Baik, Youjin; Kang, Jihoon

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Small Knowledge-Intensive Firms' Innovation and Performance: The Moderating Effects of Organizational Change

Youjin Baik[a†], Jihoon Kang[b]

[a]College of Interdisciplinary Studies for Emerging Industries, Seoul Women's University, Seoul, Republic of Korea
[b]Yonsei Business Research Institute, Seoul, Republic of Korea

A B S T R A C T

Purpose: First, this study examines the effect of innovation on long-term performance of small knowledge-intensive firms. Second, we explore organizational factors that may mitigate the relationship between innovation and long-term performance of small firms.
Design/methodology/approach: This study applies the robustness of the ordered probit models. We utilize a data set of South Korean small knowledge-intensive firms with fewer than 500 employees. The final sample consists of 2,111 firms.
Findings: The results show that innovation has a positive influence on long-term performance. Our findings also suggest that top management team(TMT) departure diminishes the effect of innovation on long-term performance and that this negative impact is more pronounced as the level of technological advancement increases. Finally, the functional diversity of employees mitigates the positive effect of innovation.
Research limitations/implications: Although this study considers organizational factors that may mitigate the positive effect of innovation on long-term performance, environmental factors are not considered. Further research could identify and test additional variables that would broadly capture both firm-specific and environmental drivers of innovation for small knowledge-intensive firms. Moreover, a longitudinally designed cross-validation of the findings, and more sources of data, would enable further evaluation of causality in the hypothesized relationships.
Originality/value: This study implies that innovation is the process of creating knowledge-based resources that are critical for providing a sustainable competitive advantage. This study further sheds lights on the important role of TMT members as the possessor of tacit knowledge; executive members are responsible for maintaining steady-state patterns of innovation by contributing their tacit knowledge and expertise to the firm.

Keywords: Small knowledge-intensive firm, Innovation, Organizational change, TMT departure, Team diversity

Ⅰ. Introduction

Small and medium-sized enterprises play an increasingly pivotal role in the global economy (Cho and Lee, 2017). Despite the growing emphasis on the importance of small firms, they still perform poorly compared to large companies. This negative relationship between firm size and performance has been described in the literature as the liability of smallness (Aldrich and Auster, 1986). This liability emerges from a lack of resources and limited support from stakeholders. For example, small firms have

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† Jihoon Kang
E-mail: lyon0725@hanmail.net

difficulty in attracting qualified and competent people compared to large firms that offer long-term career opportunities and career progression (Kale and Arditi, 1998). Moreover, small firms may find it difficult to buffer themselves against hostile environments that are characterized by precarious industry settings, intense competition, harsh, overwhelming business climates, and the relative lack of exploitable opportunities (Wright et al., 2004).

One way for small firms to overcome this liability is to pursue an innovation strategy. Innovation provides an opportunity for entrepreneurial firms to gain rents through the temporary establishment of a monopoly (Schumpeter, 1934). Small firms can move faster than bigger ones due to their nimbleness, lack of hierarchy, and quick decision-making ability (Nooteboom, 1994; Vossen, 1998), thus obtaining these rents and maintaining a monopoly for a longer period of time than large firms (Rosenbusch et al., 2011). In addition, by offering highly innovative products, small firms can avoid price competition and persistently achieve above-average returns (Porter, 1980).

Despite wide acknowledgement of the enhancing effect of innovation on small firms' survival and long-term performance, previous studies on the effect of innovation have not paid enough attention to factors that may inhibit the positive outcome of innovation in small firms. We advance this topic in the literature by positing that departure of TMT members and diversity in employee backgrounds may mitigate the effect of innovation on long-term performance of small firms. Also, we expect that a greater understanding may be gained by concomitant consideration of innovation, TMT departure, and technological advancement of the firm (i.e., a three-way interaction). To test our hypotheses, we utilize a data set of South Korean small knowledge-intensive firms with fewer than 500 employees (Lu and Beamish, 2001; Sui and Baum, 2014), firms that are listed on the Ministry of Small-Medium Enterprises and Startups of Korea. South Korea offers an interesting research background for this study. In Korea, small firms constitute 99% of all Korean firms but their average operating profits constitute only 4.5% of sales, compared with 7% for large firms (The Economist, 2011). Some small firms, however, spend about half as much on research and development of their sales portfolios to achieve competitive advantages and catch up with chaebols, the large firms in South Korea (The Economist, 2011; 2013).

