

# Balancing exploration and exploitation: The moderating role of competitive intensity

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Received 21 February 2004; accepted 30 November 2004

## Abstract

Drawing on Miles and Snow's classification of strategy type, this paper addresses the contingency role that competitive intensity plays in explaining the relationship between exploration/exploitation and firm performance. We further refine our firm performance measure into separate measures of effective and efficient firm performance. Our conceptual argument posits that for defenders, exploration will be positively related to effective firm performance while exploitation will be negatively related to efficient firm performance as competitive intensity increases. Conversely, for prospectors, we assert that exploration will be negatively related to effective firm performance, whereas exploitation will be positively associated with efficient firm performance as competition intensifies. Empirical results provide general support for our predictions. The implications for business theory and practice are discussed.

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*Keywords:* Exploration; Exploitation; Competitive intensity; Miles and Snow typology; Effective firm performance; Efficient firm performance

## 1. Introduction

Organizational learning is a necessary resource and capability for firms seeking to sustain a competitive advantage in today's marketplace (Barney, 1991). According to resource-based theory, resources include all the "assets, capabilities, organizational processes, firm attributes, information, knowledge, etc., controlled by a firm that enable the firm to conceive of and implement strategies that are efficient and effective" (Barney, 1991, p. 101). In this light, organizational learning, defined as the capability for organizations to create, disseminate, and act upon generated knowledge, can be regarded as a resource. Scholars have explored this capability using different types of learning: double loop vs. single loop

learning (Argyris and Schon, 1978); generative vs. adaptive learning (Senge, 1990); and product innovation vs. production-oriented learning (McKee, 1992). Despite the diverse terminologies, commonalities can be readily observed and two distinct concepts of learning can be identified. One branch of research is chiefly concerned with revolutionary change; change that requires tasks to be accomplished under new organizational assumptions and frameworks (e.g., "S" curve; Foster, 1986). The other is more concerned with evolutionary, incremental changes; improvements based on existing platforms that benefit from repetition and routine (e.g., experience curve).

This distinction suggests that double loop, generative, and product-innovation learning are closely aligned with exploration while single loop, adaptive, and production oriented learning are aligned with exploitation approach to learning. Having asserted that exploration and exploitation are different modes of organizational learning, we further posit that these two types of learning represent organizational resources and capabilities that firms can use to develop and sustain their competitive advantage under changing environmental conditions.

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Despite the apparent differences between the two types of learning, scholars and practitioners have long believed that a well-balanced combination of the two types of learning is essential for a healthy organization (Levinthal and March, 1993; March, 1991). Excessive exploration at the expense of exploitation can be costly, as the tangible outcomes of exploration will only be realized in the distant future and then only with considerable uncertainty. On the other hand, a concentration on exploitation without exploration discourages the organization from pursuing learning and development. This can direct firms to focus only on the near future and potentially miss out on long-term investments and opportunities that may prove valuable. Therefore, the recommendation of a well-balanced combination of the two should come as no surprise.

However, what is less understood and less well-documented in the literature is the contingency perspective of organizational learning that underscores the effectiveness of both types of learning under different contextual conditions. We draw on the strategy typology of Miles and Snow (1978) to examine how prospectors and defenders benefit by balancing exploration and exploitation when competition intensifies. We expect that the same exploratory or exploitative action will have different effects on performance depending on whether it is used by prospectors and defenders. The rationale for this belief rests on our assumption of prospectors' strong orientation towards exploration and defenders' strong orientation towards exploitation and the differential consequences of these actions under conditions of intensifying competition.

The goal of this paper is to develop a contingency model that tests the moderating role of competitive intensity on the relative effectiveness of exploration and exploitation on firm performance for prospectors and defenders. In addition, we provide a further refinement to existing measures of firm performance by looking at the categories of effective and efficient firm performance.

This study also explores the validity of Miles and Snow's (1978) construct of strategy type, using the concepts of exploration and exploitation. Despite the theoretical linkage between organizational learning (e.g., exploration and exploitation) and strategy type (e.g., prospectors and defenders), no research to date has empirically tested the validity of the models of exploration and exploitation and their differential effects on firm performance as a function of strategy type. Our study explicitly tests this assertion. Moreover, although prospectors and defenders, largely by assumption, are known to react differently to environmental change, no empirical results exist to confirm how the balance of exploration and exploitation alters for prospectors and defenders with intensified competitive pressure. In what is to follow, we provide the theoretical background for our argument along with testable hypotheses. This is followed by a presentation of empirical results and a discussion of the results. We end with a discussion of limitations and future research directions.

## 2. Theoretical background

### 2.1. Exploration and exploitation as organizational learning

March (1991) defines exploration as a learning mechanism which has the goal of experimentation with new alternatives. Exploration is thus a manifestation of organizational learning (Sinkula, 1994; Slater and Narver, 1995) and it entails activities such as search, variation, risk-taking, discovery, innovation, and research and development. Sitkin et al. (1994) associate total quality learning (TQL) with exploratory activities. These include such activities as exploring new skills and resources, testing definitions of customer need rather than accepting customer needs as given, and engaging in activities that might deliver breakthrough ideas.

