

Foreign ownership and novelty of product innovations in China (MEIDE 2008, Beijing)

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Abstract

The objective of this paper is to examine the relationship between foreign ownership and product innovation novelty in the context of advanced developing countries. The analysis is based on Ordinal Logit regression, two indicators of novelty and data from China. The results suggest, first, that there is no direct impact of foreign ownership relative to domestic ownership on the novelty of introduced product innovations. However, foreign affiliates without R&D, that rely on ownership advantages of the corporation, and foreign affiliates with domestic market orientation, seem to have higher odds of introduction of product innovations of higher novelty relative to other firms. Second, the findings suggest that compared to domestic firms foreign affiliates have higher odds to generate higher proportion of total sales by product innovations of higher novelty.

1. Introduction

Research on the relationship of foreign ownership and novelty of product innovations is recent and relatively limited. The existing studies typically make a distinction between two levels of novelty, innovations new to the firm and innovations new to the market, consistent with the distinctions in the Community innovation survey (CIS). While the literature has not explicitly

addressed the question whether foreign ownership has a different impact on innovations of different levels of novelty, it has provided early evidence, primarily regarding its impact on new to the market innovations relative to innovations new to the firm. For example, Sadowsky and Sadowsky-Rasers (2006) report a positive impact of foreign ownership on innovations of both low and high novelty (relative to no innovation) among Dutch firms that include innovators and non-innovators but, among innovators only, no impact of foreign ownership on new to the market relative to new to the firm innovations, and a negative impact when controlling for sources of innovation among innovators only. Similarly, Dachs, Ebersberger and Lööf (2007), in a group of five small European countries, detect a positive impact of at least one category of foreign firms in three countries, and no impact on the introduction of new to the market innovations in two in a sample of innovators only. With regard to (advanced) developing countries there is limited evidence, with an exception of a study on Brazil that finds that foreign firms have a higher propensity than domestic firms to introduce product innovations new to the market relative to innovation new to the firm, among innovators only (Kannebley, Porto and Toldo Pazello, 2005).

The objective of this paper is to examine the relationship between the nationality of ownership of firms and product innovation novelty. In contrast to the current literature that has implicitly assumed a positive impact of foreign ownership on different levels of novelty and focused on direct effects on the novelty of introduced innovations, it will be argued that foreign ownership is not likely to be positively associated with all levels of novelty and that the impact of foreign ownership on the novelty of introduced innovations is likely to be moderated by innovations sources and market orientation. The paper contributes to the empirical literature in several ways. First, it follows a categorisation of innovation novelty levels from the Oslo manual (applied in the Canadian innovation survey). Unlike the CIS dichotomous categorisation, it distinguishes between four levels of novelty (new to the world, new to the country, new to the firm and, in case of large countries, new to the region innovations) thus allowing for greater diversity of firm innovation behaviour. This is particularly relevant for the examination of the role of foreign ownership in the innovation in the host countries, associated with innovations crossing national borders. In addition, unlike other studies that are based on innovation propensity indicators, it also includes intensity indicators of novelty. While the propensity indicator measures the ability of firms to introduce innovations, the intensity indicator measures the commercial success of

introduced innovations. The relationship between foreign ownership and the levels of innovation novelty will be examined in the context of advanced developing countries as host economies.

The empirical analysis is based on data from China, which represents a suitable research context for two main reasons. First, in the last decades China has achieved a remarkable progress in building of innovation capabilities in the enterprise sector but despite this patent performance of domestic firms remains low both relative to its share in R&D as well as in comparison to foreign firms (OECD, 2007). Second, up to recently foreign affiliates have been primarily established as low cost manufacturing operations, but China currently has the highest inward foreign direct and R&D investments in the world (European Commission, 2004). These conditions provide a suitable setting to examine the relationship between foreign ownership and innovations of high novelty, and to assess the moderating effect of R&D internationalisation and market orientation on propensity of innovations of high novelty.

