, 2009)**

Employees are regularly rotated between different functions
There is regular talk about possibilities for collaboration between units
Our organization coordinates information sharing between units through a knowledge network
We have cross-functional teams to exchange knowledge between departments
We have standardized work processes for cooperation between units[b]
We often involve multiple organizational units in strategic decision-making[b]
Our organization uses temporary workgroups for collaboration between units on a regular basis

**Environmental dynamism (Jansen *et al.*, 2006)**

Environmental changes in our local market are intense.
Our clients regularly ask for new products and services.
In our local market, changes are taking place continuously.
In our market, the volumes of products and services to be delivered change fast and often.

[a] All items were measured on a seven-point scale, anchored by 1 = strongly disagree and 7 = strongly agree;
[b] Item deleted after factor analysis; ® reversed item

**Table 1. Descriptive statistics and correlations**

| Variables | Mean | SD | Min | Max | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Corporate entrepreneurship | 4.29 | 0.95 | 2.07 | 6.79 | (0.88) | | | | | | | | | | | | | | |
| 2. Structural differentiation | 4.17 | 1.24 | 1.00 | 7.00 | 0.371** | (0.78) | | | | | | | | | | | | | |
| 3. Shared vision | 5.37 | 0.93 | 2.20 | 7.00 | 0.251** | 0.115 | (0.87) | | | | | | | | | | | | |
| 4. Senior team social integration | 5.36 | 0.91 | 2.40 | 7.00 | 0.138* | 0.144* | 0.514** | (0.85) | | | | | | | | | | | |
| 5. Cross-functional interfaces | 4.22 | 1.19 | 1.20 | 7.00 | 0.313** | 0.363** | 0.409** | 0.252** | (0.74) | | | | | | | | | | |
| 6. Organizational size[b] | 4.46 | 1.25 | 3.22 | 10.95 | 0.133* | 0.220** | 0.001 | -0.014 | 0.177* | - | | | | | | | | | |
| 7. Environmental dynamism | 4.37 | 1.26 | 1.00 | 7.00 | 0.213** | 0.155* | 0.084 | 0.025 | 0.156* | 0.033 | (0.80) | | | | | | | | |
| 8. Past performance | 4.62 | 0.93 | 2.00 | 7.00 | 0.347** | 0.082 | 0.321** | 0.191** | 0.198* | 0.006 | 0.036 | (0.82) | | | | | | | |
| 9. Organizational age[c] | 3.39 | 0.87 | 1.10 | 5.54 | -0.027 | -0.024 | -0.030 | 0.042 | 0.007 | 0.129* | -0.150* | 0.003 | - | | | | | | |
| 10. Manufacturing | 0.53 | 0.50 | 0 | 1 | 0.108 | 0.009 | 0.033 | -0.003 | 0.085 | 0.127* | -0.044 | 0.163* | 0.219** | - | | | | | |
| 11. Construction | 0.18 | 0.38 | 0 | 1 | -0.250** | -0.101 | -0.057 | -0.020 | -0.116 | -0.191* | -0.030 | -0.150* | 0.064 | -0.488*** | - | | | | |
| 12. Trade | 0.06 | 0.24 | 0 | 1 | 0.055 | -0.013 | 0.016 | 0.099 | -0.026 | -0.102 | -0.072 | -0.004 | 0.016 | -0.274*** | -0.119 | - | | | |
| 13. Transportation | 0.05 | 0.21 | 0 | 1 | -0.230** | -0.063 | -0.027 | -0.064 | -0.078 | 0.017 | -0.178* | -0.047 | 0.023 | -0.232*** | -0.101 | -0.057 | - | | |
| 14. Financial services | 0.08 | 0.26 | 0 | 1 | 0.127* | 0.097 | 0.068 | 0.034 | 0.010 | 0.113 | 0.121 | 0.050 | -0.171** | -0.302*** | -0.131* | -0.074 | -0.062 | - | |
| 15. Professional services | 0.11 | 0.31 | 0 | 1 | 0.132* | 0.076 | -0.034 | -0.028 | 0.097 | 0.015 | 0.180* | -0.078 | -0.290** | -0.370*** | -0.161* | -0.090 | -0.076 | -0.099 | - |
| 16. Other industries | 0.00 | 0.06 | 0 | 1 | 0.019 | 0.017 | -0.012 | -0.025 | -0.132* | -0.064 | 0.007 | -0.043 | -0.107 | -0.069 | -0.030 | -0.017 | -0.014 | -0.018 | -0.023 |

