Chapter 6

Fostering Innovation and Finding Sources of New Technologies: Firm-Level Evidences from Indonesia, Thailand and Viet Nam

Yasushi Ueki
Bangkok Research Center, JETRO, Thailand

Tomohiro Machikita
Institute of Developing Economies, JETRO, Japan

Masatsugu Tsuji
University of Hyogo

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Yasushi Ueki

Bangkok Research Center, JETRO, Thailand

Tomohiro Machikita

Institute of Developing Economies, JETRO, Japan

Masatsugu Tsuji

Graduate School of Applied Informatics, University of Hyogo, Japan

Abstract

We examine factors affecting decisionmaking on innovation at the firm level using a novel research design to empirically detect the effect of firm-level perception. More precisely, binary probit models are estimated to verify factors promoting four categories of industrial upgrading or innovation, which are defined according to Schumpeter's concept, and access to different sources of new technologies and information necessary for upgrading. Differences in firm-level attributes are considered by estimating the models based on subsets of sample firms divided according to capital tie-up with foreign firms and main market. On the assumption that not only the degree of importance of a specific business condition for firms but also the degree of satisfaction

with it affects decisionmaking of firms on investments in innovation, we propose a "D-score," which is a simple difference between these degrees of importance and of satisfaction. This is an indicator of policy demands introduced in the model as independent variables. The pooled data composed of the sub-data sets of Indonesia, Thailand, and Viet Nam are developed by organizing mail surveys in these countries to be used for these analyses. This research strategy allows deriving detailed and practical policy recommendations for regional growth.

INTRODUCTION

Industrial cluster and innovation policies are increasingly emphasized by policymakers and local businesses not only in developed but also in developing countries. It is generally recognized that in the catching-up process, industrial policies are crucially important. Experiences in Asia until the 1990s offer evidences that support the role of government in industrial development. However, recent changes in economic environments, especially trade and investment liberalizations and the substantial progress of economic integration, impose huge challenges of economic development to developing countries. One of these policy issues is how to achieve industrialization and sustainable and stable growth. The other is to address the widening gap within a country and within a subregion in the global economic system. Industrial clusters and innovation policies are considered as potential measures to address these issues. Porter (2000) provides the basic idea for understanding the effects of industrial clustering and the influential argument for cluster policy. However, doubts have been raised about his framework, particularly the effectiveness and implementability of cluster policy.

In particular, Duranton (2008a) is skeptical about the ability of local governments to manipulate the global land market. He describes that clustering is not a choice variable that local policymakers can easily manipulate. The formation of cluster depends largely on location choice decisions made by an individual firm. When a firm chooses a city to put up his factory, he considers global aspects such as the size of market in the periphery area of the city and transportation networks that connect him to markets, other production bases, the headquarters, and his suppliers and customers, rather than simply the characteristics of the local business environment in the individual cluster. Duranton emphasizes the importance of land market as a factor that both economists and local policymakers should consider when they study or design a cluster policy. Duranton (2008b) likewise explicitly introduces land market as housing markets into his model of urban development. In addition, he raises several questions on the framework of Porter. He notes that Porter's framework assumes that clusters generate competitiveness but it lacks any explanation about the structures of production and competition. Duranton adds that Porter does not explain whether the removal of entry barriers is consistent with new product development that places increased emphasis on the industrial policy. In reality, there is no critical evidence that the free entry encourages firms to differentiate their products so that it results in promoting product innovation.

Moreover, Kuchiki and Tsuji (2008) consider Porter's framework impractical and unfeasible for developing countries because it gives only a picture of the nonlinear complex system of industrial agglomeration and innovation and does not present any policy priorities according to development stage.

Our research gives special focus on the factors that promote innovations and

encourage knowledge-creating firms to access sources of new technologies and information. We develop firm-level qualitative and quantitative data by organizing mail surveys in selected ASEAN countries that are in different stages of industrialization. Our research also uncovers the black box of the relationship between innovation evidence and firms' perception of business and market conditions. This allows us to derive policy implications useful for policy practitioners.

The rest of this paper is organized as follows. The background reviews literature on industrial agglomeration and innovation. Then, a new section presents the analytical framework, followed by another section explaining how and where we got our data. Then, evidence on the factors promoting innovations is discussed in another section. Sources of new technologies or information necessary for innovation are discussed next. The penultimate section provides the summary of our analyses and discussions about policy issues. The final section offers some conclusions.

1. BACKGROUND

Closing gaps in industrial development is one of the domestic and international political issues. In reality, the locations of firms are concentrated in a limited number of geographical areas. Another matter of concern is that activities for innovation, which is a key driving force of economic growth, are clustered as production activities.