March (1991, p. 85) posits that the outcome of exploration can be difficult to measure in the short-term. He argues that the organizational return from exploration can be uncertain, distant, and often negative: "the distance in time and space between the locus of learning and the locus for the realization of returns is generally greater in the case of exploration than in the case of exploitation, as is the uncertainty." In short, exploration might be effective but due to its long-term nature, it might lack a high degree of efficiency.

Whereas exploration is concerned with challenging existing ideas with innovative and entrepreneurial concepts, exploitation is chiefly interested in refining and extending existing skills and capabilities. The central thesis of exploitation is that it is possible to secure a comfortable position in the marketplace by committing sufficient/the bulk of the organization's resources to ensure the current viability of the firm against its competitors. Thus, the emphasis is on the organization refining and fine-tuning existing competencies and resources. Put another way, the emphasis is on operational efficiency, achieved by engaging in similar activities more efficiently (Porter, 1996). Exploitation includes, but is not limited to, such activities as refinement, production, efficiency, selection, implementation, and execution (March, 1991). The primary emphasis is on control, efficiency, and reliability or conformance to specification (Deming, 1981; Juran and Gryna, 1988). The returns from exploitation are typically positive, proximate, and predictable.

Organizational learning can be defined as a continuum, ranging from exploration on the one hand to exploitation on the other. Rather than emphasizing one at the expense of the other, a balance between the two approaches is necessary. Too great a reliance on exploration without complementary levels of exploitation can lead to "failure trap", placing a continuous drain on the organization's resources with no immediate financial reward in sight (Levinthal and March, 1993). On the contrary, an excessive reliance on exploitation without supporting levels of exploration can drive the firm into a "success trap", where the more certain short-term

returns will lead the organization to overlook the distant and uncertain, albeit potentially profitable, outcomes associated with exploration.

## 2.2. Competitive intensity

In this paper, we focus on competitive intensity, which is one of the factors contributing to environmental hostility (Dess and Beard, 1984; Zahra and Covin, 1995). Competitive intensity can be defined as a situation where competition is fierce due to the number of competitors in the market and the lack of potential opportunities for further growth. As competition further intensifies, the results of a firm's behavior will no longer be deterministic but stochastic as the behavior is heavily influenced by the actions and contingencies undertaken by competitors. Thus, under conditions of intensifying competition predictability and certainty diminishes.

When the competition is less intense, firms can operate with their existing systems to fully capitalize on the transparent predictability of their own behavior. However, when competition is intense, firms will have to adapt accordingly. The firm will need to engage in risk-taking and proactive activities that require both bold learning and exploration to break out of price or promotion wars. To this end, Zahra (1993, p. 324) stated: "When rivalry is fierce, companies must innovate in both products and processes, explore new markets, find novel ways to compete, and examine how they will differentiate themselves from competitors."

However, this does not necessarily suggest that greater exploration is the universally preferred option under conditions of intense competition. A critical point is that the consequences of exploration are distal and uncertain. At least in the short-term, firms will also need to engage in exploitative learning to respond to and counter competitive behavior. Without this balance, firms run the risk of losing their current position through diverting their resources to exploratory learning, the benefits of which might or might not materialize. Therefore, exploration needs to be complemented with exploitation. Next, we discuss our conceptual model and derive our hypotheses.

## 3. Conceptual model and hypothesis development

Our conceptual model is shown in Fig. 1. Both exploration and exploitation should be positively related to firm performance under certain circumstances. Douglas and Judge (2001) found that organizations employing an exploration and control focus had TQM practices that were positively related to organizational performance under certain circumstances. Organizational researchers have argued for multiple dimensions of organizational performance such as effectiveness and efficiency (Mahoney, 1988; Pennings and Goodman, 1977). In this respect, we argue that firm performance can adopt either an effectiveness perspective (e.g., market share growth or sales growth) or an efficiency perspective (e.g., profitability or return on assets) (Hambrick, 1983; Miles and Snow, 1978). Further, it is possible that firms can excel in both dimensions, in only one, or neither. Accordingly, we develop hypotheses for both effective and efficient firm performance.

According to Miles and Snow's typology (1978), organizations can be categorized into four strategy types: prospectors; analyzers; defenders; and reactors. For the purpose of our study, we explicitly compare prospectors with defenders because these two groups reveal the sharpest contrasts in their behavior (Hambrick, 1983; McDaniel and Kolari, 1987; Miles and Snow, 1978; Shortell and Zajac, 1990).