***. Correlation is significant at the 0.001 level (two-tailed).
**. Correlation is significant at the 0.01 level (two-tailed).
*. Correlation is significant at the 0.05 level (two-tailed).
a. N=240. Numbers in parentheses on the diagonal are Cronbach alphas of the composite scales.
b. Log number of full-time employees
c. Log of years since founding

**Table 2. OLS regression analysis for corporate entrepreneurship with organizational size[a, b]**

| | Model 1a | Model 1b | Model 2a | Model 2b | Model 3a | Model 3b |
|---|---|---|---|---|---|---|
| **Covariates & main effects** | | | | | | |
| Construction[b] | -0.367* | -0.359* | -0.331* | -0.326* | -0.380** | -0.392** |
| | (0.145) | (0.144) | (0.145) | (0.144) | (0.143) | (0.141) |
| Trade | 0.229 | 0.239 | 0.270 | 0.275 | 0.261 | 0.262 |
| | (0.219) | (0.216) | (0.216) | (0.215) | (0.214) | (0.212) |
| Transportation | -0.822*** | -0.852*** | -0.830*** | -0.833*** | -0.817*** | -0.886*** |
| | (0.252) | (0.249) | (0.250) | (0.249) | (0.248) | (0.246) |
| Financial services | 0.282 | 0.261 | 0.310 | 0.297 | 0.227 | 0.224 |
| | (0.208) | (0.206) | (0.206) | (0.206) | (0.203) | (0.200) |
| Professional services | 0.312+ | 0.307+ | 0.314+ | 0.306+ | 0.324+ | 0.332+ |
| | (0.184) | (0.181) | (0.180) | (0.180) | (0.179) | (0.177) |
| Other industries | 0.677 | 0.635 | 0.704 | 0.657 | 0.302 | 0.228 |
| | (0.806) | (0.797) | (0.798) | (0.797) | (0.809) | (0.799) |
| Organizational age | 0.056 | 0.050 | 0.052 | 0.046 | 0.048 | 0.039 |
| | (0.065) | (0.064) | (0.064) | (0.064) | (0.063) | (0.062) |
| Past performance | 0.264*** | 0.250*** | 0.269*** | 0.266*** | 0.288*** | 0.282*** |
| | (0.060) | (0.059) | (0.059) | (0.059) | (0.059) | (0.058) |
| Organizational size | 0.007 | 0.025 | 0.010 | -0.004 | -0.027 | -0.021 |
| | (0.048) | (0.048) | (0.047) | (0.048) | (0.049) | (0.048) |
| Environmental dynamism | 0.064 | 0.077+ | 0.061 | 0.072+ | 0.087* | 0.090* |
| | (0.043) | (0.043) | (0.042) | (0.043) | (0.042) | (0.042) |
| Structural differentiation | 0.189*** | 0.170*** | 0.207*** | 0.205*** | 0.215*** | 0.181*** |
| | (0.047) | (0.047) | (0.046) | (0.046) | (0.045) | (0.046) |
| Shared vision | 0.097 | 0.053 | 0.108 | 0.108 | 0.100 | 0.095 |
| | (0.071) | (0.073) | (0.069) | (0.069) | (0.069) | (0.068) |
| Senior team social integration | -0.040 | -0.017 | -0.073 | -0.088 | -0.036 | -0.024 |
| | (0.066) | (0.066) | (0.067) | (0.067) | (0.065) | (0.064) |
| Cross-functional interfaces | 0.077 | 0.063 | 0.076 | 0.075 | 0.033 | -0.009 |
| | (0.052) | (0.052) | (0.051) | (0.051) | (0.053) | (0.054) |
| **Two-way interaction terms** | | | | | | |
| Structural differentiation * organizational size | 0.045 | 0.007 | 0.062+ | 0.054 | 0.070+ | 0.021 |
| | (0.037) | (0.039) | (0.037) | (0.037) | (0.038) | (0.042) |
| Structural differentiation * shared vision | 0.035 | 0.087+ | | | | |
| | (0.047) | (0.051) | | | | |
| Shared vision * organizational size | -0.082 | -0.141* | | | | |
| | (0.054) | (0.058) | | | | |
| Structural differentiation * senior team social integration | | | -0.042 | -0.022 | | |
| | | | (0.045) | (0.047) | | |
| Senior team social integration* organizational size | | | -0.120* | -0.123* | | |
| | | | (0.055) | (0.054) | | |
| Structural differentiation * cross-functional interfaces | | | | | -0.111** | -0.069+ |
| | | | | | (0.036) | (0.039) |
| Cross-functional interfaces* organizational size | | | | | 0.024 | -0.013 |
| | | | | | (0.044) | (0.045) |
| **Three-way interaction terms** | | | | | | |
| Structural differentiation *shared vision * organizational size | | 0.121* | | | | |
| | | (0.049) | | | | |
| Structural differentiation * senior team social integration * organizational size | | | | 0.071 | | |
| | | | | (0.05) | | |
| Structural differentiation * cross-functional interfaces * organizational size | | | | | | 0.082** |
| | | | | | | (0.031) |
| $R^2$ | 0.367 | 0.384 | 0.380 | 0.385 | 0.387 | 0.406 |
| F-value for change in $R^2$ | | 6.18* | | n.s. | | 6.85** |