The rest of this study is structured in the following way. In the next section, we present four hypotheses. We then outline the methodology for the study and provide an overview of the empirical results. Finally, we discuss the implications of this research and directions for further research.

Ⅱ. Literature Review and Hypothesis

A. The Main Effect of Innovation

Innovation adds value to a firm's overall activities, ultimately bringing organizational change by facilitating application of new knowledge to current technology in production and manufacturing processes. Innovation is the process of creating, developing, and putting new ideas into practice in the production of goods and services; it is at the core of organizations (Koc and Ceylan, 2007; Rogers, 1998). In addition, in the process of actively responding to the market and developing new technologies, technological innovation leads to success in terms of sustainable management, competitive advantage, and long-term survival (Koc and Ceylan, 2007). Innovation opens windows of opportunity for small firms to benefit through establishment of niche markets, allowing faster growth and the chance to monopolize the market for a longer period of time (Rosenbusch et al., 2011).

In addition, small firms with technological resources have advantages in terms of employee recruitment compared to other small firms. Employee recruitment is a continuous decision-making process based on the results of innovation activities. In previous studies, employment growth is regarded as a representative indicator of corporate growth, and several empirical

studies have identified employment changes resulting from technological innovation. Employment change through technological innovation is based on the assumption that performance improves as a result of innovation activities. The impact of technological innovation on employment changes may be either quantitative or qualitative (Freeman et al., 1982; Evangelista and Savona, 2003). Firms with more technology tend to be market leaders with high visibility in the labor market. They enjoy high returns on R&D investments, new product launches, lower production costs and product prices, new machinery, and increased income.

Through technological innovation activities, firms can not only achieve good economic performance through direct competitive advantage, but also enjoy indirect growth opportunities. Scholars emphasized that innovation triggers success in foreign markets. For example, a firm with technological capability can overcome indigenous advantages enjoyed by local firms by creating creative and original products (Oviatt and McDougall, 1994) and achieving economies of scale (Zahra and Garvis, 2000), reducing the risk of selling a product in a single market (Hitt et al., 1994). These studies and their findings lead us to hypothesize as follows:

Hypothesis 1: Ceteris paribus, innovation is positively related to long-term firm performance.

B. Organizational Factors Mitigating the Effect of Innovation

Hypothesis 1 assumes that a firm's innovation has a positive effect on its long-term performance. However, the idea of innovation being always beneficial may be too simplistic. We suggest that the performance implications of innovation are context-specific, and that the relationship between innovation and performance depends on several factors related to external environments or organizational characteristics. In this study, we suggest three organizational factors that may mitigate the effect of innovation on long-term performance: TMT departure, technological advancement, and employee diversity.

1. Innovation, TMT Departure, and Technological Advancement

The TMT consists of the top executives in the firm who are responsible for the key issues of the whole enterprise including CEO, vice-president, managing director, executive directors etc. Strategic leadership theory (e.g., Child, 1972; Hambrick and Mason, 1984; Zahra and Pearce, 1989) claims that firms reflect the values and cognitive bases of powerful actors on their TMTs and their chief executive officers. Especially in small firms, strategies are more likely to be derived by TMT members who create and maintain organizational structures, processes, and cultures. As TMT members have the ultimate responsibility of setting the strategic directions of their firms, they also play an important role in creating a corporate environment that fosters innovation (Elenkov and Manev, 2005; Makri and Scandura, 2010; Moon, 2017).

TMT members are also responsible for maintaining steady-state patterns of innovation in their firms. Specifically, temporal consistency of ongoing innovation enables efficiencies in internal and external coordination of the routines underlying innovation in firms (Turner et al., 2013) and can serve as a source of competitive advantage (Brown and Eisenhardt, 1997; Turner et al., 2009). Moreover, corporate executives possess the critical knowledge and resources crucial to firm success. By using their knowledge, competences, professional experience, and access to business networks, executives can create innovation paths and improve firms' chances of deriving profit from innovative activities.