We argue that exploration is more closely aligned with prospectors while exploitation is more closely aligned with defenders. For prospectors, their primary interest is exploration, which is concerned with growth and expansion into untested markets. McDaniel and Kolari (1987) provide empirical results suggesting that prospectors place greater significance on new product development and marketing research activities. Similar findings were also provided by Shortell and Zajac (1990). On the other hand, defenders focus on improving their efficiency primarily through exploitation, that is by refining their existing resources and capabilities (Matsuno and Mentzer, 2000; Miles and Snow, 1978; Shortell and Zajac, 1990). More recently, Matsuno and Mentzer (2000) found that strategy type moderated the relationship between market orientation

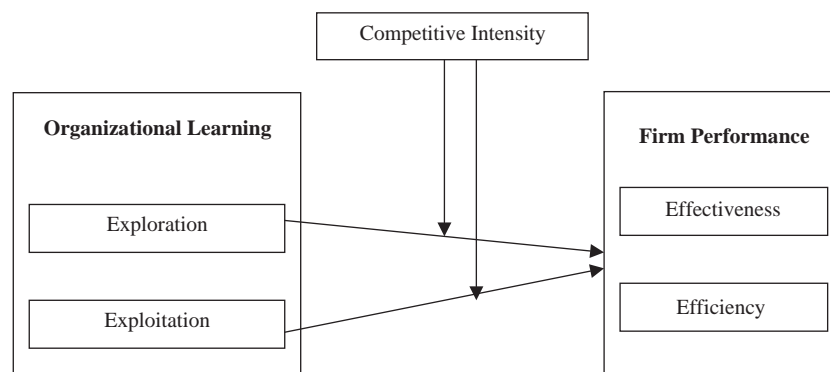


Fig. 1. Hypothesized model.

and economic performance. According to their findings, the effect of market orientation on ROI was greatest for defenders, while the effect of market orientation on market share growth, relative sales growth, and new product sales as a percentage of total sales was highest for prospectors.

Based on our prior discussion, we argue that for both prospectors and defenders, exploration will be the dominant learning mode for effective firm performance while exploitation will be the dominant learning mode for efficient firm performance. Taken collectively, we propose the following hypotheses.

**H<sub>1a</sub>:** For both prospectors and defenders, exploration will be more positively related to effective firm performance than will exploitation.

**H<sub>1b</sub>:** For both prospectors and defenders, exploitation will be more positively related to efficient firm performance than will exploration.

Although not formally hypothesized, we also expect the effect of exploration will be greater than will exploitation on firm performance (effectiveness and efficiency combined) for prospectors and the effect of exploitation will be greater than will exploration on firm performance (effectiveness and efficiency combined) for defenders.

3.1. The moderating role of competitive intensity

The literature on corporate entrepreneurship suggests that firms need to engage in a greater level of entrepreneurial activities, such as innovation, exploration, and strategic renewal as environmental hostility intensifies (Zahra, 1993; Zahra and Covin, 1995). We extend this framework and assert that this contingency effect will differ depending on the type of dominant strategy currently pursued by the firm.

We illustrate our rationale in Fig. 2. The upper portion of Fig. 2 depicts the dominant organizational learning mode for prospectors and defenders under normal market conditions. As posited in the discussion leading to H<sub>1a,b</sub>, exploration

will be the dominant mode for prospectors while exploitation will be the dominant mode for defenders. The middle and lower portions of Fig. 2 illustrate how defenders and prospectors should respond, respectively, when competition intensifies.

As competition intensifies, defenders can remain at B or move towards A (more exploitation oriented and less exploration oriented) or move towards C (less exploitation oriented and more exploration oriented). A key point is that in moving towards A from its current position (a defender firm must become even more exploitative. Engaging in greater levels of exploitative learning suggests that a firm’s strategy is to counter its competitors’ behavior with similar actions such as promotions, price-cutting, and copycat products that deliver returns promptly but which themselves can also be undercut by further competitive behavior. In order for the firm to break out of this vicious short-term cycle and establish itself as a viable long-term contender, exploitative strategies alone will not be enough. Competitive intensity invites firms to be more exploratory and innovative. Since, defenders lack this exploratory capacity of organizational learning, they should benefit by aligning this type of learning with the environment. Thus, increased competition calls for defenders to move from B towards C, by being more exploratory and less exploitative.

Since defenders are already heavily involved in exploitative learning, increased exploitation at the expense of exploration will lead to inefficient firm performance. Conversely, diverting resources to exploratory learning should contribute to greater effective firm performance. Hence, we offer the following hypothesis:

**H<sub>2</sub>:** For defenders, the effect of exploration on effective firm performance will increase with competitive intensity, while the effect of exploitation on efficient firm performance will decrease with competitive intensity.