Recently, more applied economic literature shed light on these phenomena. The distribution of innovative activities is more heterogeneous than production activities. Knowledge diffusion occurs within a very limited geographical scope (Audretsch and Feldman 1996). New economic geography and other applied microeconomic theories

provide the foundation explaining the system that generates unequal distribution of business activities at the city level.

Fujita and Thisse (2002: Chapter 11) note that because knowledge creation and transfer through interaction between knowledge workers is expensive, innovative activities can be viable in a very limited number of geographical areas, mainly large cities with advanced infrastructure, to provide knowledge workers a comfortable life and to foster interaction between them.

Even if shipping costs and communication costs are decreased by economies of scale and density in the transportation process, expansion of the geographic coverage of telecommunications network, and revolutionary information technology, the importance of collaboration for creating new knowledge based on face-to-face interactions is not necessarily diminishing. Instead, the importance of cities as a space for knowledge creation continues to increase (Gasper and Glaeser 1998). Markusen (1998) emphasizes that although information mobility is enhanced and information expense becomes less costly (slippery spaces) in the economic space, a space suitable for knowledge creation becomes limited with scarcities of goods and information indispensable for innovation activities (sticky places). Furthermore, according to Moretti (2004a,b,c), innovative activities stimulated by cross-interaction between knowledge-creating workers and production activities supported by such mechanism for spurring innovations have multiplier effects (precisely social multiplier and externalities in cities) of accelerating localization of these activities.

Although these previous works provide suggestive ideas to consider the innovation system at the city level, the unit of a place where innovations are created is in reality smaller than a city. Decisions about introduction of new products, exploitation of new

market, selection of new suppliers to procure new intermediary goods to enhance productivities, and introduction of new management system to support such activities are made at the firm level.

Therefore, to identify performance of innovation activities and business and market environments that affect attainments of innovation, it is necessary to implement a survey on the decisionmaking at the level of the individual firm. For the purpose of such analysis, it is indispensable to collect not only detailed data on firm attributes and infrastructure surrounding firms but also firms' perception of business and market conditions. Even though such data are usually compiled in official statistics, they are not sufficient to deeply understand behavioral pattern of firms.

For this reason, we propose in this paper a novel approach that develops subjective evaluations on these environments made by individual firms. We try to create various measures to approximate numerically the states of business and market environments faced by individual firms in reality. The main objective of our research is to discuss priorities and effectiveness of public policies based on these measures, instead of simply tabulating policy menus. The methodology is discussed in the next section.

The motivation and framework of this paper are based on Tsuji et al. (2006) and Kuchiki and Tsuji (2008). In Kuchiki and Tsuji (2008), Kuchiki proposes a "flowchart approach to industrial cluster policy" as a practical policy framework, which identifies factors promoting industrial agglomeration. Tsuji et al. (2006) organized a mail survey in Bangkok in 2005 and the surrounding area to verify Kuchiki's hypothesis. Miyahara and Tsuji (2007) use the data set constructed by Tsuji et al. (2006) to analyze innovations. However, there are rooms to improve their analysis because the data were developed mainly to analyze industrial agglomeration toward innovation or upgrading.

Our work is related to several previous literature that share a common interest with this present research in terms of objectives and approach. Bresnahan et al. (2002) pays attention to the difference in intensiveness of the use of information technology (IT) between firms and found the evidence of complementarities among IT, organizational change in workplace, and new products and services by using firm-level data. Their study showed the importance of in-depth surveys on employment practice and workplace organization within firms and quantifying them. It is almost impossible without such data to consider accurately innovative activities conducted daily in workplaces and complementarities among technologies that companies have, organizations that facilitate to utilize the technologies, and introduction of new goods enabled by effective combinations of these three.

Bloom and Reenen (2007) place their research focus on firm-level managerial practice to explain productivity differences between firms and countries. They conducted a survey of firms utilizing an instrument they developed to measure managerial practices, which codify the concept of "good" or "bad" management into scores from one (worst practice) to five (best practice). They also created a novel approach to analyze firm performance such as productivities and adoption of new technologies by combining discontinuous qualitative data collected by surveys and continuous quantitative data available from published information sources. They examined correlation between their survey data with data on firm performance constructed from completely independent data sources such as firm accounts and stock market values to investigate the association between their measure of managerial practices and firm performance.

On the strength of effectiveness of qualitative survey on firm-level management

organization shown by these literature, we directly asked firms about their own evaluations on business and markets environments and then developed a model to examine whether these subjective evaluations are associated with a firm's innovation performance.