The remainder of the chapter is organised as follows. The next section provides a conceptual background and develops hypotheses about the relationship between foreign ownership and the novelty of product innovations. Section 3 describes the data, variables and the method of analysis. The results are presented and discussed in section 4. The last section contains conclusions.

2. Conceptual framework and hypotheses

Building on eclectic theory of international production (Dunning, 1993, 1988), two issues are considered particularly important in understanding the relationship between foreign ownership and novelty of innovation in host countries, on one side, ownership advantages of MNEs, and on the other side, the location aspect associated with host countries context. In the studies of the impact of foreign ownership on innovation in host countries it is typically argued that foreign affiliates will be more innovative than domestic firms because of (existing) ownership advantages of multinational corporations. Since Hymer (1976) it has been widely accepted that due to advantages of domestic firms in own national environment, the internalised ownership advantages represent a precondition for the entry into production in foreign countries.

Consequently, intra-firm transfer of technology developed in home countries has been seen as a basis for international production. More recently it has been argued that MNEs tend to transfer internally tacit knowledge that cannot be more efficiently transferred externally (Kogut and Zander, 1993). This implies that on the basis of internal transfer foreign affiliates are more likely to introduce (corporate) innovations in host countries than domestic firms that rely on international inter-firm technology transfer or imitation. However, taking into account that innovations are crossing national borders, internal international technology transfer is likely to have a positive impact primarily on new to the country innovations of foreign affiliates. Regarding the context of advanced developing countries, the evidence suggests that although these countries may have started to build innovation capabilities for generation of innovations in certain firms and sectors (e.g. Mahmood and Singh, 2003), the imitation still predominates (Hobday, 1995). This suggests that domestic firms are likely to primarily generate innovations at or below new to the country level, while innovations new to the world are likely to be scarce. From the above follows that in advanced developing host countries foreign affiliates may not be more likely to introduce innovations of higher novelty than domestic firms, in other words that foreign ownership is unlikely to have a direct effect on novelty of product innovations introduced in advanced developing host countries.

Traditional theories have assumed that development of new products and processes will take place in home countries of MNEs, while foreign affiliates will primarily engage in production activities (Vernon, 1966). However, recent trends of increasing internationalisation of R&D by multinational corporations suggest that foreign subsidiaries are likely to also engage in development of improved or new products and processes. Foreign affiliates tend to recombine the knowledge from home countries with learning in foreign markets through the evolutionary process of knowledge accumulation (Kogut and Zander, 1993). The eventual responsibility within the MNE, assigned to the affiliate by the headquarters, tends to reflect these specific accumulated capabilities (Birkinshaw and Hood, 1998), rather than the duplicated capabilities of the parent. This suggests that foreign affiliates may have different innovation capabilities and, associated with this, different roles. Different roles of subsidiaries in the generation of innovations have been often associated with its value added scope, in particular its R&D activities, and with its market scope, that is its geographic markets (White and Poynter, 1986).

Decentralisation of generation of innovations to foreign affiliates in host countries can be driven by two motives. The asset exploiting (Dunning and Narula, 1995) or home-base exploiting (Kuemmerle, 1999a) motive is associated with generation of innovations in response to the local conditions either by adapting parent's innovation or by creating new innovations for the local market. In contrast, the asset-seeking (Dunning and Narula, 1995) or home-base augmenting (Kuemmerle, 1999a) motive drives generation of innovations for the global market. The nature of the motives for internationalisation of innovation generation by multinationals imply that foreign affiliates that engage in innovation generation are unlikely to remain passive recipients of the technology transfer from the parent. R&D motivated by asset exploitation is expected to have a positive impact primarily on introduction of innovations new to the country by foreign affiliates. R&D motivated by asset seeking is expected to have a positive impact primarily on introduction of innovations new to the world by foreign affiliates. Consistent with dual motives for internationalisation of R&D, it is hypothesised:

Hypothesis 1A: Foreign affiliates with formal R&D are more likely to introduce product innovations of higher novelty than other firms.