Similarly, prospectors have the option of moving from their current position either towards A (more exploitation oriented and less exploration oriented) or C (less exploita-

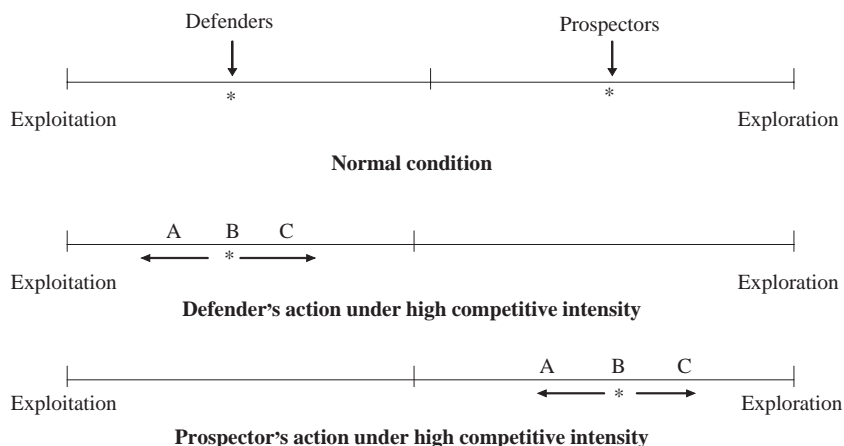


Fig. 2. Prospector and defender posture as a function of competitive intensity.



tion oriented and more exploration oriented). For prospectors, the existing level of exploration is already high. Therefore, engaging in even more exploratory behavior at the expense of exploitative action would jeopardize the prospector firm's short-term profitability and cash flow. Greater exploration without the complementary levels of exploitation can be dangerous and unprofitable due to the uncertain and long-term returns from exploration (e.g., failure trap). In order for prospectors to continue their exploratory learning without disturbance or shortfalls in financial support, it is essential that they have a source of short-term profitability/income. One way to accomplish this is to meet and surpass the short-term behavior of competitors, by engaging in similar, if not superior, price and/or promotional offers. For prospectors, we are suggesting that, despite their organizational inclination to be more exploratory when competition is intense, they should resist this tendency and be more exploitative. Hence, it would be advantageous for prospectors to move to A rather than to C.

In this respect, the impact of exploration on effective firm performance is expected to decrease with increasing competition. This is expected because firms are likely to experience minimal effectiveness with even greater exploration when they are already heavily involved in such learning. On the other hand, the effect of exploitation on efficient firm performance is likely to increase as a result of greater competition. The rationale for this rests on the benefits which result from balancing exploration and exploitation. Based on the above discussion, we propose the following contingency hypothesis:

**H<sub>3</sub>:** For prospectors, the effect of exploration on effective firm performance will decrease when competition intensifies, while the effect of exploitation on efficient firm performance will increase when competition intensifies.

## 4. Research method

### 4.1. Pre-test and measures

A draft questionnaire, prepared using well-established scales drawn from the relevant literature, was subjected to a pre-test. We first purchased a list of 1000 firms operating in a variety of manufacturing industries in Australia from a leading market research/databank company. We then contacted a random selection of 20 CEOs or senior executives. We delivered a draft form of the survey questionnaire and asked each person to evaluate the contents and meaningfulness of the items. Accordingly, some scale items were modified based on the feedback we received from senior executives.

A list of the multi-item scales is presented in Table 1. Despite the increasing number of studies that have examined the role of exploration and exploitation on firm performance, the literature lacks well-established scales to

measure these two types of learning. For our study we reclassified the scale used by Spanos and Lioukas (2001) under two categories to measure *exploration* (four items) and *exploitation* (three items). We asked respondents to indicate the extent to which their firms use the given learning methods on a five-point Likert scale (1—much less than competitors; 5—much more than competitors). *Competitive intensity* was measured with a six-item, five-point Likert scale (1—strongly disagree; 5—strongly agree) taken from Jaworski and Kohli (1993). We considered two dimensions of firm performance, namely effectiveness and efficiency. *Firm effectiveness* was measured in terms of profit growth, sales growth, and market share growth, while *firm efficiency* was measured in terms of profitability, return-on-investments, return-on-sales, and return-on-assets. Both scales used a five-point Likert scale taken from McDougall et al. (1994). We asked respondents to rate their firm's performance over the last 3 years relative to their principal competitors (1—much worse; 5—much better). In addition, respondents were asked to indicate only one cluster that most accurately defined their firm's *business strategy*, based on the typology developed by Miles and Snow (1978) and the cluster definitions used by Slater and Olson (2000).

We included the following control variables: firm size (log transformation of the number of full-time employees); sector (dummy variable); type of firm (0—freestanding firm; 1—dependent firm, such as multinational subsidiary, joint venture, dealer, etc.); type of operations (1—business-to-business; 2—business-to-consumers; 3—both); and CEO background (0—marketing/sales; 1—other).

### 4.2. Sample and data collection

First, the 20 CEOs/senior executives whom we contacted for pre-testing were deleted from the master list. We then used the remaining executives (a total of 980 firms) for data collection. Due to their knowledge and experience regarding the context of our study, CEOs (or senior executives) were the target group of our study.

