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Diverse Institutional Environments and Product Innovation of Emerging Market Firms

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Abstract:

- This study unbundled institutional environment into two distinct aspects: institutional distance (the degree of dissimilarity between the institutional environment of a firm's home country and an economy into which it expands) and institutional diversity (the variety of all the institutional environments to which a firm is exposed), and related them to product innovation performance of emerging market firms.
- Data on 917 Chinese manufacturing firms in multiple industries over 3 years was analyzed.
- The results show a positive relationship between institutional distance and product innovation success. An inverted U-shaped relationship was found between the institutional diversity of a firm's foreign markets and its product innovation success.

Keywords: Institutional environments · Institutional distance · Institutional diversity · Product innovation · Emerging markets · China

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Introduction

In an increasingly knowledge-based economy, understanding the factors that determine an organization's ability to produce new ideas and continually innovate is a fundamental issue for strategic management and international business scholars (Sorensen and Stuart 2000). Innovation occupies a central position among all organizational outputs, not only because it is a primary way in which firms compete and grow, but also because it profoundly influences social and economic evolution (Eisenhardt and Tabrizi 1995; Sorensen and Stuart 2000). This study focused on two key aspects of the institutional environment in which firms innovate—institutional distance and institutional diversity—and examined their different impacts on innovation. In so doing it addressed an important unresolved issue in international business and strategic management—the nature of the relationship between the institutional environment and a firm's innovation performance.

International business and strategy scholars have devoted sustained attention to the consequences of the institutional environment but have failed to reach consensus as to whether the institutional environment has negative or positive effects on organizational performance (Tsang and Yip 2007; Yang et al. 2012). Recent research on the international expansion of firms from emerging markets has led to the important insight that expansion into more developed countries presents an opportunity to access advanced technology and know-how and enables a firm to take advantage of a foreign country's institutions to promote organizational learning and innovation (Makino et al. 2002; Luo and Tung 2007). However, expanding into a foreign country that is institutionally distinct from the home country may also trigger "the conflicting demands of external legitimacy in the host country" (Xu and Shenkar 2002, p. 610). Thus it appears that the value of international expansion is conditioned by the level of institutional development in the foreign country relative to the home country (Makino et al. 2002). The higher the level of institutional development, the greater the probability that a foreign firm will gain access to advanced technologies and valuable resources. But the diversity of the new institutional environment may limit the benefits an entrant can harvest from international expansion (Kostova 1999). Moreover, the existing studies of foreign expansion have focused mainly on firms from developed markets. These studies have primarily examined how firms from a developed market expand to another developed market or to less developed markets, but no enough attention has been paid to how firms from emerging markets expand to more or less developed markets and their implications for organizational survival and outcomes (Luo and Tung 2007; Tsang and Yip 2007). In fact, almost no studies have explicitly examined how complex institutional environments affect innovation performance of emerging market firms.

This study is designed to fill these gaps by contributing to the literature in three areas. First, most previous studies have examined the effect of the institutional environment on the probability of organizational survival and on financial performance (e.g., Xu and Shenkar 2002; Gaur and Lu 2007), but this study instead examined the effect of the institutional environment on innovation performance. Second, differing from prior studies on this topic, this study conceptualized institutional environments as having two distinct aspects: institutional distance (the degree of dissimilarity of institutional environments between two countries) and institutional diversity (the variety of institutional environments in multiple foreign countries), and examined their different impacts on

innovation performance. Such a distinction can help elucidate the roles of different elements of the institutional environment in promoting innovation and provide an empirical indicator of the effectiveness of knowledge flows using the different elements. Then, the study integrated the literature on new institutional economics, international diversification and international expansion of emerging market firms to derive testable propositions about the relationships between institutional distance, institutional diversity and innovation performance of emerging market firms. Evidence clarifying the relationship between the institutional environment and innovation performance of emerging market firms would be relevant for designing effective and efficient international expansion strategies by emerging market firms.

The empirical analyses were designed to test the impacts of institutional distance and diversity on innovation using a large sample of 917 Chinese manufacturing firms in various industries over a period of 3 years (1998–2000). It is likely that the impact of institutional distance and diversity on product innovation will differ from that on process innovation. This study was restricted to product innovation.

The next section will review prior academic work on diverse institutional environments, analyze it in terms of the two distinct elements, and discuss the differences between them. Building on this review and the theoretical framework being proposed, hypotheses relating institutional distance and institutional diversity to the product innovation success of emerging market firms will be developed separately. An empirical study designed to test the hypothesized relationships and its findings will then be described. The final section will discuss the implications of these findings for theory and practice and the limitations of this study will be used to outline an agenda for further research.

Background

Although international business scholars have long studied the relationship between the institutional environment and firm performance, most research in this tradition has focused on the institutional environment of a firm's home country (e.g., Kim et al. 2010; Porter 1990; Wan and Hoskisson 2003) or a host country (e.g., Berry 2006; Pantzalis 2001). However, a few pioneering studies have explored the institutional environment from the perspective of the institutional distance between a firm's home and the host country into which it has expanded (Kostova 1999; Xu and Shenkar 2002; Gaur and Lu 2007). Kostova (1999) explored country-, organization- and individual-level factors that affect transnational transfer of organizational practices and suggested that institutional distance between the home and host countries affects transfer success. Xu and Shenkar (2002) suggested that institutional distance is associated with firms' host country selections. They related institutional distance to entry mode and ownership mode and proposed that institutional distance may predict foreign market entry strategies. But they did not explore the possibility that institutional distance might influence innovation output. Gaur and Lu (2007) showed that institutional distance has an inverted U-shaped relationship with the survival rate of foreign subsidiaries, and ownership strategies positively moderate the relationship between institutional distance and the survival rate, but they too did not directly examine the impact of institutional distance on innovation.