Geographic market orientation is commonly viewed as a factor of influence on innovative behaviour of firms. In the national context it is commonly argued that export orientation is likely to have a positive impact on innovation among national firms, primarily because of higher competitive pressure and customers with higher innovation capabilities than in domestic market. This argument has been largely supported by the empirical evidence (Becheikh, Landry and Amara, 2006). In contrast, with regard to market orientation of foreign multinationals the early literature has suggested that host market oriented multinationals are likely to be more innovative than export oriented multinationals. Traditional export oriented foreign affiliates, associated with efficiency seeking foreign direct investments, aiming at low cost manufacturing operations without higher value added functions, have been considered likely to have lower innovativeness than domestic market oriented foreign affiliates (White and Poynter, 1984; Behrman and Fischer, 1980). However, in the recent literature it has been suggested that among export oriented foreign affiliates a new type of exporting affiliates can be distinguished, which has a world product mandate (Pearce, 1992). In contrast to traditional export oriented foreign affiliates, foreign

affiliates with the world product mandate are likely to be associated with higher innovativeness relative to host market oriented foreign affiliates (Pearce and Tavares, 2002). However, in the context of advanced developing countries, despite a recent increase in inward foreign R&D (UNCTAD, 2005), majority of export-oriented foreign affiliates are expected to be of a traditional efficiency-seeking type. Therefore, consistent with traditional argument, it is hypothesised:

Hypothesis 1B: Foreign affiliates with domestic market orientation are likely to introduce product innovations of higher novelty than other firms.

It has been commonly acknowledged that successful commercialisation of introduced innovations depends on access to capabilities or assets complementary to innovation capabilities, typically those in manufacturing and marketing (Teece, 1988). On the other hand, it has been argued that ownership advantages of foreign affiliates over domestic firms typically include technology related advantages, but also a variety of other intangible and complementary asset advantages, for example in relation to input sourcing, marketing, finance, management, knowledge of international markets and so on (Dunning, 1993). While established affiliates in many ways resemble independent firms, it is the intra-firm access to assets of the parent that distinguishes them from independent firms (Penrose, 1956). This implies an access to capabilities and resources of the corporation that are likely to be superior to those accessible by local firms. Therefore, foreign affiliates are more likely to have an access to relevant complementary assets needed to successfully commercialise introduced innovations than domestic firms. This is especially likely in case of developing economies because of the gap in capabilities and resources between home and host country firms (Hitt, Dacin, Levitas, Arregle and Borza, 2000). Since returns on more radical innovations are likely to be higher than returns on incremental innovations (Ahuja and Lampert, 2001), it is taken that intensity of sales of innovations of higher novelty are also likely to be higher than in case of innovations of low novelty. Therefore it is hypothesised:

Hypothesis 2: Foreign affiliates are likely to generate higher intensity of innovation sales from product innovations of higher novelty than domestic firms.

3. Data and method

The empirical analysis is based on data from Jiangsu province of China. The province, located on the East coast, is one of the most developed provinces, and has the characteristics of an advanced developing economy of relevance for the research in this study. First, it has significant domestic innovation capabilities, ranking third by its share of R&D in the country's total (OECD, 2007). Next, it has considerable inflow of foreign direct investments, the second largest after Guangdong (Invest in China, 2006), with important presence of foreign R&D too (23% share of industrial R&D) (OECD 2007). Lastly, within the innovation system of the province multinationals and small and medium size enterprises are more important than state-owned enterprises or public research organisations (OECD 2007).