Inasmuch as TMT members play a vital role in creating competitive advantage (Le et al., 2017), departure of executives from the TMT will have negative implications for future performance (Durst and Wilhelm, 2011; Le et al., 2017). Many executive exits may lead to a loss of momentum in terms of maintaining a steady pace of innovative activity (Miller and Friesen, 1980), thus inhibiting goal achievement.

More importantly, TMT departure entails a loss of tacit knowledge (Hislop, 2005). Small firms are more likely to suffer from the knowledge loss problem because these firms are more dependent on the knowledge assets of a few individuals than larger companies (Hofer and Charan, 1984). TMT members in small knowledge-intensive firms tend to have valuable, firm-specific knowledge and capabilities, which are largely tacit in nature. Given that immobile resources provide a source of competitive advantage for firms (Barney, 1991), keeping firm-specific knowledge and expertise tacit and immobile may be a very competitive strategy especially when knowledge assets help to generate significant returns (Schulz and Jobe, 2001). Paradoxically, the tacitness and immobility of knowledge may pose serious challenges to the pursuit of competitive advantage when TMT members leave a firm and their valuable tacit knowledge and expertise is lost. We accordingly hypothesize the following:

Hypothesis 2-1: TMT departures will negatively moderate the positive relationship between innovation and long-term performance.

In addition, we expect that this moderating effect of TMT departures (stated in Hypothesis 2-1) will be stronger as the level of technological advancement increases. Complex knowledge is generally tacit in that it is highly personal and hard to express in codes (e.g., words, numbers, programming languages, etc.) (Polanyi, 1969). Highly complex, specific advanced technologies encompass critical tacit knowledge more than general purpose technologies. As tacit knowledge tends to reside only within the minds of a few critical individuals such as TMT members, transmission of this knowledge tends to be conservative. The diffusion of tacit knowledge to other members of a group is difficult or impossible in many cases. This implies that the knowledge loss problem due to TMT departure will be more severe for firms with higher levels of technological development and specialization, due to the higher degree of tacitness and resulting stickiness in technological knowledge (Szulanski and Jensen, 2006). When TMT members leave their firms, their critical knowledge will be more likely to disappear altogether, causing the firms to have more difficulties achieving innovation outcomes. We thus hypothesize a three-way interaction between TMT departure, technological advancement, and long-term performance as follows:

Hypothesis 2-2: The negative impact of TMT departure will be more pronounced in firms with higher levels of technological advancement.

2. Innovation and Employee Diversity

An important domain in the strategic literature examines how the decision-making processes of firms are affected by heterogeneity. Since one crucial decision for firms is how to manage heterogeneity within the workforce, we consider the degree of employee diversity as an internal force acting against innovation. Firms utilize employee diversity to innovate; this is an effective strategy that promotes satisfaction and commitment among organizational members. In such firms, performance improvements will follow. However, although diverse backgrounds of employees can lead to creative alternatives and rational decision-making (Cox and Blake, 1991), diversity within the group can also have a negative effect on performance by weakening organizational cohesion (Williams and O'Reilly, 1998). In addition, heterogeneity hinders communication among organizational members and can delay their integration into the firm. Especially for small firms that lack slack resources, coordination costs seem to outweigh the benefits of diversity. The higher the heterogeneity among employees, the higher the integration and coordination costs, which affects team cohesion negatively. This can also lead to functional conflicts (Ensley et al., 2002).

Central to the effort to meld individual talent and ability is the effective treatment of conflict among members. Unexpected conflict can arise from mis-understanding, and seeds of resentment or animosity can result. Exchange of ideas, objective assessment of alternatives, and rigorous contrasting of perspectives often produce conflicts out of which creative ideas and solutions emerge. Since smallness tends to limit

Table 1. Age and size class distribution of sample firms

Age class	Number f firms	%	Size class	Number of firms	%
1~5 years	326	15.44	under 10 employees	375	17.76
6~10 years	566	26.81	10~49 employees	868	41.12
11~20 years	939	44.48	over 50 employees	868	41.12
21~58 years	280	13.27			
Total	2111	100	Total	2111	100

a firm's capability to coordinate a broad array of resources, such conflicting interactions among employees may cause anger and alienation (Kale and Arditi, 1998). This can lead to disaffection, individual isolation, and departure by the offended team members, thereby deteriorating the positive effects of innovation (Jackson et al., 1991). We thus hypothesize as follows:

Hypothesis 3: Team diversity will negatively moderate the positive relationship between innovation and long-term performance.

