Effects of Innovation Ability on International Entry Mode Choice and Firms' Performance

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Abstract: *Using a sample of 408 Chinese enterprises with international operations, this paper investigates the impact of product innovation, R&D intensity, marketing innovation and R&D manpower on entry mode selection and performance of Chinese firms. Although there is no sufficient evidence to verify the relationship between R&D manpower and entry mode choice, our empirical results show that the enterprises with more product innovations, higher R&D intensity or marketing capability tend to choose an international entry mode with a high degree of control. These will correspondingly result in better financial performance. However, the entry mode choice does not produce statistically significant effect on the firms' sales growth.*

Keywords: *Innovation Ability, International Entry Mode, Firm Performance, Marketing Capability.*

1. INTRODUCTION

It is well known that firms with innovation ability possess ownership advantages, and may be motivated to exploit their advantages abroad. To expand internationally, firms must make a crucial decision on entry mode selections. Current research has uncovered both internal and external factors influencing that decision-making, such as corporate strategy, international business experience, product characteristics, firm size, market, industrial policy and cultural context. However, there is the need for more study about the role of innovation ability as a determinant of international entry mode choice, and its consequent impact on the firms' international performance.

Built upon the asset-exploitation theory, this paper focuses on the impact of innovation capacity on entry mode choice, and firms' performance. It uses the data of Chinese companies listed in Shenzhen Stock Exchange and Shanghai Stock Exchange during 2007-2011. An integrated approach is adapted to measure innovation ability in terms of product innovation, R&D intensity, marketing innovation and R&D manpower. In addition, we use return on equity and sales growth as indicators of the firms' financial performance and market performance respectively. The hypotheses about the effects of innovation capability are developed and tested by employing multivariate logistic regression methods. The empirical results reveal how the firms' innovation

ability can be incorporated into the strategic decision on global expansion so as to improve the firms' international performance.

2. HYPOTHESIS DEVELOPMENT

Innovation capacity stands for the ability of enterprises to use existing or potential resources for new production. Apparently, innovation ability is a source of firms' ownership advantage. To explore the impact of innovative ability on entry mode choice, we will analyze innovation ability in terms of its four dimensions: product innovation, R & D intensity, marketing innovation, and R&D manpower. In addition, entry modes are classified into two types: high control entry modes, and low control entry modes. Specifically, low control entry modes include trade, contract, and joint venture with 50% or less ownership; high control entry modes refer to more than 50% equity investment and wholly-owned subsidiary.

2.1. Product Innovation

A firm's' patents can largely reflect its production innovation, because patents represent the unique technology of the firm, and the intention to convert the technology to commercial use, as well as the legal protection for the technology (Hill et al., 1991). Proprietary technology is the basis for creating a competitive advantage, as it enables an enterprise to produce differentiated products, increase production, and improve product quality (Lefebvre& Lefebvre, 2001)

As Kim and Hwang (1992) point out, the proprietary technology is vital for firms to obtain quasi-rent. It is in their best interests to keep the technology within the firms when entering foreign markets. For fear of losing long-term profits, FDI firms are often unwilling to use low control entry modes like joint ventures because business partners may acquiring the technology in the process of cooperation, and decide to operate as independent entities. Furthermore, in foreign markets, the original patents may not be adequately protected, and there is the real risk of losing its competitive edge to potential competitors. Unfortunately, forgery and piracy is not only popular in developing countries, but also in developed countries that have implemented the most stringent laws of intellectual property protection. Therefore, in order to protect the unique technology and control its use in international market, FDI firms tend to choose a high control entry mode (Ekeledo & Sivkumar, 2004; Luo et al, 2005). On the other hand, enterprises with weak innovation ability prefer low control entry modes in order to gain access to technologies of partners.

Based on the analysis above, we propose the first hypothesis:

H1: The more product innovations the firms have, the more likely they will adopt a high control entry mode, and achieve better performance.

2.2. R & D Intensity

In international business, firms often need to develop or customize products to meet the demand of the new market, or to conform to different product standards. It is necessary to devote more resources to R&D activities. Superior designs resulting from R&D intensity will not only make products more appealing to consumers, but also reduce costs and improve product quality in manufacturing process. In general, a high level of R & D intensity facilitates operating efficiency, and enables the firms to gain competitive advantages (Kotabe et al., 2002).