[a] N = 240; Unstandardized coefficients are reported; standard errors in parentheses; + p<0.10; * p<0.05; ** p<0.01; *** p<0.001 [b] Manufacturing served as reference group in regression analyses

**Table 3. OLS regression analysis for corporate entrepreneurship with environmental dynamism[a, b]**

| | Model 4a | Model 4b | Model 5a | Model 5b | Model 6a | Model 6b |
|---|---|---|---|---|---|---|
| **Covariates & main effects** | | | | | | |
| Construction[b] | -0.379* | -0.433** | -0.367* | -0.393** | -0.380** | -0.394** |
| | (0.148) | (0.150) | (0.146) | (0.145) | (0.144) | (0.143) |
| Trade | 0.220 | 0.218 | 0.245 | 0.248 | 0.232 | 0.226 |
| | (0.221) | (0.220) | (0.219) | (0.217) | (0.217) | (0.216) |
| Transportation | -0.823*** | -0.812*** | -0.826*** | -0.849*** | -0.854*** | -0.811*** |
| | (0.253) | (0.252) | (0.253) | (0.250) | (0.250) | (0.249) |
| Financial services | 0.226 | 0.247 | 0.215 | 0.267 | 0.201 | 0.147 |
| | (0.208) | (0.207) | (0.207) | (0.206) | (0.204) | (0.205) |
| Professional services | 0.288 | 0.310+ | 0.314+ | 0.331+ | 0.332+ | 0.317+ |
| | (0.184) | (0.184) | (0.182) | (0.181) | (0.181) | (0.180) |
| Other industries | 0.596 | 0.563 | 0.566 | 0.545 | 0.390 | 0.360 |
| | (0.811) | (0.807) | (0.807) | (0.799) | (0.802) | (0.797) |
| Organizational age | 0.056 | 0.068 | 0.049 | 0.057 | 0.057 | 0.055 |
| | (0.065) | (0.065) | (0.064) | (0.064) | (0.064) | (0.063) |
| Past performance | 0.261*** | 0.240*** | 0.262*** | 0.248*** | 0.277*** | 0.266*** |
| | (0.061) | (0.061) | (0.061) | (0.061) | (0.060) | (0.059) |
| Organizational size | 0.019 | 0.007 | 0.020 | 0.001 | 0.017 | 0.009 |
| | (0.044) | (0.044) | (0.044) | (0.044) | (0.043) | (0.043) |
| Environmental dynamism | 0.073+ | 0.079+ | 0.065 | 0.076+ | 0.081+ | 0.112* |
| | (0.044) | (0.044) | (0.043) | (0.043) | (0.042) | (0.045) |
| Structural differentiation | 0.191*** | 0.195*** | 0.206*** | 0.206*** | 0.204*** | 0.206*** |
| | (0.047) | (0.047) | (0.046) | (0.046) | (0.045) | (0.045) |
| Shared vision | 0.112 | 0.145+ | 0.117 | 0.124+ | 0.109 | 0.102 |
| | (0.072) | (0.074) | (0.072) | (0.071) | (0.069) | (0.069) |
| Senior team social integration | -0.049 | -0.051 | -0.073 | -0.042 | -0.035 | -0.030 |
| | (0.066) | (0.066) | (0.068) | (0.068) | (0.065) | (0.065) |
| Cross-functional interfaces | 0.065 | 0.057 | 0.067 | 0.061 | 0.025 | 0.041 |
| | (0.052) | (0.052) | (0.052) | (0.052) | (0.054) | (0.054) |
| **Two-way interaction terms** | | | | | | |
| Structural differentiation * environmental dynamism | 0.008 | 0.040 | 0.006 | 0.038 | 0.014 | 0.020 |
| | (0.034) | (0.039) | (0.034) | (0.036) | (0.035) | (0.035) |
| Structural differentiation* shared vision | 0.022 | 0.017 | | | | |
| | (0.047) | (0.046) | | | | |
| Shared vision * environmental dynamism | -0.017 | -0.035 | | | | |
| | (0.043) | (0.044) | | | | |
| Structural differentiation * senior team social integration | | | -0.066 | -0.050 | | |
| | | | (0.045) | 0.045) | | |
| Senior team social integration* environmental dynamism | | | 0.031 | -0.004 | | |
| | | | (0.047) | (0.048) | | |
| Structural differentiation * cross-functional interfaces | | | | | -0.087** | -0.095** |
| | | | | | (0.033) | (0.033) |
| Cross-functional interfaces* environmental dynamism | | | | | -0.004 | -0.030 |
| | | | | | (0.034) | (0.036) |
| **Three-way interaction terms** | | | | | | |
| Structural differentiation *shared vision * environmental dynamism | | -0.072+ | | | | |
| | | (0.040) | | | | |
| Structural differentiation * senior team social integration * environmental dynamism | | | | -0.102* | | |
| | | | | (0.043) | | |
| Structural differentiation * cross-functional interfaces * environmental dynamism | | | | | | -0.050+ |
| | | | | | | (0.026) |
| $R^2$ | 0.357 | 0.367 | 0.363 | 0.379 | 0.376 | 0.387 |
| F-value for change in $R^2$ | | 3.27+ | | 5.54** | | 3.74+ |

[a] N = 240; Unstandardized coefficients are reported; standard errors in parentheses; + p<0.10; * p<0.05; ** p<0.01; *** p<0.001 [b] Manufacturing served as reference group in regression analyses