Ⅲ. Research Methods

A. Sample Selection and Data Collection

We used secondary survey data from small knowledge-intensive firms collected in 2017 by the Ministry of Small-Medium Enterprises and Startups (MSS) of South Korea. MSS is a governmental organization that supports to strengthen competitiveness and support innovation of small and medium-sized enterprises and micro enterprises in Korea. MSS has been publishing Survey of Korea Venture Firms annually since 1999.[1] This data contains various firm-level information in 10 categories. The categories are as follows: 1) managerial performance and financial status, 2) employees and organizational status, 3) general status, 4) founder characteristics, 5) intellectual property status, 6) marketing capability and overseas status, 7) partnership status, 8) venture capital and M&A status, 9) fair trade status, 10) educational and managerial difficulties. After deleting observations with missing values, the sample consisted of 2,111 firms. The purpose of this survey is to identify the motives, characteristics, and patterns of growth in small knowledge-intensive firms. Most of the firms in the sample are small (Table 1). Firms with under 10 employees account for 17.76% of the total, including a 0.52% share of non-employers (no employees besides the owner). Firms with 10-49 employees account for an additional 41.12% of the sample and the next size category (over 50 employees) accounted for 41.12% of the total.

In order to minimize potential common method bias effects inherent in using survey data, we performed Harman's one factor test (Harman, 1976). The basic assumption is that if common method variance is present, a single factor will account for most of the covariance when all variables are entered together. We performed a factor analysis and no single explanatory factor was apparent in the unrotated factorial structure. This result suggested that common method bias was not a serious problem in this study.

B. Variables

1. Dependent variable

Long-term performance is a Likert scale-type variable where respondents were asked to evaluate the extent of their firm's long-term performance (1= poor to 5 = excellent).

2. Independent and moderating variables

The primary independent variable in our study

1) https://www.mss.go.kr/site/smba/foffice/ex/statDB/surveyList.do?param1=0&param2=5

is firm innovation. We measured Innovation using a count of each firm's patents, each of which represents a successfully realized innovation (Sears and Hoetker, 2014). In Hypotheses 2 and 3, we identified several factors that moderate the effect of innovation. First, we calculated TMT departure by dividing the number of TMT members who left a given firm by the total number of employees in that firm. Second, technological advancement was measured using a single-item scale of 5-point Likert-type items that summarizes the degree to which the core technologies of a given firm have advanced (1 = not advanced to 5 = highly advanced). Finally, to measure Employee Diversity, we distinguished between five main areas of expertise (i.e., general management; manufacturing; sales; research and development; others) within the workforce (Protogerou et al., 2017). Specifically, this variable was calculated with Blau's index (1997) as follows:

$$\text{Employee Diversity} = 1 - \Sigma_{t=1}^{p} p_i^2$$

where P_i is the fraction of employees with expertise *i*. The value of this index is between 0 and 1. A higher index indicates more mixed expertise among the employees of a given firm.

3. Control variables

We controlled for firm age and size. To measure firm age, we subtracted the year in which a given firm was established from 2017 and added 1 to the number (Yasuda, 2005). Older and larger firms have additional resources that support their long-term success (Barkema et al., 1996). Firm size was measured using the natural logarithm of the total number of employees within a given firm (Chao and Kumar, 2010). We also controlled for R&D intensity. Prior studies have found that R&D investment is positively related to firm performance (e.g., Lichtenberg and Siegel, 1991; Eberhart et al., 2004). R&D intensity was measured by determining R&D expenditure divided by sales in each firm (Belderbos, 2003). Next, we controlled for firm experience with mergers and acquisitions (M&A). M&A involves transfer of technology and innovation to keep pace with the globalization of business (Hitt et al., 2006). M&A was measured as a binary variable which takes the value of 1 when the firm has experience with M&A, and 0 otherwise. To control for industry effects, we included industry group dummies (4 groups), with high-technology manufacturing being the reference group (Table 2).