We prepared a mailing packet that contained a personalized letter, a questionnaire, and a postage-paid envelope with an individually typed return-address label. Four weeks after the first mailing, we sent a follow-up letter and an additional copy of the questionnaire to non-respondents. We obtained 260 usable questionnaires with a response rate of 26.5%. One of the authors made a series of phone calls and conducted additional mail surveys to assure key informant quality. We found that the questionnaires were completed by managers who were CEOs, or by those with an equivalent position.

The average firm size was 676 full-time employees. Firms were operating in a variety of sectors, such as food, mining, automotive, construction materials, and chemicals. Of the 260 firms, 51% of firms were freestanding and 68% were business-to-business type firms. The background of CEOs was predominantly in marketing/sales (68%). Finally,

Table 1  
Confirmatory factor analysis

Scales and items	Prospectors		Defenders	
	Factor loading	<i>t</i> -value	Factor loading	<i>t</i> -value
<i>Exploitation</i>				
Modernization and automation of production processes	.86 <sup>a</sup>	–	.80 <sup>a</sup>	–
Efforts to achieve economies of scale	.81	14.19	.80	13.79
Capacity utilization	.80	13.71	.75	11.52
<i>Exploration</i>				
Research and development expenditures for product development	.79 <sup>a</sup>	–	.72 <sup>a</sup>	–
Research and development expenditures for process innovation	.84	15.41	.80	12.99
Rate of product innovations	.83	14.80	.83	15.39
Innovations in marketing techniques	.87	16.62	.91	17.61
<i>Competitive intensity</i>				
Competition in our industry is cut-throat	.70 <sup>a</sup>	–	.72 <sup>a</sup>	–
There are many promotion wars in our industry	.95	16.01	.82	14.33
Anything that one competitor can offer, others can match easily	.78	13.44	.77	12.95
Price competition is a hallmark of our industry	.82	14.80	.84	15.17
One hears of a new competitive move almost every day	.71	10.29	.76	11.52
Our competitors are relatively weak (r)	.79	13.76	.68	9.68
<i>Firm efficiency</i>				
Profitability	.90 <sup>a</sup>	–	.87 <sup>a</sup>	–
Return-on-investment	.92	13.05	.71	11.01
Return-on-sales	.93	13.19	.86	12.21
Return-on-assets	.80	11.78	.93	13.30
<i>Firm effectiveness</i>				
Profit growth	.78 <sup>a</sup>	–	.71 <sup>a</sup>	–
Sales growth	.86	12.50	.61	10.03
Market share growth	.84	12.29	.73	11.76

r—reverse scored item.

<sup>a</sup> Initial loading was fixed to 1 to set the scale of the construct.

the response frequencies for each strategy type were: 104 prospectors (40%); 44 analyzers (16.9%); 104 defenders (40%); and 8 reactors (3.1%). For the purpose of this study, we excluded analyzers and reactors from the subsequent analysis. Analyzers tend to combine aspects of both prospectors and defenders, which would obscure what we are trying to test in our hypotheses. Reactors, on the other hand, typically lack a clear, focused strategy and thus were excluded.

The likelihood of nonresponse bias was tested by splitting the total sample into two groups; those received before the second wave of mailing and those received after the second wave (Armstrong and Overton, 1977). A comparison of the two groups on each variable (i.e., *t*-test) revealed no significant differences, supporting the assumption that respondents were not different from nonrespondents.

## 5. Analyses and results

### 5.1. Measurement assessment

We followed a two-step procedure to assess the validity, unidimensionality, and reliability of the con-

structs (Anderson and Gerbing, 1988). We assessed the underlying factor structure of the scale items using an exploratory factor analysis. To do so, we randomly divided the dataset into two halves (i.e., prospectors and defenders). The first half of the data (104 prospectors) was used to purify the scale items. All the items loaded on their respective factors (i.e., <.40) and items did not show significant cross-loading(s). The resulting five factors with eigenvalues greater than 1.0 accounted for 89% of the total variance. Further, the results of Harman's one-factor method revealed that the first factor explained only 21% of the variance and there was no general factor in the unrotated factor structure. Consequently, we concluded that common-method bias was not a likely threat for the first half of the dataset (Podsakoff and Organ, 1986).

We used the second group (i.e., 104 defenders) to verify that the scales developed in the first stage did not provide model fit randomly. For each sample, we conducted confirmatory factor analysis (CFA) to assess the reliability and validity of the multi-item scales. The CFAs provided acceptable fit for both prospectors ( $\chi^2_{(160)}=315.9$ ,  $p<.001$ , GFI=.90; CFI=.94, RMSEA=.06) and defenders ( $\chi^2_{(160)}=319.7$ ,  $p<.001$ , GFI=.88; CFI=.92,

RMSEA=.07). Table 1 shows the results of CFAs (i.e., factor loadings, corresponding  $t$ -values).