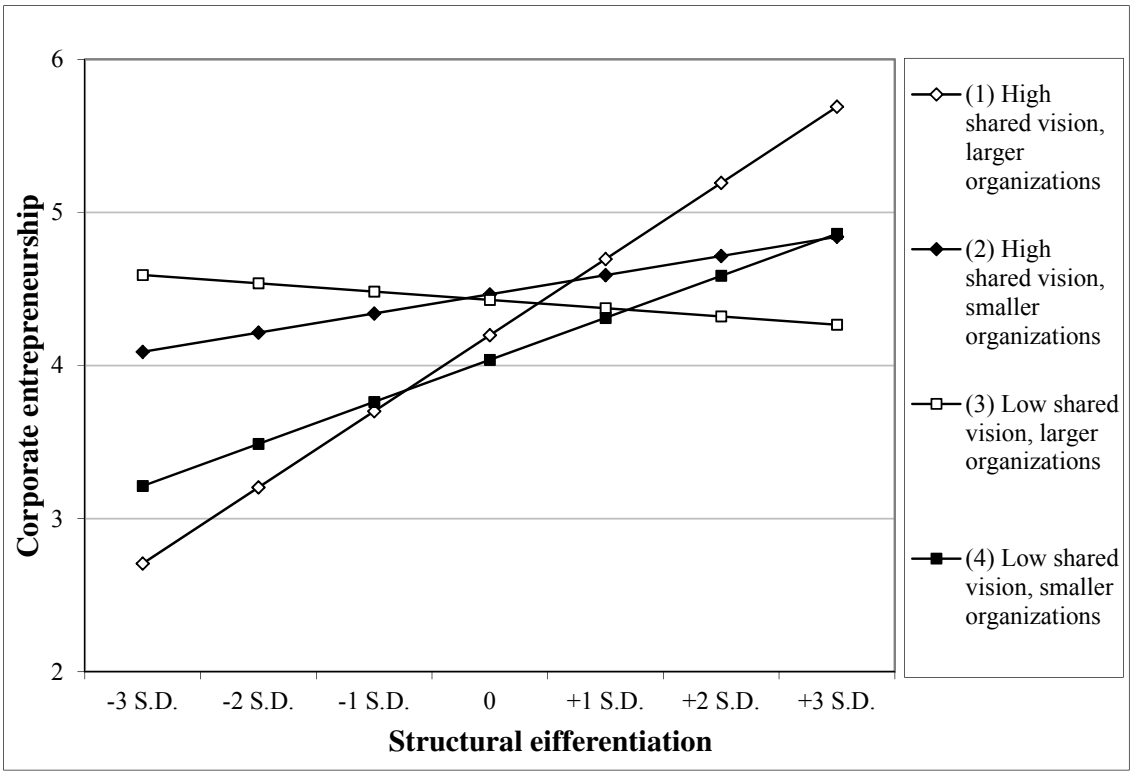


**Figure 1A. Three-way interaction plot of structural differentiation, shared vision, and organizational size**