C. Model Specification

The study used the robustness of the ordered probit model. While bivariate logit/probit analyses arbitrarily categorize a firm's result (long term performance) into one of two groups and deviate mediocre performances to either failure or success, an ordered model allows us to further classify the dependent variable. In this sense, a multinomial method can be applied in the same way. However, a multinomial model ignores that the dependent variable categories have a preferred order, leading to the loss of efficiency of the estimators and the higher standard errors. Therefore, it is more appropriate to utilize an ordered probit technique for analyzing this data. The distribution parameters of the subjacent latent variable are estimated by maximum likelihood models. Maximum likelihood estimation is a method of estimating the parameters

Table 2. List of industry dummies included in the model

#	Industry Group	2-digit Korea Standard Industry Classification (KSIC)
1	High-technology manufacturing	26, 28, 29, 30, 31
2	Other manufacturing	7, 10, 11, 19, 20, 21, 22, 23, 24, 25, 25, 32, 33
3	Software and IT services	58, 62, 63
4	Others	1, 10, 13, 14, 15, 16, 17, 18, 35, 37, 38, 39, 41, 42, 46, 47, 49, 58, 59, 61, 70, 71, 72, 73, 75, 90

of a probability distribution by maximizing a likelihood function; under the assumed statistical model the observed data is most probable (Rossi, 2018). It is possible to estimate the likelihood of a relative long-term performance of 1, 2, 3, 4, or 5, with the slope parameters βi and the threshold parameters κi.

The model to estimate is:

$$\begin{aligned} \textit{Firm's long term performance} = \beta_0 + + \beta_1 * \textit{age} \\ + \beta_2 * \text{size} + \beta_3 * \textit{R\&D intensity} + \beta_4 * \textit{M\&A} \\ + \beta_5 * \textit{industry} + \beta_6 * \textit{innovation} \\ + \beta_7 * \text{TMT departure} \\ + \beta_8 * \text{technological advancement} \\ + \beta_9 * \text{employee diversity} \end{aligned}$$

Ⅳ. Results

Table 3 displays the means, standard deviations, and correlations of all the variables used in empirically testing the model and hypotheses. A Pearson correlation analysis between variables was firstly performed as a preliminary test to find any potential multicollinearity problem. Overall, variance inflation factors turned out to be acceptably low with values ranging from 1.01 to 1.32. To test for heteroscedasticity, we also performed the Spearman's rank test (at 5% significance level). The results show that there is no evidence of heteroscedasticity correlation.

Table 4 provides the results of the ordered probit analysis. The likelihood ratio is highly significant at 1% which indicates a good model fit. As a baseline, Model 1 includes only the control variables. While the coefficient of firm age is negative and significant for long-term performance, the coefficients of firm size and R&D intensity are positive and significant. The independent variable is added to Model 2 for hypothesis testing. The results reveal support for Hypothesis 1, which indicates that innovation leads to improved long-term performance, because the coefficient of Innovation is positive and statistically significant.

H2-1 posits that TMT departure negatively moderates the relationship between innovation and long-term performance. Model 3 implies that when the TMT departure variable is added, the positive relationship between innovation and performance becomes weaker. Therefore, Hypothesis 2-1 is supported. In Model 3, we insert the technological advancement variable to test Hypothesis 2-2. As the results also support the three-way moderating effect of technological advancement, Hypothesis 2-2 is supported as well. Finally, in Model 5, employee diversity negatively moderates the innovation-performance relationship. Thus, this result supports H3.

We conducted robustness checks on our moderating variable, TMT departure, by running the ordered probit analysis on its alternative operationalization. Based on Bendeck and Waller (1999), we included

Table 3. Descriptive statistics and correlations

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Performance	3.86	.54	1.00									
(2) Innovation	8.72	17.29	0.07**	1.00								
(3) TMT departure	.12	.55	-0.02	-0.01	1.00							
(4) Advancement	3.05	.73	-0.17***	-0.14***	0.01	1.00						
(5) Diversity	.59	.12	0.04*	0.08***	0.01	-0.05*	1.00					
(6) Firm age	13.12	7.51	-0.03	0.19***	-0.01	-0.09***	-0.03	1.00				
(7) Firm size	3.62	1.11	0.01	0.28***	-0.08***	-0.10***	-0.19***	0.43***	1.00			
(8) R&D intensity	.11	.69	0.07**	0.01	-0.01	0.01***	0.03	-0.07**	-0.10***	1.00		
(9) M&A	.02	.16	-0.01	0.01	0.04*	0.01	0.00	-0.03	-0.07	0.02**	1.00	
(10) Industry	2.1	1.15	-0.01	-0.14***	0.03	0.13**	-0.05	-0.10***	-0.05	0.01	0.09***	1.00