Extant studies show that firms with high R & D intensity tends to use a high control entry mode, and vice versa (Makino & Beamish, 1998; Brouthers et al., 2003; Brouthers & Nakos, 2004; Chen & Hu, 2002). First, if the firms with high R & D intensity adopt cooperative entry modes, it is likely to face a high risk of local partners' free-riding or opportunistic behavior. A high control entry mode can reduce such risks as the R & D outputs are used internally (Brouthers & Brouthers, 2000; Chen & Hu, 2002; Meyer et al., 2009). Second, firms with low R & D intensity can adopt cooperative entry modes to obtain new technology resources. By doing so, these firms can overcome their weakness in research investment, or get complementary resources for developing their competitive advantages (Mutinelli & Piscitello, 1998). In addition, employing a high control entry mode allows the firms to sustain their competitive advantage by making full use of their high level R & D capacity. Therefore, we state the second hypothesis:

H2: The higher the level of R & D intensity, the more likely the firms will choose a high control entry mode, and achieve better performance.

2.3. Marketing Innovation

Marketing innovation is the use of a new marketing idea or method, such as a new marketing scheme, or a novel marketing channel. A firm's level of marketing innovation is determined by its marketing capabilities. The stronger the marketing capability a firm has, the better it can meet customers' needs. Through innovative marketing, a firm can reduce uncertainty in the markets, build a reputation, differentiated products and services, and develop a competitive advantage (Javalgi & Martin, 2007; Luo et al, 2005)

A strong marketing ability means that a firm is able to position itself properly in a foreign market. Firms with a strong marketing capability tend to choose a high control mode. First, under a high control entry mode, the firms with strong marketing capabilities can follow certain routines efficiently, such as through monitoring and assessing customers' needs and expectations, making necessary changes in products, improving business strategies to enhance the value of companies (Fang et al., 2010). Second, by using high control entry modes, firms with strong marketing abilities can properly assess the competitive environments, and take actions to avoid erosion of their market share. Third, marketing capabilities have direct relationship with brand equity, and adopting high control entry mode is beneficial for the protection of the firms' brand assets (Shieh & Wu, 2012). Fourth, a low control entry mode is not desirable for the firms with strong marketing capabilities because foreign partners can absorb the marketing knowledge, and become potential competitors. Finally, in the case of incomplete market, it is difficult for the firms to transfer their marketing competence from home country to foreign countries, and contractual mechanisms are not applicable for the protection of the intangible assets. A high control entry mode is suitable for the firms to transfer and protect marketing competence effectively (Chen & Hu, 2002). Thus, our third hypothesis is:

H3: The stronger Chinese firms' marketing capabilities, the more likely they will adopt a high control entry mode, and achieve better performance.

2.4. R & D Manpower

The number of engineers, scientists and technical personnel in a firm can reflect its stock of technological knowledge, which determines what advanced technologies it will adopt, and how intensive its innovation activities will be. The firm's competitive positions tend to vary with internal and external innovation activities. R & D human resources shape the firm's internal innovation abilities, as technologies can easily be outdated and innovations are the products of R&D activities. Thus, R & D manpower is a key indicator of the firms' innovation capability (Lefebvre & Lefebvre, 2001; Zahra et. al., 2000).

Knowhow, skills and experiences of R&D personnel largely take the form of tacit knowledge. The higher the ratio of R & D employees to the firm's personnel, the more important the tacit knowledge to the firm's innovation capabilities. A main feature of tacit knowledge is its non-codifiability, which makes it difficult to transfer externally. An efficient way of transferring tacit knowledge across national border to build competitive advantage is the use of a high control entry mode. It can keep knowledge-based assets inside the firm, and reduce technical diffusion risk during the transfer process (Fang et al., 2010, Koght & Zander, 2003; Kim & Gray, 2008). Then it's appropriate to test the following hypothesis:

H4: the more R & D manpower the firms have, the more likely they will adopt a high control entry mode, and achieve better performance.

3. EMPIRICAL DESIGN AND PRELIMINARY ANALYSIS

3.1. Variable Selection and Measurement

Entry mode (MODE) is an unordered categorical variable. Adopting a popular approach (Hu et. al, 2012), we divide international market entry modes into two types according to the level of control, and they were given two values: 0 and 1, where o stands for a low control entry mode and 1 for a high control entry mode.

In order to measure corporate performance comprehensively, we use ROA (return on equity) and SG (sales growth) as indicators of the firm's financial performance and market performance respectively (Fernhaber & Li, 2010; Kim & Hwang, 1992). A sample of panel data is obtained from OSIRIS databank, China Commerce and Internet sources. Then we take the average of the index for five years. To analyze the sample properly, we make adjustments on the measurement of performance. By employing the method of Chen & Hu (2002), the sample is classified according to the level of performance. First, we calculate the mean of ROA and SG. If an individual ROA is greater than the mean ROA of the sample, we set it to 1, and set 0 if it is less than the mean ROA. Similar adjustments are also made for SG.