Other studies have examined the complexity of the institutional environments in which firms are embedded and its strategic implications. Kostova and Zaheer (1999) have suggested that the complexity of the institutional environment is reflected in the institutional distance between the home and host countries and the variety of institutional environments encountered in multiple foreign countries. They posited that variety and inconsistency in the institutional environments a firm faces raises challenges when it needs to develop competence in dealing with them. While they did not directly examine the role of variety as a predictor of organizational outcomes, their work has important implications for modeling the relationship between institutional environments and firm performance. Recognizing the institutional distance between the home and host countries and the diversity of institutional environments across multiple foreign countries highlights the importance of decomposing the institutional environment into distinct elements and identifying their very different underlying causal mechanisms leading to innovation performance.

This study thus analyzed institutional environments in terms of two distinct elements: (1) the degree of dissimilarity in the institutional development between a foreign market and the home market (Kostova 1999) and (2) the variety in the institutional environments of multiple foreign markets to which a firm has expanded (Kostova and Zaheer 1999). The first is referred to here as *institutional distance;* the second is referred to as *institutional diversity*. The two concepts differ in several important ways. First of all, institutional distance focuses on the dyadic relationship between the home market and a particular foreign market to which the focal firm is exposed, whereas institutional diversity describes a group of foreign markets to which a focal firm has expanded. Second, institutional distance captures the degree of dissimilarity between a foreign market and the home market in terms of institutional development, whereas institutional diversity expresses the degree of variety among a group of foreign markets with respect to their institutional development. Third, institutional distance reveals differences which can either promote or hinder product innovation, whereas institutional diversity reflects complexity which provides a firm with opportunities to learn but also imposes substantial costs (e.g., in coordinating communications and managing operations).

Hypotheses

Institutional Distance and Product Innovation

Expanding to a foreign country with better-developed institutions can alleviate the institutional constraints that limit opportunity in the home market. This is particularly true for firms from emerging markets (e.g., Makino et al. 2002; Luo and Tung 2007). Many emerging markets are characterized by weak legal protection for property rights, poor enforcement of commercial laws, opaque legal systems, and inefficient market intermediaries—together termed the "institutional void" (Khanna and Palepu 1997; Mahmood and Mitchell 2004). Moreover, such markets suffer from political hazards such as political instability, unpredictable regulatory changes, government interference, bureaucratic red tape, widespread corruption, and ambiguous laws and rules (Luo and Tung 2007). It is very costly (both financially and in terms of time) for firms operating in such markets

to deal with the institutional void and political hazards, and this seriously erodes a firm's competitiveness and impels it to expand into markets which are more developed, with more efficient and transparent institutions. Emerging market firms expanding into foreign countries with better-developed institutions can take advantage of institutional advantages there and better concentrate on building their technological capabilities.

Expanding to a foreign country with better-developed institutions can also provide emerging market firms access to advanced technologies and a better-developed customer base, because these important strategic assets are spatially concentrated in developed countries (Makino et al. 2002; Yiu et al. 2007). Emerging market firms can learn sophisticated process and product technology from doing business with partners and customers from developed markets, which can help promote successful product innovation. They can also imitate or buy in much of the technology and expertise they need and combine them with their home-grown capabilities (e.g., mass production capability). Such combination can spur them to introduce new products to domestic and foreign markets and offer them at a competitive price (Yeung 1997), which will have an effect on product innovation.

Third, an emerging market firm expanding to a foreign country that is more developed than the home country can also enhance its reputation and brand image, which can in turn increase the acceptance of its new products in both home and foreign markets (Luo and Tung 2007). The increased market acceptance will again contribute to successful product innovation.

In contrast, expanding to a foreign country with less developed institutions than the home country increases transaction costs and the costs of market information. The lack of reliable market information, an effective legal system, predictable government actions and an efficient bureaucracy makes market transactions costly and operations less efficient for firms doing business there (Chan et al. 2008; Wu 2013). Also, the costs of market information (including searching for and gaining access to market information and complementary assets needed for innovation) are extremely high in such markets due to their under-developed and inefficient intermediaries (North 1990). High transaction and market information costs greatly reduce a firm's incentives to develop new products.

Firms expanding to a foreign country with less developed institutions than the home country also have to bear high risks of expropriation by governments and local organizations. Less developed institutions mean a greater risk of unenforceable contracts and insecure property rights (Wu 2013). To protect their assets from expropriation and prevent unwanted dissemination of their proprietary assets, firms must commit substantial resources and managerial attention to dealing with governments which are powerful but often capricious, and with hostility from local nongovernmental organizations (Rangan 2000; Wu 2011). This leaves fewer resources and less attention to allocate to product innovation.