All factor loadings were statistically significant ( $t > 2.0$ ) (Gerbing and Anderson, 1988). In addition, the average variance extracted (AVE) values were higher than .50 (Bagozzi and Yi, 1988). Consequently, the convergent validity of the constructs was supported. Further, all the tests for discriminant validity were supportive. That is, no confidence intervals of correlations for the constructs included 1.0 ( $p < .05$ ) (Anderson and Gerbing, 1988), and the square of the intercorrelations between two constructs was less than the AVE estimates of the same constructs for all pairs of constructs (Fornell and Larcker, 1981). In addition, we assessed discriminant validity by comparing the unconstrained model with the constrained model in which the correlation between two constructs was set to one. For every pair of constructs, we found a significant chi-square difference, providing evidence of discriminant validity. For example, the test for discriminant validity between exploration and exploitation ( $\chi^2_{(1)} = 29.5$ ;  $p < .001$ ) showed a significant chi-square difference, supporting the presence of discriminant validity.

It is noteworthy that the initial findings provided evidence for measurement equivalence across the two groups (i.e., the same number of factors with similar item loading patterns) (Atuahene-Gima and Li, 2002). However, we further tested for measurement equivalence between the first group (prospectors) and the second group (defenders) using CFA. We compared a constrained model (i.e., equal factor loadings across the two samples) with an unconstrained model (i.e., variant factor loadings across samples). The chi-square difference tests showed no statistically significant differences in the factor loadings, supporting measurement equivalence between

the two groups ( $\Delta\chi^2 = 23.1$ ,  $\Delta df = 20$ ). Table 2 shows the descriptive statistics, intercorrelations, and reliability estimates.

## 5.2. Hypotheses testing

Hypotheses were tested via hierarchical moderated regression analysis. As suggested by Aiken and West (1991), the variables of exploration, exploitation, and competitive intensity were mean-centered to minimize the threat of multicollinearity in equations where we created interaction terms. The values of the variance inflation factor were well below the cut-off of 10 recommended by Neter et al. (1985).

Tables 3 and 4 show the results of our hypotheses.  $H_{1a}$  posits that for both prospectors and defenders exploration will be more positively related to effective firm performance than will exploitation, while exploitation will be more positively related to efficient firm performance than will exploration. Exploration (prospectors:  $t = 4.24$ ;  $p < .001$ ; defenders:  $t = 5.52$ ;  $p < .001$ ) and exploitation (prospectors:  $t = 2.59$ ;  $p < .01$ ; defenders:  $t = 2.87$ ;  $p < .01$ ) were found to be positively and significantly related to firm effectiveness. Using the procedure suggested by Gujarati (1995) (i.e., restricted least squares test), we tested whether the regression coefficients of exploration and exploitation for prospectors and defenders were significantly different. Findings revealed that for both groups the regression coefficients were statistically different (for prospectors:  $F_{(1, 92)} = 3.19$ ,  $p < .05$ ; for defenders:  $F_{(1, 92)} = 3.48$ ,  $p < .05$ ). Hence,  $H_{1a}$  was supported.

$H_{1b}$  posits that for both prospectors and defenders, exploitation will be more positively related to efficient firm performance than will exploration: the findings were some-

Table 2  
Descriptive statistics and intercorrelations

Variables	1	2	3	4	5	6	7	8	9	10
Mean	2.54	5.08	.46	2.81	.46	3.85	3.80	3.40	3.64	3.82
Standard deviation	.48	2.83	.50	.56	.50	.75	.48	.62	.93	.82
Cronbach's alpha	–	–	–	–	–	.87	.89	.90	.94	.87
Composite reliability	–	–	–	–	–	.87	.90	.91	.94	.87
Ave. variance extracted	–	–	–	–	–	.68	.69	.63	.79	.69
1. Firm size (log)		.02	–.02	–.54	–.34	–.01	–.31	.03	–.15	–.21
2. Sector	.13		–.08	–.02	–.06	–.25	–.10	–.47	.35	.12
3. Type of firm	–.42	.01		.32	.23	.23	.23	.23	.09	.17
4. Type of operations	.14	–.32	.07		.32	.21	.36	–.21	.32	.23
5. CEO background	.27	–.19	–.09	–.02		–.01	–.31	–.21	.37	.20
6. Exploitation	.04	–.18	.10	.25	.13		.31	.08	.25	.27
7. Exploration	.15	–.41	.00	.19	.07	.55		–.08	.32	.52
8. Competitive intensity	.18	.15	–.15	.06	.02	–.30	–.37		–.46	–.28
9. Firm efficiency	–.16	–.27	.02	–.24	.20	.37	.50	–.50		.64
10. Firm effectiveness	–.04	–.55	.07	.28	.30	.54	.70	–.34	.42	
Mean	2.54	4.65	.58	2.69	.23	3.34	3.00	3.17	3.42	3.49
Standard deviation	.41	2.83	.50	.73	.42	.89	.69	.64	.81	.75
Cronbach's alpha	–	–	–	–	–	.82	.88	.89	.90	.71
Composite reliability	–	–	–	–	–	.83	.89	.90	.91	.73
Ave. variance extracted	–	–	–	–	–	.61	.66	.59	.72	.50

Correlations above .19 are significant at  $p < .05$  (prospectors above the diagonal; defenders below the diagonal).