2. MEASURING DEMANDS FOR PUBLIC POLICIES TO PROMOTE INNOVATIONS

The models of industrial upgrading or innovation estimated in other chapters presented effects of levels of satisfaction with the 20 policy-related items on achievements of four categories of industrial upgrading or innovation. In this chapter, we develop an indicator of policy demands for these 20 items named "D-score" and applied them to models similar to those analyzed in the previous sections to complement their results and verify policy fields demanded by firms. In addition, we develop new models of determining sources of new technologies and information with the D-scores as independent variables. The data used for these analyses are the pooled data composed of the data sets of Indonesia, Thailand, and Viet Nam.

2.1. A Framework for Explanation of Industrial Upgrading and Measuring Policy Demands

2.1.1. A Conceptual Framework for Explanation of Industrial Upgrading

Many factors affect decisionmaking by firms on investments in business activities. As a result, these factors have influences on shaping firm specificities and geographic characteristics of types of business function, knowledge or technology intensiveness,

size of business operations, and so on.

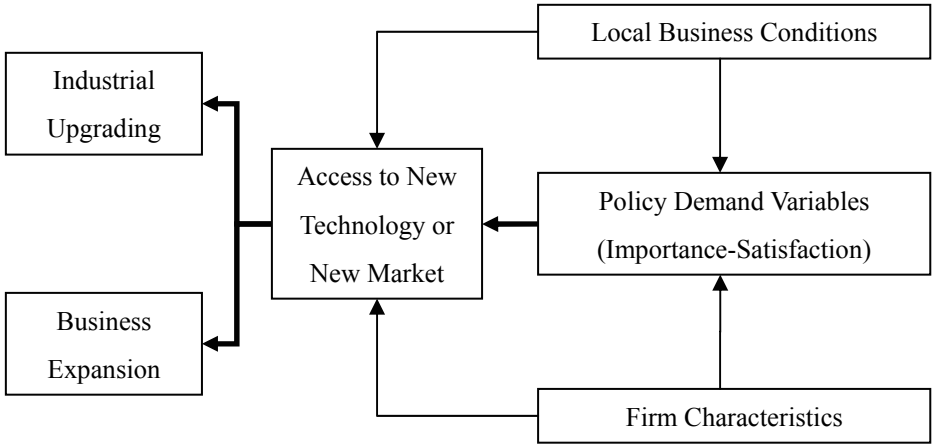
Firm characteristics are fundamental elements that determine in part the capability and rationality of activities firms could engage in. For example, it seems obvious that manufacturing firms tend to introduce new production methods more often than other industrial sectors, although it is necessary to prove this hypothesis by statistical methods.

Local business conditions or external factors, which are given conditions for firms, have a great influence on profitability of specific businesses. For example, existence of competitors affects a firm's business strategy on introducing new methods of production. Again, the strategy regarding whether this firm develops a new technology by itself or subcontract it to suppliers is affected by availability of potential suppliers. Competition also encourages firms to be more innovative, and then again access to new technologies and skilled engineers indispensable for innovative activities depends on local innovation system and labor pool, respectively.

Considering their own characteristics and local business conditions, firms assess priorities and obstacles for their business. Such assessments stimulate both entrepreneurship and demand for public support to overcome the prioritized but dissatisfied matters.

These three elements—firm characteristics, local business conditions, and prescriptions for impediments including public policies—facilitate access to new technologies and information or new markets, leading to investments in expanding or upgrading existing operations. This simple framework for consideration of strategic issues for the private and public sectors such as industrial upgrading and technology transfer is depicted in Figure 1.

Figure 1: A Simple Framework to Explain the Effects of Policy Demand on Industrial Upgrading and Business Expansion



Source: Author.

2.1.2. Measuring Demands for Public Policies to Promote Industrial Upgrading

As shown in the conceptual framework developed to explain industrial upgrading, companies are motivated or encouraged by various factors to access sources of new technologies and markets, and carry out attempts for upgrading their activities. The models estimated in the previous sections focused on the effects of levels of satisfaction with potential influential factors on achievements of upgrading.

However, it seems that both the levels of importance and of satisfaction can affect the strategic behavior firms take. The models estimated in other chapters lack consideration for the levels of importance. In addition, the satisfaction level for a specific factor is not necessarily related to demands for policies to alleviate discontent with this factor if this factor is not important. In order to reduce these problems and keep the model and interpretations of estimated model straightforward, we propose a

"D-score."

We define D-score as a simple difference between "importance (*imp*)" and "satisfaction (*sat*)" for a firm (*j*) about each policy-related factor (*p*). More precisely, the importance minus satisfaction is the D-score as follows.

$$D_{pj} \equiv imp_{pj} - sat_{pj}$$

Explicitly positive D-scores express degrees of dissatisfaction with factors. We presume that D-scores measure implicitly the degree of subjective demands for each public policy. This is because larger D-score for a specific business condition implies more dissatisfaction with it, which result in increasing demands for public policies to improve the condition. D-scores are included in the econometric models estimated in the following section.