The data have been collected by an innovation survey conducted in 2003 by the second and the third author. Since the official business register of the firms in Jiangsu province was not available, the sampling frame was based on telephone directories of the capitals of 13 province's municipal counties. In contrast to typical official Chinese surveys, that cover only medium and large firms, it includes firms of all sizes (from 10 or more employees). The inclusion of small firms is relevant because of their important role in the provincial system of innovation and because in the context of transition economies the majority of newly created private firms are typically small firms. Firms were randomly sampled from a population of urban manufacturing firms. The sample was restricted to one fifth of the estimated population of 12,000 firms. The data collection started with a postal survey, with follow-up visits to non-responding firms, resulting in the response rate of 15%. The innovation survey was single-respondent, subject-based and consistent with the Oslo manual, with several modifications: it covered incremental and significant innovations; it included sales-based output measurement of product innovations of all levels of novelty; and it covered the innovation in one year (2002).¹

1 For a description of the main results of the survey see Alcorta, Urem and Tongliang (2008).

Analysis in this paper is restricted to those innovating firms that introduced product innovations (defined as the commercial adoption of a new product), and reported product innovation sales and the associated levels of innovation novelty, resulting in a sample of 130 firms.

Regarding the levels of innovation novelty, apart from new to the firm innovations, as the lowest level of novelty (considered in other classifications in the literature as well), the Oslo manual distinguishes, on the basis of the geographical criteria, new to the region (in case of large countries), new to the country and new to the world innovations, in increasing order of novelty.² Consistent with the manual, the innovation survey distinguished between first to the firm, first to Jiangsu, first to China and first to the world innovations.³

Product innovation novelty is analysed on the basis of two indicators, innovation propensity and innovation intensity. Definition and measurement of propensity and intensity variables is consistent with the prior innovation literature (see Arundel, Smith, Patel and Sirilli, 1998). The innovation propensity variable is dichotomous with value one if the firm reported sales of innovations of a given level of novelty and value zero if the firm did not report sales of innovations of a given level novelty. Reporting sales of innovations of a given level of novelty is interpreted as their successful introduction. The innovation intensity is measured by the ratio of sales of product innovations of a given level of novelty in total sales. Based on propensity and intensity indicators of individual levels of innovation novelty, two dependent ordinal variables have been defined.

The novelty of the introduced product innovations is a dependent variable based on individual propensity indicators, and the intensity of product innovation novelty is a dependent variable based on individual intensity indicators. In the definition of the variables the two lowest levels of novelty (first to the firm and first to Jiangsu) have been combined into one category to reduce the

2 Canada is the only country that is implementing geographical criteria of innovation novelty in its official survey. However, there are three differences in comparison to the Jiangsu innovation survey: 1) the novelty is considered only for the firm's most significant innovation; 2) the questionnaire considers only whether firms introduced innovations of different levels of novelty, not innovation sales generated by such innovations, and 3) the new to the region innovations are not included among innovation novelty categories.

3 Regarding the comparability of the novelty levels used here and the Community innovation survey distinctions, following Mohnen and Therrien (2001) it is taken that all innovations that are new beyond the firm (i.e. except new to the firm innovations) correspond to new to the market innovations (as nearest concepts).

problem of empty or small cells. The novelty of introduced product innovations (NOVELTY_p) is an ordinal variable with value 1 if first to the firm or first to Jiangsu product innovations are the highest level of novelty introduced in the firm, value 2 if first to China product innovations are the highest level of novelty introduced, and value 3 if first to the world product innovations are the highest level of novelty introduced. The second dependent variable is the intensity of product innovation novelty (NOVELTY_i), an ordinal variable with value 1 if the highest intensity of product innovation sales in the firm are generated by first to the firm and first to Jiangsu product innovations, value 2 if the highest intensity is generated by first to China product innovations, and value 3 if the highest intensity is generated by first to the world product innovations.