Table 3

The moderating role of competitive intensity on the relationship between exploration, exploitation and firm efficiency

Variables	Prospectors (N=104)						Defenders (N=104)					
	Step 1		Step 2		Step 3		Step 1		Step 2		Step 3	
	b	t-value	b	t-value	b	t-value	b	t-value	b	t-value	b	t-value
<i>Controls</i>												
Firm size (log)	.21	1.03	.08	.43	.16	.90	-.22	-1.03	-.39	-2.21*	-.36	-2.27*
Sector	.11	3.85***	.10	3.25**	.04	1.25	-.09	-3.25***	-.03	-1.15	-.01	-.05
Type of firm	-.10	-.56	-.03	-.17	-.09	-.57	.01	.05	-.14	-1.08	-.27	-2.28*
Type of operations	.49	2.73**	.18	1.02	-.02	-.14	-.36	-3.30***	-.37	-4.11***	-.38	-4.78***
CEO's background	.58	3.36***	.42	2.61**	.35	2.36*	.30	1.61	.33	2.27**	.59	4.22***
<i>Main effects</i>												
Exploration			.16	1.99*	.08	.85			.29	3.58***	.24	3.14**
Exploitation			.23	2.88**	.51	5.95***			.13	1.78	.13	1.97*
Competitive intensity			-.23	-2.49**	-.47	-5.08***			-.21	-3.22**	-.20	-3.49***
<i>Interactions</i>												
Exploration× Competitive intensity					.28	2.77**					.24	2.93**
Exploitation× Competitive intensity					.24	3.14**					-.48	-5.27***
R <sup>2</sup>		.30		.44		.58		.21		.54		.64
ΔR <sup>2</sup>				.14		.14				.33		.10
F		8.54***		9.49***		12.98***		5.33***		13.71***		16.81***
ΔF				8.02***		15.42***				21.96***		14.10***

Unstandardized coefficients.

\*  $p < .05$ .\*\*  $p < .01$ .\*\*\*  $p < .001$ .

Table 4

The moderating role of competitive intensity on the relationship between exploration, exploitation and firm effectiveness

Variables	Prospectors (N=104)						Defenders (N=104)					
	Step 1		Step 2		Step 3		Step 1		Step 2		Step 3	
	b	t-value	b	t-value	b	t-value	b	t-value	b	t-value	b	t-value
<i>Controls</i>												
Firm size (log)	-.20	-1.00	-.25	-1.36	-.31	-1.62	-.05	-.30	-.31	-2.28*	-.27	-2.12*
Sector	.04	1.31	.02	.87	-.01	-.17	-.12	-5.01***	-.05	-2.73**	-.06	-3.31***
Type of firm	.21	1.19	.25	1.52	.29	1.77	.11	.81	-.01	-.11	.07	.75
Type of operations	.15	.82	-.20	-1.18	-.34	-1.92	.14	1.56	.12	1.67	.16	2.44*
CEO's background	.16	.90	-.02	-.16	-.11	-.71	.40	2.59**	.45	3.89***	.31	2.76**
<i>Main effects</i>												
Exploration			.35	4.50***	.40	4.24***			.37	5.97***	.34	5.52***
Exploitation			.15	1.97*	.24	2.59**			.12	2.12*	.15	2.87**
Competitive intensity			-.24	-2.71**	-.31	-3.23**			-.04	-.73	-.06	-1.29
<i>Interactions</i>												
Exploration× Competitive intensity					-.05	-.50					.05	.81
Exploitation× Competitive intensity					.18	2.15*					.21	2.80**
R <sup>2</sup>		.10		.38		.41		.36		.67		.73
ΔR <sup>2</sup>				.28		.03				.31		.06
F		2.28		7.22***		6.43***		11.09***		24.37***		25.09***
ΔF				13.95***		2.43*				30.05***		9.84***

Unstandardized coefficients.

\*  $p < .05$ .\*\*  $p < .01$ .\*\*\*  $p < .001$ .



what mixed. We found that exploitation was positively and significantly related to firm efficiency for both prospectors ( $t=5.95$ ;  $p<.001$ ) and defenders ( $t=1.97$ ;  $p<.05$ ). On the other hand, exploration was not significantly related to firm efficiency ( $t=.85$ ; ns) for prospectors, but it was positively and significantly related to firm efficiency ( $t=3.14$ ;  $p<.01$ ) for defenders. Using the same procedure as above, we found that the regression coefficients were significantly different for prospectors ( $F_{(1, 92)}=6.71$ ,  $p<.01$ ). Consequently,  $H_{1b}$  was supported for prospectors, but not for defenders.