And firms expanding to a foreign country that is less developed than their own may be disinclined to explore the resources and capabilities possessed by local firms because they conceive themselves as possessing comparatively better firm-specific technology than the local firms. Wu and Pangarkar (2006) found that Chinese firms are less likely to develop new capabilities in foreign markets that they consider less developed than the market in China because of the weak market-supporting institutions and severe information asymmetry in such environments. These arguments lead to the following hypothesis:

Hypothesis 1: The institutional distance of an emerging market firm's foreign markets from its home market positively affects its product innovation success such that a larger positive institutional distance promotes greater product innovation success and a larger negative distance hinders product innovation success.

Institutional Diversity and Product Innovation

Institutional diversity exerts two contradictory influences on a firm's product innovation. On the one hand, diverse institutional environments provide a firm with opportunities to learn about many new technologies and novel practices that are useful for the development of new products (Barkema and Vermeulen 1998). Expanding to diverse institutional environments exposes a firm to various technologies and new ideas (Huber 1991) which add new elements to the firm's knowledge pool and lead to a more extensive knowledge base (March 1991). Diversity in its institutional environments also exposes firms to a broader array of new, dissimilar customer needs (Barkema and Vermeulen 1998). Firms are thereby stimulated to experiment with different solutions and develop new products to address these new, dissimilar market demands, which can greatly enrich the firm's experience and knowledge. Finally, diverse institutional environments also mean that a firm is confronted with a wide range of competitors (Miller and Chen 1996). To effectively counter the new threats arising from very different market settings, a firm is triggered to build strong technological capabilities, which helps to increase the firm's product innovation success.

Against these positive impacts of increased institutional diversity stand diversity's negative influences. Increased diversity that exposes a firm to new technologies and practices also places a strain on its management and its absorptive capacity. Beyond a certain point the innovation benefits should diminish as the costs of managing and absorbing diverse technologies derived from multiple markets increase significantly. Not only are firms required to manage each new technology, but they must also integrate them with their existing technologies (Bettis and Prahalad 1995). However, new technologies from a very different institutional environment are often deeply rooted in a set of rules, procedures, conventions, beliefs, codes and even cultures which may not relate well with a firm's existing knowledge structure, organizational practices and culture. To assimilate various new technologies and apply them to commercial ends may require that a firm unlearn aspects of its existing technological routines and perhaps even beliefs, codes and culture. Too much new technology may finally entail fundamental organizational change (Fiol and Lyles 1985). Further, there is a natural limit to the time and effort that any firm can devote to managing its operations across diverse institutional environments (Hitt et al. 1997). At high levels of institutional diversity, correctly understanding and interpreting different institutional requirements becomes extremely difficult, and this may exceed an organization's capacity. The coordination costs between corporate headquarters and multiple foreign operations in diverse host countries can be substantial. All these costs are likely to increase with the level of institutional diversity and will have a negative impact on product innovation.

A firm's actual product innovation success will reflect the joint effect of the benefits and costs associated with institutional diversity. At low levels of institutional diversity, a firm's limited exposure to foreign markets will restrict the number of new technologies

and practices available to it. Even though the costs of managing new technologies and integrating them with existing technology is minimal, the lack of available new technologies will serve as a constraint and the resulting level of success in product innovation may be low. With exposure to greater institutional diversity, firms will be exposed to many more new technologies that can contribute to product innovation, but the costs of coordinating them and incorporating them into a firm's existing technological routines, as well as the cost of maintaining operations in diverse markets will be relatively high, which can at some point outweigh the benefits of the diversity. Therefore, the innovation benefits are likely to increase with diversity up to a point, but then the costs resulting from high levels of institutional diversity will overtake the benefits and the net impact on product innovation success will become negative. Firms dealing with intermediate levels of institutional diversity will have the opportunities of exposure to many new technologies while keeping the coordination costs and the complexity of maintaining cross-border operations at a reasonable level. Such firms should, on average, turn out to be more successful in new product development.

Hypothesis 2: The institutional diversity of an emerging market firm's foreign markets has an inverted U-shaped relationship with its product innovation success.

Methods

Data and Sampling

These propositions were tested using data from a large survey conducted by the Enterprise Survey Organization of China's National Bureau of Statistics in collaboration with the World Bank under a project entitled Competitiveness, Technology and Firm Linkages. The survey covered 1,500 firms from five cities in China: Beijing, Chengdu, Guangzhou, Shanghai, and Tianjin. Three hundred firms from each city were selected by experts with an eye to achieving a representative sample given predetermined distributions by city, industry, and size (for a more detailed description of the data, see Hallward-Diriemeier et al. 2003).

The questionnaire was prepared in English and translated into Chinese by scholars competent in both languages and with substantial research experience. A translation-back-translation technique was employed to make sure that there were no misunderstandings. Before the formal survey, the questionnaire was pilot tested in interviews with 17 business managers to determine whether the questions were properly worded and well understood in the context of Chinese business. A letter of introduction was then hand-delivered to the CEO/general manager of each company, explaining the purpose of the study and inviting participation. The top executives (general managers or CEOs) were then contacted by telephone within 2 weeks to ensure their participation in the study and to make appointments for onsite interviews. This survey method ensured access to the right respondents, confirmed the correct use and understanding of the terms, and provided high response rates (Wu and Chen 2012). Each completed questionnaire was immediately checked by a supervisor to determine whether it had been filled out in accordance with the instructions. All questionnaires were verified by supervisors before data entry (for more details, see World Bank 2003).