In the regression model on the novelty of introduced product innovations there is one focal independent variable and two moderator independent variables. The focal independent variable is foreign firm (FOR), a dichotomous variable with value 1 if the firm is foreign and value 0 if it is not. Foreign firms are defined here as firms in majority foreign ownership and in majority Hong Kong, Macao and Taiwan (i.e. overseas Chinese) ownership. This definition is consistent with the ownership categories of foreign invested enterprises and Hong Kong, Macao and Taiwan invested enterprises in the Chinese official statistics. Foreign firm is the only independent variable in the regression model on the intensity of product innovation novelty.

The first moderator variable in the regression on the novelty of introduced product innovations is formal R&D (R&D), a dichotomous variable with value 1 if the firm has a separate R&D department and value 0 if it does not. In case of foreign firms it indicates whether a decentralisation of R&D to the affiliates of foreign multinationals located in Jiangsu has taken place. Because of high collinearity of the product term of this and foreign ownership variable, with its component variable foreign ownership, this moderator variable has been replaced by an inverse variable, no formal R&D in the regression model for the novelty of introduced product innovations.⁴ No formal R&D (NOR&D) variable is a dichotomous variable with value 1 if the firm does not have a separate R&D department and value 0 if it does.

4 The replacement of the R&D variable by an inverse NOR&D variable has reduced the correlation between product interaction term and the foreign ownership variable below 0.8.

The second moderator variable in the regression on the novelty of introduced product innovations is domestic market (DOMMKT), a dichotomous variable with value 1 if the firm was selling products only on domestic market in 2000, 2001 or 2002 and value 0 if it was not. Value 1 on this variable means that the firm was not an exporter in any of the three considered years.

In the regression on the novelty of introduced product innovations there are three control variables, firm size, sector and age, consistent with the innovation literature. Size of the firms is defined in terms of sales, rather than employment because of the transition context of China. Traditional state firms from centrally planned economies have been characterised by labour hoarding, therefore in transition economies size of firms in terms of employment is unlikely to be a reliable indicator of size. Large firm (LARGE) is a dichotomous variable with value 1 if total sales of the firm in 2002 were above median value and value 0 if they were not.

The influence of industry is controlled by a dichotomous variable sector. The definition of the variable is based on a categorisation of sectors by Robson, Townsend and Pavitt (1988), who distinguish between core sectors, which are highly innovative and primarily characterised by product innovations, secondary sectors that are less innovative and have similar levels of both product and process innovations, and the sector other that is low innovative. The core and secondary sector are considered here 'high innovative' and the sector other 'low innovative'. The high innovative sector includes chemicals, plastics, metal products, non-electrical machinery, electrical machinery and vehicles, and the low innovative sector food, textile, wood and non-metal industries and other manufacturing. The variable SECTOR has value 1 if the firm is from the high innovative sector and value 0 if it is not.

Regarding age of firms, the aim is to distinguish between young and mature, established firms, therefore, the variable new firm (NEW) is defined as dichotomous with value 1 if the firm was established in 1992 or later and value 0 if it was not. In the context of China this variable is also likely to capture a distinction between new private firms created during the transition period, and old firms inherited from the centrally planned period.

The regression on the intensity of product innovation novelty contains, in addition to control variables for size, sector and age, also control variables formal R&D and export. Export is a dichotomous variable with value 1 if the firm was an exporter in 2000, 2001 or 2002 and value 0 if it was not.

The analysis is based on Ordinal Logit regression model, estimated in SPSS. This is a cumulative ascending proportional odds model that estimates the probability of an outcome being *at or below* a particular category of the dependent variable, where the category of the ordinal dependent variable with the highest score is treated as the reference category, and is omitted (see more in O’Connell, 2006). The model assumes proportional or parallel odds. The model estimates the effects of independent variables on the logits (or log odds) of lower scores relative to higher scores on the ordinal dependent variable:

$$\ln \left(\frac{p(Y \leq j)}{p(Y > j)} \right) = \alpha_j - \sum_{k=1}^K \beta_k X_k \quad \text{for } j = 1 \text{ to } J - 1$$

where Y presents the score, j number of categories of the ordinal variable and α_j the intercepts (one for each category of the dependent variable, except for the reference category). A positive coefficient indicates lower cumulative logit for lower scores relative to higher scores, that is, a higher logit for larger scores. Two Ordinal Logit regression models are estimated, the model for novelty of introduced innovations and model for intensity of product innovation novelty. All independent, moderator and control variables are dichotomous and treated as quantitative. The impact of moderator variables is examined through the inclusion of product interaction terms.