Table 4. Results of analysis

	Hypotheses	Model 1	Model 2	Model 3	Model 4	Model 5
Firm age		-0.010**	-0.010***	-0.011***	-0.013***	-0.012***
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Firm size		0.051**	0.032	0.029	0.020	0.048*
		(0.026)	(0.027)	(0.027)	(0.027)	(0.028)
R&D intensity		0.136***	0.130***	0.128***	0.141***	0.126***
		(0.045)	(0.044)	(0.044)	(0.047)	(0.044)
M&A		-0.034	-0.061	-0.044	-0.065	-0.050
		(0.157)	(0.158)	(0.158)	(0.160)	(0.158)
Industry dummies[a]						
TMT departure (TD)[b]				-2.635	-4.406**	
				(1.637)	(1.876)	
Technological advancement (TA)[b]					-0.294***	
					(0.037)	
Innovation X TA					0.004*	
					(0.002)	
TD X TA					-2.380	
					(1.911)	
Employee diversity (ED)[b]						0.352
						(0.226)
Innovation[b]	(H1: +)		0.005***	0.005***	0.006***	0.006***
			(0.002)	(0.002)	(0.002)	(0.002)
Innovation X TD	(H2-1: -)			-0.333**	-0.516***	
				(0.152)	(0.180)	
Innovation X TD X TA	(H2-2: -)				-0.457*	
					(0.252)	
Innovation X ED	(H3: -)					-0.043**
						(0.017)
Constant cut1		-2.704***	-2.782***	-2.797***	-2.926***	-2.749***
		(0.161)	(0.163)	(0.163)	(0.170)	(0.165)
Constant cut2		-0.701***	-0.776***	-0.789***	-0.844***	-0.736***
		(0.097)	(0.100)	(0.101)	(0.102)	(0.103)
Constant cut3		1.458***	1.391***	1.382***	1.379***	1.439***
		(0.101)	(0.103)	(0.103)	(0.104)	(0.106)
Observations		2,112	2,112	2,112	2,112	2,112
Chi−squared statistic		23.35***	33.15***	38.48***	112.91***	42.72***

Standard errors in parentheses.
*** p < 0.001, ** p < 0.01, * p < 0.5.
a. Industry dummies not significant.
b. Variables mean-centered

the departures of senior managers, as well as TMT members. We also recalculated Team diversity as diversity in educational backgrounds among employees (Ely, 2004). The results of these robustness tests (presented in Table 5) were qualitatively similar to the original regression results (presented in Table 4). The departure of senior managers weakens the positive effect of innovation on long-term performance. Also, team diversity remeasured based on employees' educational backgrounds negatively moderates the relationship between innovation and performance. Overall, the robustness tests support the results we obtained in our main analyses.

Ⅴ. Discussion and Conclusion

This study had two primary purposes. First, we examined the effect of innovation on long-term performance in small knowledge-intensive firms. Second, we examined the moderating effects of organizational factors that may mitigate the effect of innovation. Based on secondary survey data from 2,111 small knowledge-intensive firms collected in 2017 by the MSS in Korea, we found evidence as follows. First, our results suggest that innovation (measured in terms of patents) has a positive influence on long-term performance. We also found that TMT departure diminishes the effect of innovation on long-term performance. Third, this negative impact of TMT departure is more pronounced as the level of technological advancement increases. Finally, functional diversity within the workforce mitigates the positive effect of innovation.