The survey comprised two separate questionnaires answered by two different groups of respondents. One was completed by accountants or personnel managers who provided basic profile information such as about a firm's ownership and revenues, R&D expenditure and labor force size. The other was completed by senior line managers (e.g., head of manufacturing or a general manager) who provided information on innovation outcomes. The sample covered ten industry sectors, including five manufacturing sectors (electronic equipment, electronic components, consumer products, vehicles and vehicle parts, and apparel and leather goods) and five service sectors (accounting, advertising and marketing, business logistics, communications, and information technology). Because manufacturing and service industries exhibit different innovation patterns (Sirilli and Evangelista 1998), this study used the manufacturing firm data only. After excluding items with missing values, the final sample comprised 917 firms.

Of the 917 firms, about 41% were of medium size with between 100 and 1,000 employees and 45% were smaller with less than 100 employees. About 40% had been in business between 5 and 10 years, with another 30% aged between 10 and 30 years, 21% older and 10% aged less than 5 years. About 25% were in apparel and leather goods, 12% in consumer products, 26% in electronic components, 18% in electronic equipment, and 19% in the vehicle and vehicle parts industry. 16% of the firms were from Beijing, 11% from Chengdu, 26% from Guangzhou, 31% from Shanghai, and 17% from Tianjin (see Table 1).

Table 1: Sample description

Characteristics	Number of firms	Percentage
Number of employees		
Small (<100)	411	44.82
Medium (101–1,000)	380	41.44
Large (>1,000)	126	13.74
Location		
Beijing	143	15.59
Chengdu	102	11.12
Guangzhou	236	25.74
Shanghai	283	30.86
Tianjin	153	16.68
Age (*years*)		
>30	189	20.61
10–30	275	29.99
5–10	365	39.80
<5	88	9.60
Industry		
Apparel and leather goods	232	25.30
Consumer products	113	12.32
Electronic components	234	25.52
Electronic equipment	168	18.32
Vehicles and vehicle parts	170	18.54
Total	917	

To assess the risk of heteroscedasticity (i.e., whether or not pooling data across industries and cities would be appropriate), the panel data were analyzed using White's generalized test (Bowen and Wiersema 1999). The Breusch-Pagan test statistics revealed no heteroscedasticity concerns ($\chi^2 = 17.92$, $p = 0.36$). The estimated residuals were also plotted against the independent variables and no systematic patterns of heteroscedasticity were found (Wooldridge 2009). The study also created "dummy" variables representing industries and cities to model coefficient variations. Modeling coefficient variation alleviates concerns about possible heteroscedasticity associated with pooling of the data (Greene 1994).

To overcome common method bias, the study employed information provided by two different sets of respondents answering at different times. Specifically, the information on the dependent and independent variables was provided by different respondents from the same firm. This research design substantially minimizes the risk of common method variance (Eisenhardt and Tabrizi 1995). In addition, a Harmon one-factor test for common method bias showed that the first factor explained less than 42 % of the variance, indicating that common method bias was not a serious concern in this study.

Measures

Product Innovation. Product innovation was measured in terms of the number of new products a firm had introduced to the market in 1999–2000. The number of new products is an important indicator of product innovation because it "indicates the potential commercial significance of a firm's innovation activities" and "most innovations cannot influence firm performance until the ideas have been put into use and introduced to the market" (Katila 2002, p. 996). Previous studies have shown that the introduction of new products increases market share and market value (Chaney and Devinney 1992), improves firm performance (Roberts 1999), and enhances a firm's survival chances (Banbury and Mitchell 1995).

Institutional distance. On the basis of previous work by La Porta's group (La Porta et al. 1998) and by Gaur and Lu (2007), this study used country-level indicators related to institutional profiles from the *International Country Risk Guide* (*1991–2001*) (ICRG 2001). These indicators have often been used in academic work to measure differences in institutional environments (La Porta et al. 1998, 1999; Gaur and Lu 2007; Wu 2013). Among the institutional variables tabulated, "law and order" relates to the strength and impartiality of the legal system and the effectiveness of law enforcement and "bureaucracy quality" relates to the strength and quality of the nation's bureaucratic institutions. Countries with high ratings have the strength and expertise to govern without drastic changes in policy and interruption in government services. "Corruption" relates to demands for special payments and bribes connected with import and export licenses, exchange controls, tax assessments, police protection or loans, any of which put foreign businesses at risk (ICRG 2001). The study had information on these three dimensions in 1998 in terms of a total of 140 country-level indicators.

An exploratory principal component factor analysis with varimax rotation supported a single factor with an eigenvalue greater than 1 and explaining 72.4 % of the variance. The three variables were subjected to factor analysis and the factor loadings of all the

variables were greater than 0.65. A composite measure was then constructed using the weighted average of the three institutional variables. The weight assigned to each variable was based on the factor loadings obtained from the factor analysis.[1] The 140 country-level weighted average scores were matched with the panel data on the 74 countries with which the Chinese firms were involved. To quantify the institutional distance of a foreign market from China's, China's score was subtracted from that of the foreign market.