4. Results and discussion

Results of the Ordinal Logit regression for the novelty of introduced product innovations are presented in Table 1 and for the intensity of product innovation novelty in Table 2. Frequencies of main variables are given in the Table A1 and correlations among variables in Table A2 in the Appendix. Both Ordinal Regression models are statistically significant, satisfy the assumption of proportional odds and have a moderate level of Nagelkerke pseudo R^2 (.287 and .268, respectively). The results have provided support for two of three formulated hypotheses.

On the basis of the findings of the Ordinal Logit model with interaction terms, contingency Hypothesis 1A is not supported. In contrast, it is found that foreign affiliates without formal R&D have higher odds to introduce innovations of higher novelty relative to other firms and holding all other variables constant. This suggests that higher novelty of product innovations of foreign affiliates in China is primarily based on exploitation of ownership advantages of the corporation, rather than on innovation generation in the host country. While unexpected, the finding is consistent with the foreign R&D primarily driven by asset exploitation motive, that is characteristic for countries with relatively larger markets and weaker science base (Kuemmerle, 1999b). This result is also consistent with the finding that foreign R&D units in China were initially relatively small and primarily established because of regulatory requirements (Walsh, 2003), as well as with the evidence that majority of R&D units aim at adaptive innovations for the local market (von Zedwitz, 2004).

Table 1. Novelty of introduced product innovations: Ordinal Logit regression model

		Estimate (β)	Std. Error	Wald	df	Sig.	95% Confidence Interval		Exp (β)
							Lower Bound	Upper Bound	
Threshold	NOVELTYp = 1	-,688	,613	1,262	1	,261	-1,889	,513	0,503
	NOVELTYp = 2	2,082	,633	10,811	1	,001	,841	3,324	8,020
Location	LARGE	1,239	,422	8,630	1	,003	,412	2,066	3,452
	HIGHINNOV	,905	,380	5,660	1	,017	,159	1,650	2,472
	FOR	-1,983	,889	4,972	1	,026	-3,725	-,240	0,138
	NOR&D	-,446	,414	1,157	1	,282	-1,257	,366	0,640
	DOMMKT	-1,450	,411	12,428	1	,000	-2,257	-,644	0,235
	NEW	,884	,411	4,620	1	,032	,078	1,691	2,421
	FOR * NOR&D	2,258	1,108	4,150	1	,042	,086	4,430	9,564
	FOR * DOMMKT	2,603	1,028	6,415	1	,011	,589	4,617	13,504
	Model fit	Chi-square	37,501			8	,000		
G. of fit	Pearson Chi-sq.	61,870			64	,552			
	Deviance Chi-sq.	60,875			64	,588			
PseudoR ²	Nagelkerke	,287							
T.of prop.	Chi-square	9,808			8	,279			
	N								

Link function: Logit.

On the other hand, consistent with contingency Hypothesis 1B, it was found that foreign affiliates with domestic market orientation have higher odds of introducing innovations of higher novelty relative to other firms and holding all other variables constant. This is consistent with the traditional arguments that the domestic market orientation has a positive impact on innovative behaviour of foreign affiliates. The finding is also consistent with the primarily efficiency seeking motive of traditional export-oriented foreign direct investments in developing countries, including China, where up to recently foreign affiliates used to be primarily cost-based.