2.2 Models of Industrial Upgrading and Sources of New Technologies or Information

Based on the conceptual framework explained in the previous section, we develop two econometric models to verify factors promoting industrial upgrading and access to different sources of new technologies and information necessary for upgrading. Now we omit each firm's subscript (*j*) to simplify presentation of empirical specification.

2.2.1. The Model of Industrial Upgrading

We set the degree of subjective demand for each public policy (*p*) variable as D_p. This variable means the importance of each public policy or market structure for each firm. A set of other factors and unobserved factors are denoted by X and u, respectively. For each policy, we run a probit regression of the type:

$$\Pr(G=1) = \beta_0 + \beta_1(imp_p - sat_p) + \gamma X + u$$
$$\Pr(G=1) = \beta_0 + \beta_1 D_p + \gamma X + u \quad .$$

In the model of industrial upgrading, the event Pr*(G=1)* is a type of upgrading carried out by firms in the last three years. The dependent variable is binary; if a company achieved an industrial upgrading, *G* equals 1, or else 0. Industrial upgrading is categorized into the following four types as asked in the questionnaire (Q9-1):

(1) Introduction of new goods,

(2) Adoption of a new method of production,

(3) Opening of a new market,

(4) Acquisition of a new source of supply of raw materials.

The independent variables are D-scores (D_ps) and attributes of respondent firms. We assume Imp_p and Sat_p, on which coefficients are equivalent, are key factors that affect implementation of upgrading, and factors other than Imp_p and Sat_p are contained in the control variables (*X*s) and the error term (*u*).

This model is interpreted as follows. A negative coefficient on D_p for a specific factor means that the larger the difference between importance and satisfaction with the factor is, the less motivation to practice innovative activities firms find. That is to say, if the coefficient on a variable related to a policy (*p*) is negative, the current policy framework (*p*) does not meet policy demands from firms or variables related to the policy (*p*) would be obstacles for a firm to realize upgrading. On the other hand, the interpretation of positive coefficients is not as straightforward as negative ones. In this case, importance of the factor relative to degree of satisfaction for the innovative firm promotes upgrading or such companies give importance to it. One interpretation is that unfavorable conditions for firms and the market mechanism including competition

stimulate their entrepreneurship.

2.2.2. The Model of Sources of New Technologies or Information

The model of determining sources of new technologies or information is formulated in the same form as the model of industrial upgrading, while the event (y) is a source of new technologies or information accessed by firms that carried out at least one of the types of upgrading in the last three years. Such sources are categorized into the following as asked in Q9-3.

(1) Technology transfer from multinational companies,
(2) Technical assistance from foreign agencies (including official development assistance [ODA]),
(3) Technical cooperation with (or assistance from) local government,
(4) Technical cooperation with (or assistance from) local business organization,
(5) Technical cooperation with (or assistance from) local university or R&D institutes,
(6) Technology transfer from or cooperation with local companies

In this model of a source of new technologies or information, if the coefficient of a D-score for a specific policy is positive, this suggests that firms depend on the technology/information source to overcome obstacles they face to carry out innovative activities. If the coefficient is negative, the current policy (p) or variables related to the policy (p) would discourage firms to access such sources of industrial upgrading. Or the firms that carried out innovation did not give importance to the policy aspect.

3. THE DATA AND SUMMARY STATISTICS

3.1. The Data

The data used for these analyses are the pooled data composed of the data sets of Indonesia, Thailand, and Viet Nam. Each of them was constructed based on a standardized questionnaire designed exclusively for this research project. Mail surveys are organized by the Centre for Strategic and International Studies (CSIS) in Indonesia, the Sirindhorn International Institute of Technology, Thammasat University (SIIT) in Thailand, and Institute for Industry Policy and Strategy (IPSI) in Viet Nam. The questionnaires were sent out to firms located in major industrial districts—Jakarta, Bandung, and Surabaya in Indonesia; Bangkok and surrounding regions in Thailand; and Hanoi and the surrounding regions in Viet Nam—and collected by the end of 2007.

The D-scores are calculated from question 8 (Q8) in the questionnaire on "How important are the following factors in your company's decision to continue/expand its operations (in the surveyed area)?" and "How satisfied are you with the current condition of each of these factors?." Summary statistics of dependent and independent variables, including D-scores, are listed below.