Institutional diversity. Institutional diversity (ID_j) for firm j was measured by the standard deviation of the institutional distances of its foreign destinations:

$$ID_j = \sqrt{\frac{\left[\sum_{i=1}^{I}\left(dist_i - \left(\sum_{i=1}^{I}\frac{dist_i}{I}\right)\right)\right]^2}{I-1}},$$

where $dist_i$ refers to the institutional distance of foreign destination i and I refers to the group of important countries from which the firm derived foreign sales. Standard deviation is a common measure of diversity (e.g., Baskin 1989; Bittlingmayer 1998). The computation was restricted to the top five foreign destinations for which the respondents provided complete information. This restriction did not much affect the calculation of institutional diversity because the majority of the firms reported that their foreign sales were derived from less than five destinations, and the remaining firms reported a very small proportion of foreign sales derived from destinations outside the top five. To further alleviate any concern about this issue, any firms reporting foreign sales derived from more than five foreign destinations were excluded and the models were re-estimated (see the discussion of robustness checks). Further, a measure of foreign market dispersion was created to control for this effect.

Economic distance. A country's degree of economic advantage was defined as the difference in gross domestic product (GDP) per capita between that country and China in 1998 (Tsang and Yip 2007). Following the methods of Tsang and Yip, a natural logarithm transformation was applied, and economic distance was computed as the difference between the logarithms of the two countries' GDP per capita so that a positive value represents an economic advantage for the foreign country and a negative value an economic disadvantage.

Cultural distance. Cultural distance between China and each foreign country was measured based on Kogut and Singh's (1988) formula using Hofstede's (2001) four cultural dimensions including power distance (PDI), individualism versus collectivism (IDV), Masculinity versus femininity (MAS) and uncertainty avoidance (UAI):

$$Cul\_dis_{ij} = \sum_{k}^{K}\frac{\left[\frac{(C_{ik}-C_{pk})^2}{V_k}\right]}{K}$$

where Cul_dist_{ij} refers to the cultural distance of firm *j*s foreign country *i* from China, C_{ik} refers to cultural dimension *k* in foreign country *i*, *p* denotes China, and V_k is the variance of cultural dimension *k*.

Previous studies have suggested that *technological advantage* is a key factor in successful product innovation (Agarwal et al. 2004), so a firm-specific indicator of technological advantage was computed following the lead of Agarwal and his colleagues (Agarwal et al. 2004). Each firm's R&D expenditure as a proportion of its total sales was compared with the appropriate industry-city average among the firms surveyed. *Geographic distance* was also included and measured by the number of kilometers separating Beijing from each country's capital (available at http://www.cepii.fr/anglaisgraph/bdd/distances.htm) (Stringfellow et al. 2008). The logarithm of the difference was used in the analysis. Some firms derive foreign sales unevenly from their important foreign destinations, so *foreign market dispersion* was computed as

$$1 - \left(\sum_{i}^{I} P_i^2 \right),$$

where P_i is the percentage of foreign sales derived from foreign country *i*.

Prior studies have shown that government ownership has a negative effect on innovation (Wu 2011), so *government ownership percentage* was another control. The study also controlled for *firm age*. Prior studies provide different predictions about the effect of firm age on innovation performance (e.g., Sorensen and Stuart 2000), so firm age was included without predicting a specific influence. Large firms may have more resources (e.g., human, capital) for product innovation (Eisenhardt and Tabrizi 1995), so this study thus included a dummy variable representing *large-sized firms* in the analysis. According to the Classification Standard of Large- and Medium-sized Enterprises issued by China's National Statistics Bureau in 1998, manufacturing firms with more than 2,000 employees were classified as large. In addition, because the sample included firms from five manufacturing industries, four *industry dummy* variables were created using the apparel and leather goods industry as the base group. The study also included four *location dummy* variables (with Shanghai as the base group).

Statistical Modelling

All of the models were estimated using robust maximum likelihood estimation (MLE).[2] The dependent variable, the number of new products introduced, was a count variable. Poisson or negative binomial regression modeling can be used with count data, but a Poisson regression model requires that the mean be equal to the standard deviation, so it was not suitable for this dataset and negative binomial regression was applied in the analyses. The negative binomial regression model is:

$$y_j \sim \text{Poisson}(\mu_j^*),$$

where $\mu_j^* = \exp(x_j\beta + \text{offset}_j + \nu_j)$, $e^{\nu_j} \sim \text{Gamma}(1/\alpha, \alpha)$. e^{ν_j} follows a gamma distribution with expectation *ab* and variance ab^2; α is the overdispersion parameter. The larger α, the greater the overdispersion (Long and Freese 2006).

Although time subscripts have been omitted to avoid unnecessary complication of the equation, all explanatory variables were lagged 1 year, taking into consideration a possible delay before the effects of institutional distance and institutional diversity would be reflected in product innovation performance.