The results for the two contingency hypotheses suggest that the impact of foreign ownership on the novelty of introduced product innovations is moderated by innovation sources and market orientation of foreign affiliates, moreover, the indirect effect of foreign ownership, through the two moderator variables, is larger than the direct effect of any other variable in the model. These findings are consistent with the findings of the model for the novelty of introduced product innovations *without* interaction terms where the foreign ownership variable was not statistically significant.⁵ Taken together these results provide strong support for the proposition that the impact of foreign ownership on product innovation novelty is contingent rather than direct. Consistent with the findings of Sadowsky and Sadowsky-Rasers (2006), who find a negative direct impact of foreign ownership when controlling for sources of innovation among innovators only, the direct effect of the foreign ownership on the novelty of introduced product innovations, relative to domestic ownership, is negative in the model with interaction terms.

With regard to the intensity of product innovation novelty, consistent with direct Hypothesis 2, it has been found that foreign affiliates have higher odds to generate higher intensity of innovation sales by product innovations of higher novelty, compared to domestic firms and holding all other variables constant (Table 2). This suggests that economic benefits of market introduction of innovations of higher novelty are higher in foreign relative to domestic firms. This is consistent with the argument that foreign affiliates in advanced developing countries have advantages over domestic firms in intangible and other assets complementary to innovation, which are of

⁵ This finding is consistent with findings on several studies on the impact of foreign ownership on the new to the market innovations relative to new to the firm innovations among innovating firms only in several developed countries (Sadowsky and Sadowsky-Rasers, 2006; Dachs et al., 2007), but is not consistent with the findings on another large advanced developing country ((Kannebley et al., 2005).

relevance for the commercialisation of innovation. The finding suggest weaker resource endowments of domestic firms and is consistent with findings on developing and transition economies (Hitt et al., 2000), as well as with the evidence that the main motive of Chinese firms in international alliances is learning, in particular with regard to marketing expertise and managerial skills (Luo, 2002). Since intensity indicators measure ‘firm’s ability to replenish its stock of products’ (Barlet, Duguet, Encaoua and Pradel, 1998:458), the finding suggests higher odds of foreign firms compared to domestic firms to replenish their stock of products with product innovations of higher novelty. This implies that relative to each other foreign and domestic firms derive highest economic benefits from innovations of different levels of novelty.

Table 2. Intensity of product innovation novelty: Ordinal Logit regression model

		Estimate (β)	Std. Error	Wald	df	Sig.	95% Confidence Interval		Exp (β)
							Lower Bound	Upper Bound	
Threshold	NOVELTY _i = 1	2,891	,677	18,227	1	,000	1,564	4,218	18,011
	NOVELTY _i = 2	4,804	,774	38,551	1	,000	3,288	6,321	121,997
Location	HIGHINNOV	1,200	,470	6,530	1	,011	,280	2,120	3,320
	FOR	1,804	,509	12,545	1	,000	,806	2,802	6,074
	R&D	,114	,443	,066	1	,797	-,755	,983	1,121
	EXPORT	1,147	,405	8,015	1	,005	,353	1,940	3,149
	NEW	,779	,453	2,956	1	,086	-,109	1,668	2,179
Model fit	Chi-square	31,809			5	,000			
G. of fit	Pearson Chi-sq.	39,227			41	,550			
	Deviance Chi-sq.	39,201			41	,551			
PseudoR ²	Nagelkerke	,268							
T. of prop.	Chi-square	7,767			5	,170			
	N	130							

Link function: Logit.