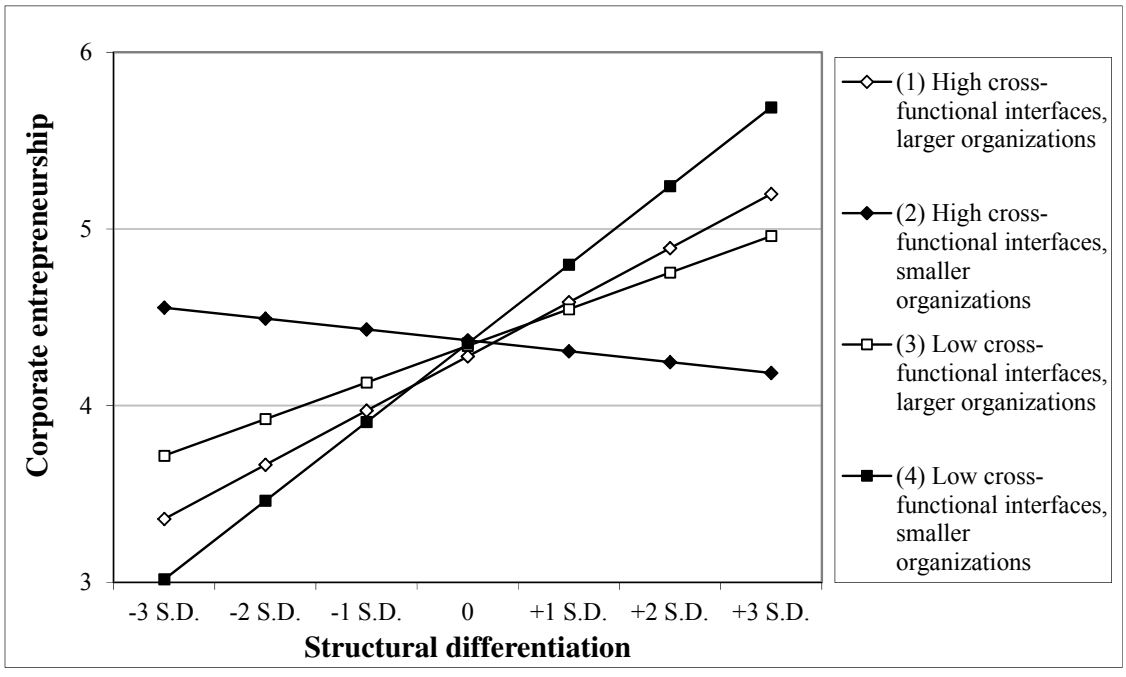


**Figure 1B. Three-way interaction plot of structural differentiation, cross-functional interfaces, and organizational size**