From mean values of the degree of importance, firms attach importance to physical infrastructure such as roads and ports, telecommunications infrastructure, utilities, size of local markets, and availability of skilled labors or professionals. On the other hand, firms are discontent with customs procedures, local content requirements/rule of origin, government institutional infrastructure, financial system, legal system, and protection of intellectual property rights.

Table 1: Summary Statistics of Dependent and Independent Variables

		Variable	Obs	Mean	Std. Dev.	Min	Max
Dependent Variable							
Q9-1)		Innovation : Goods	364	0.747	0.435	0	1
		Methods	362	0.577	0.495	0	1
		Markets	364	0.753	0.432	0	1
		Suppliers	363	0.493	0.501	0	1
Q9-3)	1)	Technology transfer from multinational companies	342	0.582	0.494	0	1
	2)	Technical assistance from foreign agencies (including ODA)	341	0.364	0.482	0	1
	3)	Technical cooperation with (or assistance from) local government	342	0.371	0.484	0	1
	4)	Technical cooperation with (or assistance from) local business organization	339	0.566	0.496	0	1
	5)	Technical cooperation with (or assistance from) local university or R&D institutes	341	0.440	0.497	0	1
	6)	Technology transfer from or cooperation with local companies	339	0.560	0.497	0	1
Independent Variable							
Q2)		Multinationals	374	0.350	0.478	0	1
Q3)	1)	Size of company Full-time Employees	373	374.799	553.813	25	2000
		Total Assets	347	3182032	3942501	10000	10000000
		Paid-UP Capital	333	2467703	3628215	10000	10000000
Q4)		Manufacturing	374	0.479	0.500	0	1
Q5)		Exporters	374	0.241	0.428	0	1
D-score	1)	Investment incentives including tax incentives	349	0.702	1.364	-3	4
	2)	Liberal trade policy	346	0.390	1.125	-3	4
	3)	Customs procedures	349	0.490	1.366	-2	4
	4)	Local content requirements, rule of origin	343	0.169	1.257	-4	4
	5)	Physical infrastructure (roads, highways, ports, airports, etc.)	349	0.888	1.421	-3	4
	6)	Infrastructure (telecommunications, IT)	348	0.586	1.172	-3	4
	7)	Infrastructure (electricity, water supply, other	346	0.610	1.226	-3	4
	8)	Government institutional infrastructure	350	0.871	1.368	-2	4
	9)	Financial system	347	0.628	1.085	-2	4
	10)	Legal system	348	0.856	1.340	-3	4
	11)	Protection of intellectual property rights	344	0.622	1.283	-2	4
	12)	Size of local markets	348	0.497	1.048	-3	3
	13)	Access to export markets	346	0.269	1.258	-3	3
	14)	Proximity to suppliers/subcontractors	345	0.301	1.004	-3	3
	15)	Request by large/related company	344	0.323	1.012	-3	3
	16)	Availability of low-cost labor	350	0.323	1.340	-3	4
	17)	Availability of skilled labor and professionals	348	0.776	1.203	-3	4
	18)	Other companies from the same country are located here (synergy)	348	0.040	1.128	-4	4
	19)	Access to cutting-edge technology and information	347	0.380	1.155	-3	4
	20)	Living conditions	349	0.461	1.185	-3	4

Source: ERIA Research Project Mail Survey 2007.

As the important factors do not correspond to the dissatisfied factors, the important factors do not coincide with factors with large D-scores. From the calculated D-scores,

policy areas that firms are discontented with include investment incentives, physical infrastructure, government institutional infrastructure, legal system, and availability of skilled labors or professionals.

Table 2: Average of Importance, Satisfaction, and D-Score by Business and Market Environment

		Importance	Satisfaction	D-score
1)	Investment incentives including tax incentives	3.876	3.160	0.846
2)	Liberal trade policy	3.670	3.263	0.417
3)	Customs procedures	3.547	3.028	0.509
4)	Local content requirements, rule of origin	3.321	3.134	0.198
5)	Physical infrastructure (roads, highways, ports, airports, etc.)	4.193	3.309	0.944
6)	Infrastructure (telecommunications, IT)	4.243	3.662	0.628
7)	Infrastructure (electricity, water supply, other utilities)	4.146	3.536	0.657
8)	Government institutional infrastructure	3.904	3.011	0.960
9)	Financial system	4.125	3.480	0.699
10)	Legal system	3.967	3.103	0.969
11)	Protection of intellectual property rights	3.723	3.101	0.608
12)	Size of local markets	4.214	3.723	0.495
13)	Access to export markets	3.630	3.330	0.240
14)	Proximity to suppliers/subcontractors	3.866	3.548	0.300
15)	Request by large/related company	3.801	3.464	0.332
16)	Availability of low-cost labor	3.507	3.185	0.388
17)	Availability of skilled labor and professionals	4.212	3.444	0.793
18)	Other companies from the same country are located here (synergy)	3.183	3.143	0.062
19)	Access to cutting-edge technology and information	4.044	3.664	0.379
20)	Living conditions	4.006	3.553	0.497