5. Conclusions

The paper contributes to the literature on the relationship between foreign ownership and product innovation novelty in advanced developing countries in three ways. First, while the prior studies focus on the direct impact of foreign ownership on innovation novelty, no evidence of direct impact of foreign ownership relative to domestic ownership on the novelty of introduced product

innovations has been found in the regression model without interaction terms. Indeed, the relationship seems to be contingent on innovation sources and market orientation of foreign affiliates. The results suggest that foreign affiliates that are relying on ownership advantages of the corporation, and foreign affiliates with domestic market orientation have higher odds to introduce innovations of higher novelty compared to other firms. Second, due to unique data, the relationship between foreign ownership and product innovation novelty (defined by geographical criteria), is examined based on innovation intensity indicators also. The results suggest that foreign affiliates relative to domestic firms have higher odds to generate higher intensity of innovation sales by innovations of higher novelty. Lastly, the absence of direct impact of foreign ownership, relative to domestic ownership, on product innovation novelty based on propensity indicators, in contrast to a direct positive impact on novelty based on intensity indicators, suggests that the relationship between foreign ownership and the two dimensions of product innovation novelty are influenced by different factors.

The findings have important policy implications. First, they suggest that an important weakness of the Chinese innovation system may lie in complementary assets and capabilities rather than in innovation capabilities. Second, a lower ability of domestic firms relative to foreign firms to gain economic benefit from innovations of higher novelty raises an issue of conditions under which introduction of innovations of increasing level of novelty is likely to be beneficial for national firms and economy.

Certain caveats concerning this research should be mentioned. First, the study is focused on urban enterprises only. Since rural firms (i.e. private firms in rural areas) are less innovative than urban firms in Jiangsu (Sun and Wang, 2004:28), the evidence presented here likely overestimates innovation level of firms in the province. Therefore, including rural firms in the analysis in further research would be important. Next, since the moderator variable measures only the presence of formal R&D, rather than its nature, it would be useful in further research to consider the moderating role of motivation and composition of R&D activities in the relationship between foreign ownership and innovation novelty.

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Appendix.

Table A1. Frequencies

		N	Percentage
NOVELTYp	1 firm & Jiangsu 1st	30	23,1%
	2 China 1st	65	50,0%
	3 world 1st	35	26,9%
NOVELTYi	1 firm & Jiangsu 1st	87	66,9%
	2 China 1st	31	23,8%
	3 world 1st	12	9,2%
HIGHINNOV	1 high innovative	83	63,8%
	0 low innovative	47	36,2%
LARGE	1 above median	77	59,2%
	0 below median	53	40,8%
FOR	1 foreign	20	15,4%
	0 domestic	110	84,6%
RD	1 yes	77	59,2%
	0 no	53	40,8%
NORD	1 yes	53	40,8%
	0 no	77	59,2%
EXPORT	1 yes	54	41,5%
	0 no	76	58,5%
DOMMKT	1 yes	76	58,5%
	0 no	54	41,5%
NEW	1 yes	75	57,7%
	0 no	55	42,3%
Valid		130	100,0%
Missing		0	
Total		130	

Table A2. Correlations

	NOVELTYp	NOVELTYi	LARGE	HIGHINNOV	FOR	RD	NORD	EXPORT	DOMMKT	NEW
NOVELTYp	1	,580**	,267**	,200*	,098	,156	-,156	,308**	-,308**	,047
NOVELTYi	,580**	1	,010	,193*	,376**	,034	-,034	,242**	-,242**	,173*
LARGE	,267**	,010	1	,092	,093	,331**	-,331**	,159	-,159	-,394**
HIGHINNOV	,200*	,193*	,092	1	,055	,190*	-,190*	,049	-,049	-,093
FOR	,098	,376**	,093	,055	1	,093	-,093	,030	-,030	,149
RD	,156	,034	,331**	,190*	,093	1	-1**	,064	-,064	-,267**
NORD	-,156	-,034	-,331**	-,190*	-,093	-1**	1	-,064	,064	,267**
EXPORT	,308**	,242**	,159	,049	,030	,064	-,064	1	-1**	,027
DOMMKT	-,308**	-,242**	-,159	-,049	-,030	-,064	,064	-1**	1	-,027
NEW	,047	,173*	-,394**	-,093	,149	-,267**	,267**	,027	-,027	1
N	130	130	130	130	130	130	130	130	130	130

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).