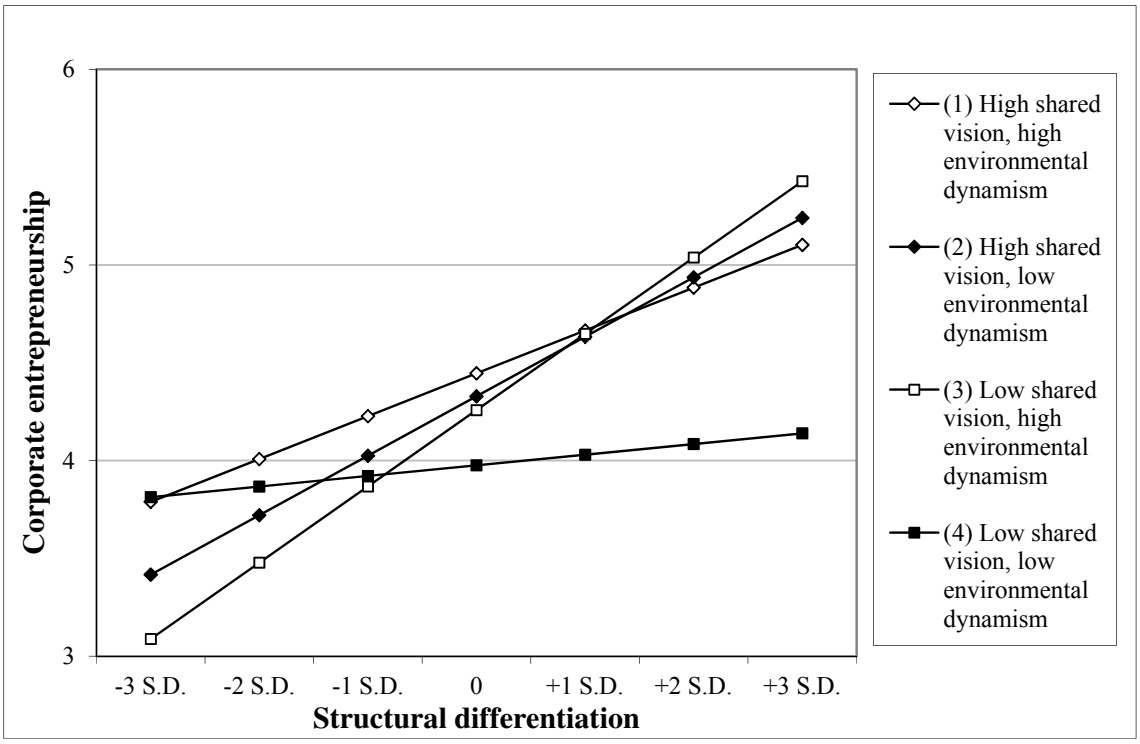


**Figure 2A. Three-way interaction plot of structural differentiation, shared vision, and environmental dynamism**

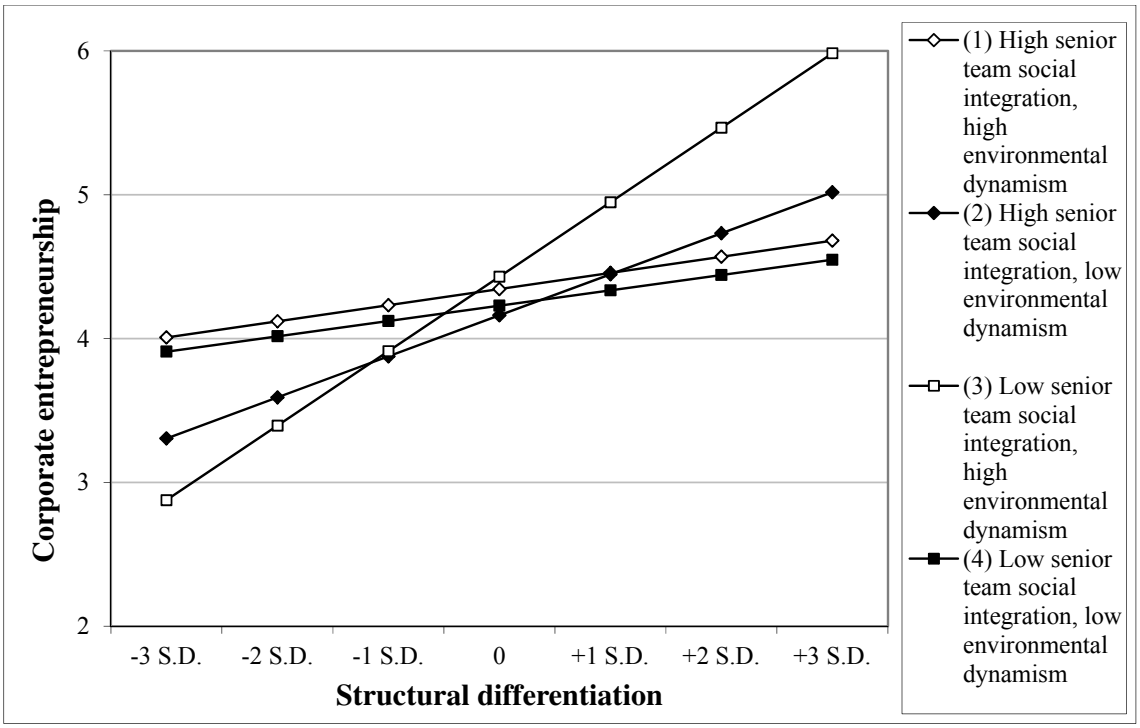


**Figure 2B. Three-way interaction plot of structural