Although this study used institutional distance and diversity as predictor variables, not all Chinese firms have the same chances of engaging in international expansion. As a result, firms which expand internationally may differ in other important ways from those which do not. Heckman's selection model was used to account for this self-selection effect (Heckman 1979; Shaver 1998). The models were evaluated in two stages. In the first stage, probit regression was used to estimate the probability that a firm engages in international expansion as a function of firm age, firm size, foreign ownership and the industry dummies. The predicted value derived from the first stage was then transformed into an inverse Mills ratio.[3] The inverse Mills ratio was then included as a regressor in the second stage model to estimate the probability of new product introduction (Heckman 1979; Shaver 1998). This two-stage procedure tends to generate consistent and asymptotically efficient estimates (Heckman 1979).

Results

Table 2 reports descriptive statistics for the variables used in the data analyses. A review of the correlations among the independent variables suggests that multicollinearity is not a major concern. This is confirmed with the analysis of variance of inflation (VIF). The VIF values range from 1.15 to 4.61, well below the cutoff threshold of ten, which indicates that there are no serious multicollinearity problems in the models (Hair et al. 1998).

Table 3 provides the estimation results testing hypotheses 1 and 2. M1 includes the controls, M2 adds the main effect of institutional distance, M3 adds the main effect of institutional diversity, M4 adds the squared term of institutional diversity. The log-likelihood ratios and chi-squares for these models indicate significant explanatory power. The smaller values of Akaike's information criterion (AIC) and the Bayesian information criterion (BIC) in M4 suggest that the relative goodness of fit was significantly improved in the full model.

Hypothesis 1 predicts a positive relationship between the institutional distance of a foreign country from the home country and product innovation success. The coefficient of institutional distance in M2 and M4 is significant ($\beta = 1.77$, $p \leq 0.01$; $\beta = 2.32$, $p \leq 0.001$). To facilitate the interpretation, this effect is plotted in Fig. 1 following Aiken and West's (1991) method for linear models. In Fig. 1 the horizontal axis represents the institutional distance of a foreign country from the home country and the vertical axis represents the number of new products introduced. As shown in Fig. 1, innovation performance increases linearly as the institutional distance of a foreign country increases, suggesting a positive relationship between institutional distance and product innovation. Hence, Hypothesis 1 was supported.

Hypothesis 2 predicts an inverted U-shaped relationship between institutional diversity and success in product innovation. As shown in M4 the coefficient of the main effect of institutional diversity is positive and significant ($\beta = 4.72$, $p \leq 0.001$) and the coeffi-

Table 2: Means, standard deviations and correlations

	Variables	1	2	3	4	5	6	7	8	9	10	11
1.	New product innovation	1.00										
2.	Institutional distance	0.06	1.00									
3.	Institutional diversity	0.03	−0.09*	1.00								
4.	Economic distance	0.03	0.40*	−0.26*	1.00							
5.	Cultural distance	0.08*	0.41*	−0.01	0.42*	1.00						
6.	Geographic distance	0.00	0.24*	0.18*	−0.05	0.29*	1.00					
7.	Technological advantage	0.05	0.01	0.15*	−0.04	−0.01	0.03	1.00				
8.	Foreign market dispersion	0.06	0.09*	0.34*	−0.01	0.10*	0.11*	0.02	1.00			
9.	Firm age	−0.05	0.03	0.11*	0.06	0.06	0.07*	0.10*	0.09*	1.00		
10.	Large-sized firms	0.03	−0.08*	0.04	−0.18*	−0.03	0.05	0.07*	−0.06	0.07*	1.00	
11.	Govt. ownership (%)	−0.04	−0.01	0.14*	−0.03	0.00	0.05	0.15*	0.01	0.44*	0.05	1.00
	Mean	9.25	0.20	0.11	0.21	2.78	2.80	0.36	0.35	2.53	0.25	1.59
	S.D.	32.58	0.15	0.07	0.12	1.71	3.32	0.48	0.33	0.80	0.43	1.54

*Significance at the $p = 0.05$ level of confidence

Table 3: Hypotheses testing

Variables	M1	M2	M3	M4
Constant	1.82***	1.78***	1.37**	1.79**
	(0.57)	(0.57)	(0.57)	(0.60)
Firm age	−0.46***	−0.45***	−0.49***	−0.50***
	(0.13)	(0.13)	(0.13)	(0.13)
Large-sized firms	0.88***	0.88***	0.91***	0.88***
	(0.21)	(0.22)	(0.21)	(0.21)
Technological advantage	0.62***	0.68***	0.64***	0.58***
	(0.17)	(0.17)	(0.17)	(0.17)
Govt. ownership (%)	0.86***	0.86***	0.60*	0.22
	(0.26)	(0.26)	(0.27)	(0.32)
Foreign market dispersion	−0.02	−0.04	−0.09	−0.09
	(0.07)	(0.07)	(0.07)	(0.07)
Economic distance	−0.36	−1.13	−0.68	−0.74
	(0.72)	(0.77)	(0.78)	(0.78)
Cultural distance	0.18***	0.13*	0.12*	0.11*
	(0.05)	(0.06)	(0.06)	(0.06)
Geographic distance	−0.04	−0.06**	−0.06**	−0.06**
	(0.03)	(0.03)	(0.03)	(0.03)
Inverse Mills ratio (λ)	0.66	0.72	0.83	0.57
	(0.77)	(0.78)	(0.77)	(0.77)
Industry dummy	(included)	(included)	(included)	(included)
Location dummy	(included)	(included)	(included)	(included)
Institutional distance		1.77**	2.10**	2.32***
		(0.71)	(0.72)	(0.72)
Institutional diversity			4.24***	4.72***
			(1.35)	(1.30)
Institutional diversity^2				−31.67**
				(12.77)
Log-likelihood	−2355.06	−2351.96	−2346.91	−2344.08
AIC	4732.12	4727.91	4719.82	4716.16
BIC	4785.16	4785.77	4782.49	4783.66
D.F.	9	10	11	12
χ^2	59.32	65.53	75.63	81.28
Prob. $>\chi^2$	0.00	0.00	0.00	0.00