The independent variables include product innovation (PATENT), R& D intensity (RD-IS), marketing innovation (MP), and R & D manpower (RD-MP). Product innovation (PATENT) is measured based on the number of patents by a firm, and more patents indicates more product innovations. R & D intensity (RD_IS) is measured by the proportion of R & D expenditure to the sales revenue. Marketing innovation (MP) is the ratio of marketing expenses to sales revenue (Chen & Hu, 2002), RD_MP is the ratio of R & D staffs to the firm's personnel.

Control variables include the firm's scale SIZE, international experience EXP, intangible assets IA and host country risk CR. SIZE is measured by sales revenue, EXP by the number of oversea subsidiaries, and IA by the proportion of total intangible assets to total assets, As for the country risk CR, the initial data are collected from the national risk assessment report issued by Euro money. We set CR equal to log (100- risk index). Thus a high CR means a high risk.

3.2. Empirical Models

Given our research purpose, we formulate three empirical models as follows:

(1) $\text{MODE} = \alpha_0 + \alpha_1 \text{PATNT} + \alpha_2 \text{RD\_IS} + \alpha_3 \text{MP} + \alpha_4 \text{RD\_MP}$
$$+ \alpha_5 \text{SIZE} + \alpha_6 \text{EXP} + \alpha_7 \text{IA} + \alpha_8 \text{CR}$$

(2) $\text{ROA} = \beta_0 + \beta_1 \text{MODE} + \beta_2 \text{PATENT} + \beta_3 \text{RD\_IS} + \beta_4 \text{MP} + \beta_5 \text{RD\_MP}$
$$+ \beta_6 \text{SIZE} + \beta_7 \text{EXP} + \beta_8 \text{IA} + \beta_9 \text{CR}$$

(3) $\text{SG} = \eta_0 + \eta_1 \text{MODE} + \eta_2 \text{PATENT} + \eta_3 \text{RD\_RD} + \eta_4 \text{MP} + \eta_5 \text{RD\_MP}$
$$+ \eta_6 \text{SIZE} + \eta_7 \text{EXP} + \eta_8 \text{IA} + \eta_9 \text{CR}$$

In model 1, 2 and 3, MODE, ROA and SG are the dependent variable respectively. Since MODE is a categorical variables, logistic regression method is appropriate for the estimation.

3.3. Descriptive Statistics and Correlation Analysis

Table 1 shows the descriptive statistics of the sample. Among 408 firms, 235 of them have high control entry modes, accounting for 57.6% of the total, and 173 of them adopt low control modes, accounting for 42.4%. Regarding financial performance based on return on assets, 183 of the firms achieved superior performances, accounting for 44.85%; and 225 poor performers accounting for 55.15%. As for market performance based on sales growth, 193 firms demonstrated superior performances, accounting for 47.3%, and 215 poor performers account for 52.7%.

Table 1. *Sample Descriptive Statistics*

Variables & Measurement		Number of Observations	percentage
Entry mode MODE	High control (1)	235	57.60%
	Low control (0)	173	42.40%
Return on assets ROA	Superior performance (1)	183	44.85%

	Poor performance (0)	225	55.15%
Sales growth SG	Superior performance (1)	193	47.30%
	Poor performance (0)	215	52.70%
Total		408	100%

Table 2 is a correlation matrix of the main variables. As it is shown, the absolute values of the correlation coefficients are less than 0.4, indicating insignificant correlations among the main variables.

Table 2. *Correlation Matrix of the Main Variables*

	PATENT	RD_IS	MP	RD_MP	SIZE	EXP	IA	CR
PATENT	1							
RD_IS	0.244***	1						
MP	0.264***	0.208***	1					
RD_MP	-0.121*	-0.156**	-0.129**	1				
SIZE	0.099*	-0.209***	-0.167***	0.131**	1			
EXP	0.353***	0.150**	0.315***	-0.212***	0.105*	1		
IA	0.023	-0.127**	-0.128**	0.070	-0.279***	0.056*	1	
CR	0.053	0.035	0.079	-0.040	-0.073	0.014	0.074	1

4. EMPIRICAL RESULTS

Our regression analysis is divided into two stages. In the first stage a regression is run on model 1, and we examine the effects of product innovation, R & D intensity, marketing innovation and R & D human resources on the entry mode selection when the firms' scale, international experience, intangible assets and country risk are taken as control variables. In the second stage, we use ROA and SG as dependent variables in model 2 and model 3 respectively, and add entry mode MODE as an independent variable in the models to explore the relationship between entry mode and performance.