Note: Importance minus satisfaction is the D-score. Average of D-score is positive for all business and market environment. Higher D-score means that the degree of dissatisfaction is also high. Top three of D-score are: (1) Legal System; (2) Government Institutional Infrastructure; (3) Physical infrastructure. This finding suggests that transaction and transportation costs still higher in sample countries. On the contrary, average of importance for these top three of D-score is not so higher than other more economic environment. Top three of business and market environment are not satisfied with many firms even though basic factors to promote industrial upgrading.

Source: ERIA Research Project Mail Survey 2007.

3.2. Summary Statistics of Sources of New Technologies

In the analyses developed from the following section, we verified the effects of the difference of firm-level characteristics on the probability of (1) industrial upgrading or innovation, and (2) sources of new technologies or information that are accessed by firms that have achieved at least one of four categories of innovations in last three years.

To examine the importance of firm-level attributes, we divide firms in our data set into two groups according to (1) whether or not firms are multinational companies (MNCs) and (2) whether or not they are exporters. To define MNCs, in Q2) of the questionnaire, firms are asked to choose one of the following capital structure: 1 100% local; 2 100% foreign; and 3 joint venture. MNCs are defined as firms with "100% foreign" capital or "joint venture." To define exporters, in Q5-1), firms are asked to choose as their main markets one of the following geographical areas: 1 domestic; 2 ASEAN; 3 China; 4 Other Asia; 5 United States; 6 Europe; and 7 Other. A company is categorized as nonexporter if its response is "1 domestic," and as exporter if the reply is anything else.

Among our sample of 374 firms, 35 percent of them are MNCs and 24 percent are exporters. Some 19 percent of the total number of non-MNCs (local firms) and 32 percent of MNCs are exporters. On the other hand, among non-exporters, 69 percent are local and 31 percent are MNCs. Likewise, among exporters, 52 percent are local and 48 percent are MNCs. In sum, our sample firms are mainly local firms, in particular local nonexporting firms (65 percent and 52 percent of the total, respectively). Even among MNCs, two-thirds of them are nonexporting and domestic-oriented.

We defined the four categories according to Schumpeter's concepts, namely, (1)

introduction of new goods; (2) adoption of a new method of production (new technology); (3) opening a new market and (4) acquisition of a new input such as raw materials. Question 9-1 is related to the question "What upgrades has your company carried out in the last three years," and asks respondents to reply either "yes" or "no".

Table 3: Innovations achieved by MNCs and Exporters

	Local	MNCs	Domestic	Exporters	Total	
	(%)	(%)	(%)	(%)	(No.)	(%)
Q9-1_1: Introduction of new goods						
Yes	74.04	75.97	73.19	79.55	272	74.73
No	25.96	24.03	26.81	20.45	92	25.27
Total	100.00	100.00	100.00	100.00	364	100.00
Q9-1_2: Adoption of a new method of production						
Yes	57.94	57.36	56.93	60.23	209	57.73
No	42.06	42.64	43.07	39.77	153	42.27
Total	100.00	100.00	100.00	100.00	362	100.00
Q9-1_3: Opening of a new market						
Yes	75.74	74.42	74.64	77.27	274	75.27
No	24.26	25.58	25.36	22.73	90	24.73
Total	100.00	100.00	100.00	100.00	364	100.00
Q9-1_4: Acquisition of a new source of input						
Yes	48.29	51.16	48.36	52.27	179	49.31
No	51.71	48.84	51.64	47.73	184	50.69
Total	100.00	100.00	100.00	100.00	363	100.00

Note: Local means local firms without any relationship with multinationals. MNCs means firms with capital relationship with multinationals. Domestic means firms' main target is domestic market. Exporters means firms' main target is outside country.

Source: ERIA Research Project Mail Survey 2007.

Cross tables of these variables allow us to overview interesting present situation of innovation achieved by companies in developing countries. It is surprising that almost half or more of the firms answered that they have succeeded in at least one category of innovations in the last three years. By category of innovation, about 75 percent of respondents did introduction of new goods or opened a new market. Some 58 percent

and 49 percent of them adopted a new technology and acquired a new source of input, respectively. What is more important is that there are not significant differences in these probabilities between local and multinational firms and between exporters and non-exporters.