$N=917$. Robust standard errors are given in parentheses

*Significance at the $p\leq0.05$ (**$p\leq0.01$; ***$p\leq0.001$) level of confidence (two-tailed tests)

cient of the squared term of institutional diversity is negative and significant ($\beta=-31.67$, $p\leq0.01$), indicating that institutional diversity has an inverted U-shaped relationship with product innovation success. To facilitate interpretation, this effect is plotted in Fig. 2 following the same procedure used to create Fig. 1. In Fig. 2 the horizontal axis represents institutional diversity and the vertical axis represents the number of new products intro-

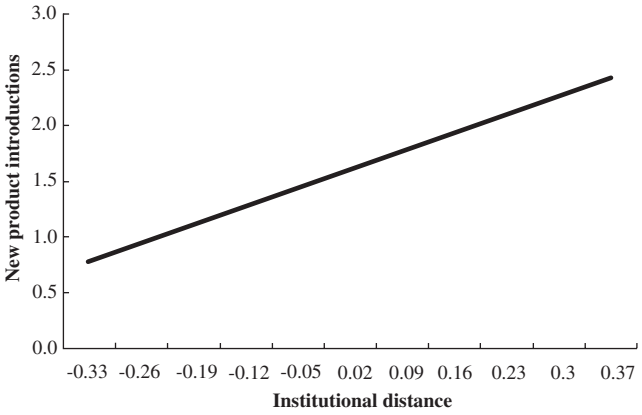

Fig. 1: The effect of institutional distance on firm product innovation

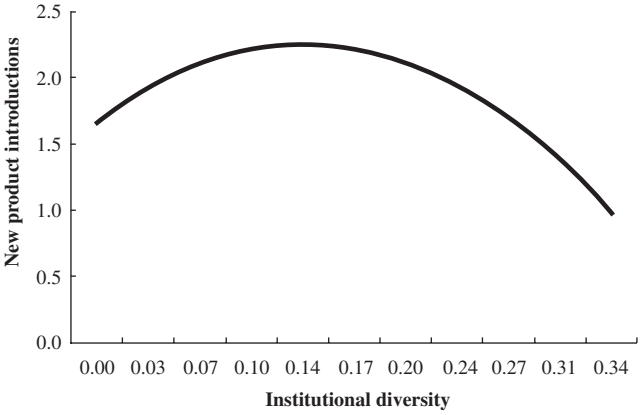

Fig. 2: The effect of institutional diversity on firm product innovation

duced. Fig. 2 shows that innovation performance first increases with institutional diversity and then declines after institutional diversity crosses some threshold, suggesting that success in product innovation has a curvilinear relationship with institutional diversity, in support of Hypothesis 2.

The robustness of these results was tested in several ways. First, to reduce any concerns that might arise from the fact that the sample contains observations without any new products, all the models were re-estimated with a sub-sample of 685 firms which had introduced at least one new product during the period. The results did not change in any substantial way. Second, to further alleviate any concern that some firms may have generated foreign sales from more than five foreign destinations, those firms were omitted and the models were re-estimated. The results were very similar to those reported. In addition, one could argue that the pattern of regulated industries (the transportation industry) may be different from that of unregulated industries such as electronic equipment, as the Chinese government exerts more constraints on the former, creating more information asymmetry problems. To eliminate this concern, the vehicle sector was excluded from the sample and all of the models were then re-estimated. The results remained consistent with the earlier findings, providing additional evidence of their robustness.

Discussion

Building on the literature on new institutional economics, international diversification and the international expansion of emerging market firms, this study examined the impacts on a firm's innovation performance of two aspects of the institutional environments in which the firm is embedded—institutional distance and institutional diversity. As predicted, the data show that the institutional distance of a foreign country from the home country influences product innovation success positively, and the institutional diversity of the foreign countries to which a firm is expanding is curvilinearly related to product innovation success. These findings have some important theoretical implications.

This study was motivated by a theoretical and empirical puzzle concerning the implications for innovation performance of expanding internationally. It sought to evaluate the idea that expanding to a market with a large institutional distance from the home country may be an effective way for firms to develop and augment firm-specific capabilities (Makino et al. 2002; Yiu et al. 2007). Extending this idea, this study argued that relatively better institutional development in a foreign country provides access to advanced technology and know-how helps avoid poor institutions in the domestic market and enhances a firm's reputation and brand image. The results clearly show that institutional distance has a positive relationship with product innovation success. The arguments and conclusions of this study therefore shed some light on this important issue.