Although not formally hypothesized, exploration had a greater effect than exploitation on firm performance for prospectors, while exploitation exerted a greater impact than exploration on firm performance for defenders.

$H_2$  posits that for defenders the effect of exploration on effective firm performance will increase with competitive intensity while the effect of exploitation on efficient firm performance will decrease with competitive intensity. We found that at high levels of competitive intensity exploration was not related to firm effectiveness ( $t=.81$ ; ns), while exploitation was related negatively and significantly to firm efficiency ( $t=-5.27$ ;  $p<.001$ ). Hence,  $H_2$  was partially supported.

$H_3$  posits that for prospectors the effect of exploration on effective firm performance will decrease with competitive intensity while the effect of exploitation on efficient firm performance will increase with competitive intensity. We found that at high levels of competitive intensity, exploration was not related to firm effectiveness ( $t=-.50$ ; ns), while exploitation was related positively and significantly to firm efficiency ( $t=3.14$ ;  $p<.01$ ). Hence,  $H_3$  was partially supported.

## 6. Discussion

The goal of this paper was two-fold. First, we wanted to address the question of how two different learning modes, namely exploration and exploitation, are differently related to efficient and effective firm performance for prospectors and defenders. Despite the strong theoretical suggestion leading to such a research question, the extant literature has not explicitly tested this hypothesis. Our results generally point to the existence of different impacts of exploration and exploitation on firm performance, such that for prospectors, exploration was more positively related to firm performance than was exploitation while the opposite was true for defenders. Our findings also supported the claim that regardless of whether the firm is a prospector or a defender, exploration is more positively associated with effective firm performance than was exploitation. On the other hand, exploitation was more positively related to efficient firm performance than was exploration. However, this was so only for prospectors and not for defenders.

Second, we examined the different positions prospectors and defenders could take and their effect on effective and

efficient firm performance in conditions of increasing competition. Contrary to our straightforward prediction that firms would pursue a strategy of greater exploration in the presence of intensified competition, our model captured the different effects that environmental hostility could exert based on the level of existing exploration and exploitation. Since prospectors are predisposed towards exploration, more exploitation in response to increased competition was positively associated with efficient firm performance. Contrary to our hypothesis though, more exploration was not negatively related to effective firm performance.

Conversely, since defenders are exploitation-oriented, additional exploitation when confronted with increased competition contributed to less efficient firm performance. Also, contrary to our prediction, more exploration did not positively relate to effective firm performance. Our results cautiously imply that firms need to strike a balance between exploration and exploitation when faced with adverse environmental conditions, and that the value of such learning depends on the existing level of exploration and exploitation. Our results underscore the importance of a well-balanced position, and suggest that the costs associated with neglecting one over the other can negatively influence firm performance.

The implications for managers are that resource allocation needs to be made with great prudence. The effective distribution of resources needs to take into account the dominant learning mode of the firm. This mode will be amplified under conditions of increasing competitive pressure. For example, prospector firms will find the desire to be even more exploratory tempting. This will, however, create a potentially threatening imbalance in the mix of learning; a case of the firm having all their eggs in one basket. Hence, prospector firms are susceptible to outcomes that are uncertain and they are only potentially realizable in the distant future, hampering the firm's short-term market position through operational inefficiency.

## 7. Limitations and future research

The results of this study are subject to several limitations. First, for theory-testing purposes, we conducted our study in manufacturing organizations. While we collected the data from a variety of sectors in the manufacturing industry, and thereby reached a greater source of variance, the generalizability of this study's findings to other types of organizations is still limited. Hence, future researchers may replicate and extend this study to sectors other than manufacturing.

Second, we collected our data from a single source (i.e., CEOs or senior executives). As stated earlier, we believe that CEOs or senior executives are the most knowledgeable respondents for a study such as ours. Despite this advantage, the most desirable data collection procedure would have used a design of multiple respondents (i.e., CEOs and

marketing managers). Future studies might consider such a data collection procedure.

Third, a concern to our study might be common method variance in the effect of the interaction between competitive intensity and exploitation/exploration on performance, given that self-reported measures were used for both the moderating and criterion variables. Although the statistical procedure we employed assured us that common-method bias alone was not likely to explain any observed relationships between our model variables, one cannot completely rule out the possibility of such bias. Nevertheless, future studies may consider a variety of data collection procedures to minimize common method bias, such as use of multiple respondents.

### Acknowledgement

The work described in this paper was fully supported by a grant from the Research Grants Committee of the Faculty of Economics and Commerce, the University of Melbourne.

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