Table 3. *Estimation of Parameters*

	Model 1	Model 2	Model 3
MODE		0.661**(0.244)	0.267(0.267)
PATENT	0.463**(0.166)	0.146(0.174)	0.605**(0.208)
RD_IS	0.132*(0.060)	0.055*(0.053)	0.575***(0.053)
MP	0.075*(0.036)	0.057**(0.037)	0.048(0.041)
RD_MP	0.011(0.010)	0.000(0.010)	-0.040***(0.012)
SIZE	-0.076(0.237)	-0.034(0.237)	0.669*(0.266)
EXP	0.025***(0.007)	-0.029***(0.006)	-0.042***(0.007)
IA	0.059*(0.028)	0.054***(0.027)	0.118***(0.027)
CR	-1.820***(0.520)	-0.992*(0.498)	0.165(0.537)

Note: * indicates that the coefficient at the level of 0.05 was significantly (wald test); ** indicates that the coefficient on the 0.01 significance level (wald test): *** indicates the coefficient on the 0.001 significance level (wald test).

As shown by model 1 in table 3, the coefficient of PATENT is positive and significant at the 0.01 level. It suggests that the firms with more product innovations prefer a high control entry mode. The coefficient of RD_IS is positive and significant at the 0.05 level. It means that the firms with a higher level of R & D intensity are inclined to choose a high control entry mode. The coefficient

of MP is also positive and significant at the 0.05 level. It indicates that the firms with strong marketing capability tend to select a high control entry mode. However, the coefficient of RD_MP is positive but it's not significant, implying that the level of RD manpower does not significantly influence entry mode choice. As for the control variables, the coefficients of EXP and IA are positive and significant in the level of 0.001 of 0.05 respectively. They indicate that more international experience or higher proportion of intangible assets tend to increase the firms' willingness to adopt a high control entry mode. The coefficient of country risk CR is negative and significant at the level of 0.001, suggesting that a higher risk of the host country tend to induce the firms to select a low control entry mode.

In model 2 where ROA is a dependent variable, the coefficient of MODE is positive and significant at the level of 0.01, indicating that there exists a strong association between entry mode selection and financial performance. The coefficient of product innovation PATENT is positive but not significant. The coefficients of RD_IS and MP are positive and significant at the 0.05 level, suggesting that a higher level of the R & D intensity or strong marketing capacity is directly related with superior financial performance. However, the coefficient of PD_MP is not statistically significant. As for the control variables, the coefficient of international experience EXP is negative and significant in the level of 0.001, suggesting that more international experience does not improve the firms' financial performance. The coefficient of intangible assets is positive and significant at the level of 0.05, indicating that a higher proportion of intangible assets is associated with superior performance. The coefficient of country risk CR is negative and significant at the level of 0.001, implying that a lower risk of host country is related to the firms' better performance.

In model 3 where SG is a dependent variable, the coefficient of entry mode is positive but not significant, indicating that entry mode selection does not have a significant impact on the firms' sales growth. The coefficients of PATENT, RD_IS and RD_MP are all positive and significant at the level of 0.01. It means that product innovations, R&D intensity and R&D manpower are all positively associated with sales growth. Regarding the control variables, the coefficient of enterprise scale SIZE is positive and significant at the level of 0.05, indicating that a larger size is directly associated with superior market performance. The coefficient of EXP is negative and significant in the level of 0.001, implying that more international experience does not improve the sales growth. The coefficient of intangible assets is positive and significant at the level of 0.001, suggesting that a higher proportion of intangible assets is directly related to the firms' market performance.

5. CONCLUSION

In this empirical study, we have examined how innovation capacity influences the firms' entry mode selection and performance. Our results show that a high control entry mode is preferred for the firms with a strong innovation capability. Specifically, it is more efficient for firms to choose high control entry modes if they have more product innovations, higher R&D intensity, and stronger marketing ability. Furthermore, by adopting high control entry modes, firms with strong innovative capability tend to achieve better financial performance. Product innovativeness and R&D intensity are positively associated with the firms' market performance. Despite its practical implications for foreign expansion, this study is quite limited in its sample size and its data collecting method, which may weaken the ground to some degree for drawing our conclusions about the causal relationships. Future research is needed to further enhance our understanding about the complex factors for the success of international operations.

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