This study also sought to clarify the degree to which the variety of institutional environments in which a firm invests could have an effect on innovation output. Previous academic work has highlighted the positive and negative roles of the complexity of market environments for firm performance (Hitt et al. 1997; Barkema and Vermeulen 1998). Building on the insights provided by that previous work, this study argued that institutional diversity exposes a firm to a variety of new technologies, dissimilar customer needs, and diverse competitors, but imposes high costs of managing diverse technologies rooted in very distinct institutional settings and coordinating multiple foreign operations across markets. Firms in institutional environments with little diversity have very limited opportunities to access new technologies, while firms exposed to very diverse institutional environments have to bear high costs of managing too many distinct technologies and high coordination costs due to excessive complexity. In contrast, firms exposed to moderate levels of diversity can access many new technologies at reasonable cost. The results of this study confirm that a moderate level of institutional diversity predicts the greatest product innovation success, whereas exposure to a high or low level of institutional diversity actually inhibits a firm's product innovation. Thus the arguments and findings of this study draw attention to the importance of finding an appropriate variety in the institutional environments to which a firm is expanding.

More generally, these results highlight the fact that institutional distance and institutional diversity differ significantly in the innovation benefits that they provide to a firm. Both affect innovation output, but they probably have very different underlying causal mechanisms. Institutional distance serves primarily as an effective way of escaping institutional voids and political hazards in the domestic market and taking advantage of the institutional advantages of a foreign country. Institutional diversity exposes a firm to various new technologies, a broader array of dissimilar customers, and diverse competitors.

This study clearly shows that the effects of institutional distance and diversity on product innovation success differ significantly.

It is therefore critical for managers to simultaneously consider the benefits provided by institutional distance and diversity when configuring an efficient and effective international expansion strategy. They need to distinguish between institutional distance and institutional diversity and understand their different roles. Although conventional wisdom states that the complexity of the institutional environments managers face have important consequences for firm strategies and performance, that reasoning tends to confound two different aspects of institutional environments and may thus mislead managers about how to reap the distinct benefits of the two different aspects of institutional environments. The findings of this study indicate that institutional distance and institutional diversity offer distinct opportunities for companies in augmenting firm-specific capabilities and developing new products. Differences in institutional development can help companies seek institutional advantage, acquire sophisticated technologies and enhance their reputation. Diversity in institutional environments offers them opportunities to learn new technologies, serve distinct customer needs, and cope with diverse competitors. However, companies dealing with excess institutional diversity seem to suffer from the high costs of managing and absorbing diverse new technologies and high coordination costs, leading to lower innovation output.

The findings also have valuable implications for public policy makers. The governments of many emerging market countries (e.g., China and India) have developed preferential policies to encourage their home country firms to compete globally. This study provides empirical support for such policies by showing that exposure to institutionally more developed markets can significantly facilitate product innovation among emerging market firms. The study also suggests that policymakers should endeavor to strengthen market-supporting institutions and improve the efficiency of domestic factor markets, which can help indigenous firms develop and augment firm-specific advantages to best benefit from participating in the global market.

Like all research, this study has some limitations that in turn suggest interesting avenues for future research. First, it is necessary to be cautious in inferring the direction of causality among the key constructs. The arguments tested are based on theoretical logic and the relationships were tested using panel data. Future research using a longitudinal design would be beneficial to confirm the causality hypothesized here. Second, generalizing from a single-country study warrants caution. Although the processes observed in China appear to be similar to those in other emerging market contexts, there may exist some peculiarity with respect to organizational structure, internationalization methods, government actions or the institutional setting associated with this country and the time period. So the models need to be replicated using data from firms in other emerging markets to confirm the generalizability of the findings. This is especially important given the heterogeneous institutions of emerging markets, as their different levels of institutional development will presumably affect how emerging market firms obtain innovation benefits from different aspects of institutional environments.

But the results of this study raise several exciting questions for future research. Researchers might profitably explore how firm-specific competitive advantages moderate the effects of institutional distance and diversity on innovation performance. For

example, it would be interesting to examine how firm-specific technological, marketing or operational capabilities moderate these relationships. Furthermore, future research can examine the differences with regard to firm-specific advantages between companies originating from developed countries versus companies originating from emerging markets in moderating these relationships. In addition, rather than the introduction of new products, further research could examine other aspects of innovation performance such as new product quality and process innovation.

In conclusion, this study advances our knowledge of the relationship between the institutional environment and product innovation among emerging market firms. The results show that a positive relationship exists between a foreign country's institutional distance and product innovation success among emerging market firms, and an inverted U-shaped relationship between institutional diversity and product innovation success. The findings will hopefully contribute to a better understanding of how emerging market firms can gain innovation benefits from being exposed to complex institutional environments.

Endnotes

1 An alternative measure—an equal-weighted average score—was developed by assigning equal weight to each variable. The results using the equal-weighted average score were consistent with those reported.

2 Standard maximum likelihood estimation may be biased by the clustering of observations from the same industry. Robust variance estimates were employed to calculate the standard errors based on the primary sampling unit (industries in these data) rather than individual observations. Robust MLE does not change the point estimates, but ensures unbiased standard errors.

3 The inverse Mill's ratio is a monotonically decreasing function of the probability that a firm engages in international expansion.

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