differentiation, senior team social integration, and environmental dynamism**

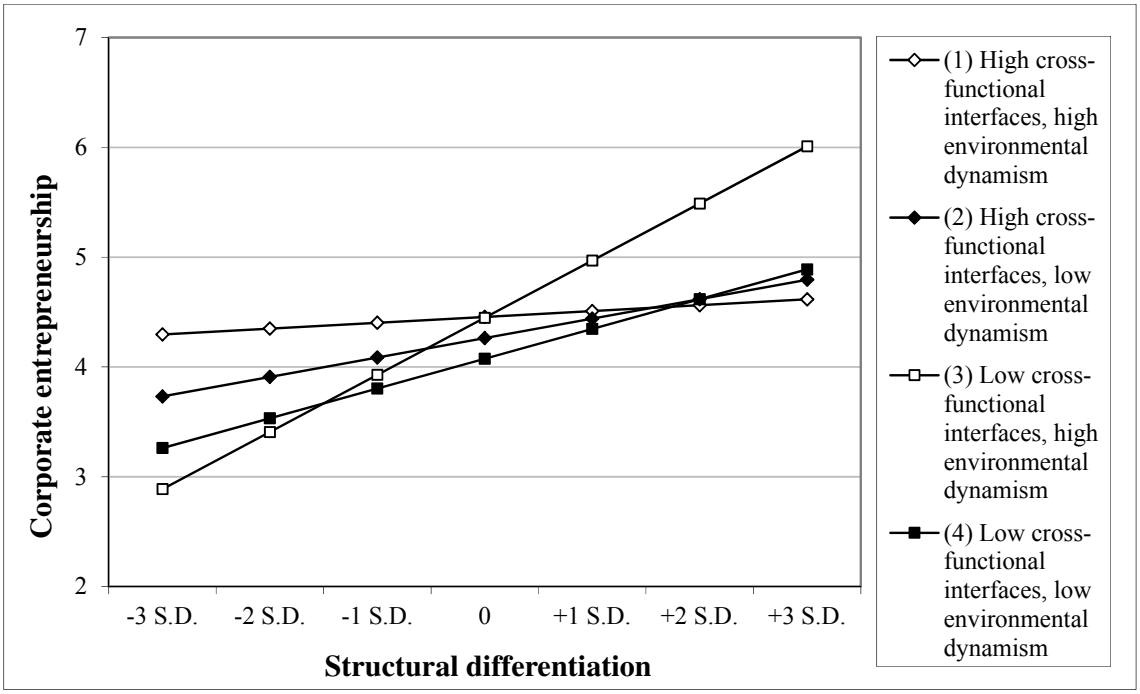


**Figure 2C. Three-way interaction plot of structural differentiation, cross-functional interfaces, and environmental dynamism**