Table 4: Sources of New Technologies or Information

	Non-MNCs	MNCs	Domestic	Exporters	Total	
	(%)	(%)	(%)	(%)	(No.)	(%)
Q9-3_1: Technology transfer from MNCs						
Yes	46.58	78.86	58.62	56.79	199	58.19
No	53.42	21.14	41.38	43.21	143	41.81
Total	100.00	100.00	100.00	100.00	342	100.00
Q9-3_2: Technical assistance from foreign agencies						
Yes	32.27	43.80	35.50	39.24	124	36.36
No	67.73	56.20	64.50	60.76	217	63.64
Total	100.00	100.00	100.00	100.00	341	100.00
Q9-3_3: Technical cooperation with (or assistance from) local government						
Yes	43.18	26.23	37.93	34.57	127	37.13
No	56.82	73.77	62.07	65.43	215	62.87
Total	100.00	100.00	100.00	100.00	342	100.00
Q9-3_4: Technical cooperation with (or assistance from) local business organization						
Yes	65.30	40.83	57.53	53.75	192	56.64
No	34.70	59.17	42.47	46.25	147	43.36
Total	100.00	100.00	100.00	100.00	339	100.00
Q9-3_5: Technical cooperation with (or assistance from) local university or R&D institutes						
Yes	49.32	34.43	44.62	41.98	150	43.99
No	50.68	65.57	55.38	58.02	191	56.01
Total	100.00	100.00	100.00	100.00	341	100.00
Q9-3_6: Technology transfer from or cooperation with local companies						
Yes	61.64	45.83	58.69	47.50	190	56.05
No	38.36	54.17	41.31	52.50	149	43.95
Total	100.00	100.00	100.00	100.00	339	100.00

Note: Local means local firms without any relationship with multinationals. MNCs means firms with capital relationship with multinationals. Domestic means firms' main target is domestic market. Exporters means firms' main target is outside country.

Source: ERIA Research Project Mail Survey 2007.

We cannot find significant disparity in the percentages of technology sources between exporters and non-exporters except technology transfer from local firms. For both domestic-oriented and exporting firms, technology transfer from MNCs and technical cooperation with local business organization are main sources of new technologies or information. However, more nonexporting firms depend on technological cooperation with local firms. Because about 70 percent of non-exporters are local firms, this implies that technology transfers or cooperation between local firms are one of the main sources for local firms.

On the other hand, sources of technologies and information are significantly different between MNCs and non-MNCs. MNCs depend on foreign sources such as technology transfer from MNCs and technical assistance from foreign agencies. For local firms, of importance are local sources, especially in terms of technical cooperation with local business organization and technology transfer from or cooperation with local companies. This implies that local firms are cut off from MNC networks for technology transfer and cooperation, but develop their own geographically localized networks. In addition, factors affecting the choice of technology sources made by firms would be different between MNCs and local firms.

4. FACTORS PROMOTING INDUSTRIAL UPGRADING

In this section, binary probit models are estimated to analyze the nature and characteristics of the industrial upgrading or innovation processes. Special focus is placed on factors such as policy measures and economic environments that have contributed so far and are required for future upgrading. In addition to full-sample

models based on the complete pooled data composed of three countries, three sample restricted models for MNCs, non-MNCs, and non-exporters (hereinafter referred to as MNC model, Local model and non-Exporter model, respectively) are estimated to consider the effects of different attributes and different sources of upgrading.

4.1. The New Goods

Let us first examine the full-sample model of the introduction of new goods in the last three years. In Table 5, significant variables are indicated with asterisks corresponding to their level of significance. The figures in Table 5 are marginal effects calculated from coefficients (βs), which enable to compare impacts of changes in each variable on the probability of the introduction of new goods. It should be noted that factors with negative (positive) signs indicate that a one-point decrease in a D-score, for example by an appropriate policy intervention, increases (decreases) the probability of introducing new goods by firms by β percentage points.

Table 5 shows that “Tax Incentives” (5% or 10% significant level), “Legal system” (1% level), and “Request by large companies” (5% or 10% level) have negative signs. Therefore, these are policy areas that can be taken as additional measures to promote product innovations. Among these, the marginal effect of “Legal system” is the most substantial. A one-point increase in the D-score for “Legal system” decreases the probability of introduction of new goods by 5.4-8 percentage points. A less influential factor is tax incentives whose marginal effect is between -0.03 and -0.05. On the other hand, “Local content requirements” (1% or 5% level), “Access to cutting-edge technologies” (5% or 10% level), and “Living conditions” (5% or 10% level) have positive signs, which suggests that firms that introduced new goods placed importance

on these matters. The significantly positive marginal effect for “manufacturing,” which is one if the firm belongs to the manufacturing sector, means that manufacturing firms tend to introduce new goods more often than other sectors. Likewise, “exporters,” which is a dummy variable defined to be one if the firm is an exporter, are more innovative.