The contributions of our study are as follows. First, our findings support the assertion that innovation is an important source of sustainable competitive advantage for small knowledge-intensive firms. The results of this study imply that innovation is the process of creating knowledge-based resources that are particularly important for providing a sustainable competitive advantage (McEvily and Chakravarthy, 2002). Second, our study contributes to the entrepreneurship literature involving the role of TMT members and their departures in innovation. Our finding is consistent with the view of Schumpeter (1934) that innovation is driven by the entrepreneur, who is at the heart of the firm. He noted that entrepreneurs can reform or revolutionize patterns of production by exploiting an invention or an untried technology or by producing an old one in a new way (Schumpeter, 1934). Therefore, it can be inferred that successful innovation is dependent on the stability of the TMT, and executive members are responsible for maintaining steady-state patterns of innovation by using their tacit knowledge and experience to firm advantage. When TMT departure occurs, knowledge and expertise of the departing TMTs will be lost. This may prevent retention of valuable knowledge assets within a firm (Hislop, 2005) and inhibit efforts to maintain a steady pace of innovative activity (Miller and Friesen, 1980).

In addition, our study enriches our understanding of how technological advancement within a firm affects the moderating role of TMT departure. Based on the assumption that TMTs in a firm with more developed technologies have more tacit knowledge, we observe that the negative impact of TMT departure is more pronounced when the level of technological advancement is higher, because of the greater tacitness of the knowledge of TMT members. Finally, our findings show that functional diversity among employees could harm corporate innovation, a result inconsistent with the finding of Protogerou et al. (2017) that increased diversity in terms of functional expertise enhances the ability of firms to pursue radical innovation. A possible explanation for this discrepancy is that especially for small knowledge-intensive firms, employee diversity in functional expertise can be a liability because the coordination costs resulting from distributed knowledge may outweigh the potential gains (Boone and Hendriks, 2009). This explanation seems to be consistent with the argument of Rhee et al. (2006) that diversity can impede interpretation of knowledge specificity, decreasing confidence in lessons learned.

This study is not without limitations. First, we

Table 5. Robustness test results

	Model 1	Model 2	Model 3
Firm age	-0.0103***	-0.0125***	-0.0105***
	(0.00385)	(0.00389)	(0.00386)
Firm size	0.0327	0.0250	0.0309
	(0.0266)	(0.0268)	(0.0269)
R&D intensity	0.131***	0.145***	0.130***
	(0.0442)	(0.0471)	(0.0442)
M&A	-0.0618	-0.0528	-0.0545
	(0.159)	(0.161)	(0.158)
Industry dummies [a]			
Senior manager departure (SD) [b]	-1.0688	-2.191**	
	(0.0882)	(0.0930)	
Technological advancement (TA) [b]		-0.298***	
		(0.0368)	
Innovation X TA		0.00247	
		(0.00213)	
SD X TA		0.0455	
		(0.115)	
Educational diversity (ED) [b]			0.0855
			(0.183)
Innovation [b]	0.00483***	0.00467**	0.00480***
	(0.00158)	(0.00184)	(0.00159)
Innovation X SD	-0.2454*	-0.3312***	
	(0.00621)	(0.00848)	
Innovation X SD X TA		-0.3298*	
		(0.00736)	
Innovation X ED			-0.00597**
			(0.0111)
Constant cut1	-2.781***	-2.895***	-2.784***
	(0.163)	(0.170)	(0.164)
Constant cut2	-0.773***	-0.820***	-0.778***
	(0.100)	(0.102)	(0.101)
Constant cut3	1.395***	1.397***	1.390***
	(0.103)	(0.104)	(0.104)
Observations	2,112	2,112	2,112
Chi−squared statistic	34.48***	104.63***	33.61***
Pseudo R^2	0.0101	0.0306	0.0198

Standard errors in parentheses.
*** p < 0.001, ** p < 0.01, * p < 0.5.
a. Industry dummies not significant.
b. Variables mean-centered.

were unable to test the stability of the effects of innovation, TMT departure, and employee diversity on long-term performance in a time-series analysis. More specifically, an argument might be made for reversed causality in which TMTs pursuing innovations enthusiastically reach burnout and thus intend to leave, leading to an overall decrease in long-term performance. In this case, TMT departure can be considered a mediation, not a moderator. Thus, a longitudinally designed cross-validation of the findings, and more sources of data, would enable further evaluation of causality in the hypothesized relationships. In addition, although this study considers organizational factors that may mitigate the positive effect of innovation on long-term performance, environmental factors are not considered. Further research could identify and test additional variables that would broadly capture both firm-specific and environmental drivers of innovation for small knowledge-intensive firms. Finally, our sample is restricted to Korean companies. Future research can include samples from other countries to improve the cross-cultural generalizability of the results.

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