Table 6 presents the results of estimation of the models whereby samples are grouped into three categories. Among the negative variables in the full-sample model, “Tax incentives” is significant for local firms and non-exporters but “Request by large companies” is not robust. “Legal system” is significant at one or five percent level for MNCs and at one percent level for non-exporters. This factor has a great impact on MNCs whose marginal effect is approximately -0.11. On the other hand, as for the positive variables in the full-sample model, “Local content requirements” is significant for all attributes of firms, and the marginal effect for MNCs (about 0.09) is around twice those for non-MNCs and non-exporters. “Access to cutting-edge technologies” is significant mainly for MNCs (5% or 10% level) and has a considerable marginal effect (about 0.1). “Living conditions” (5% or 10% level) is a key factor for non-MNCs and non-exporters. The dummy variable for “manufacturing” is significant at 5 or 10 percent level except the model for MNCs. Among other factors, “Access to export markets” (5% or 10% level) is significantly positive only for non-MNCs. “Government institutional infrastructure” (5% level) encourages only MNCs to be innovative. The negative “Lower costs of labor” (10% level) characterizes non-exporters.

Table 5: Results: Introduction of New Goods (Full-sample)

	Pool (three countries)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Probit Regression (Marginal Effects)	Dependent: Introduction of New Goods Last 3 years=1, otherwise 0						
D-score: Tax Incentives	-0.031	-0.032	-0.032	-0.034	-0.042	-0.049	-0.054
	(1.607)	(1.621)	(1.625)	(1.741)*	(2.190)**	(2.483)**	(2.556)**
D-score: Liberal Trade Policy	-0.006	-0.007	-0.007	-0.009	-0.016	-0.011	-0.001
	(0.279)	(0.311)	(0.299)	(0.399)	(0.730)	(0.474)	(0.033)
D-score: Customs Procedures	0.007	0.001	0.002	0.001	0.008	-0.001	0.015
	(0.406)	(0.071)	(0.083)	(0.066)	(0.467)	(0.051)	(0.839)
D-score: Local Content	0.048	0.045	0.045	0.042	0.046	0.05	0.045
	(2.449)**	(2.359)**	(2.354)**	(2.249)**	(2.586)***	(2.634)***	(2.336)**
D-score: Physical Infrastructure	-0.031	-0.026	-0.025	-0.026	-0.029	-0.034	-0.036
	(1.405)	(1.213)	(1.177)	(1.248)	(1.438)	(1.622)	(1.638)
D-score: ICTs	0.022	0.035	0.035	0.034	0.031	0.033	0.043
	(0.814)	(1.309)	(1.294)	(1.287)	(1.248)	(1.271)	(1.574)
D-score: Utilities	0.008	-0.01	-0.01	-0.008	-0.009	-0.007	-0.008
	(0.357)	(0.424)	(0.433)	(0.356)	(0.406)	(0.280)	(0.345)
D-score: Government Institution	0.023	0.021	0.021	0.028	0.026	0.025	0.023
	(1.073)	(1.031)	(1.034)	(1.410)	(1.341)	(1.282)	(1.165)
D-score: Financial System	0.005	0.008	0.007	0.004	0	-0.007	0
	(0.180)	(0.282)	(0.273)	(0.144)	(0.016)	(0.248)	(0.018)
D-score: Legal System	-0.081	-0.071	-0.072	-0.071	-0.066	-0.054	-0.059
	(3.368)***	(3.123)***	(3.112)***	(3.172)***	(3.175)***	(2.532)**	(2.597)***
D-score: Protection of IPRs	0.019	0.015	0.015	0.016	0.02	0.011	-0.002
	(0.899)	(0.743)	(0.752)	(0.813)	(1.092)	(0.551)	(0.076)
D-score: Size of Local Markets	0	0.01	0.01	0.017	0.022	0.015	0.036
	(0.008)	(0.370)	(0.370)	(0.642)	(0.905)	(0.592)	(1.272)
D-score: Access to Export Markets	0.015	0.009	0.009	0.002	0.004	0.01	0.003
	(0.669)	(0.396)	(0.400)	(0.072)	(0.200)	(0.457)	(0.129)
D-score: Proximity of Suppliers	0	-0.002	-0.002	0.003	0.008	0.008	0.001
	(0.016)	(0.066)	(0.077)	(0.094)	(0.332)	(0.273)	(0.036)
D-score: Request by Large Companies	-0.051	-0.052	-0.052	-0.052	-0.057	-0.043	-0.052
	(1.825)*	(1.898)*	(1.894)*	(1.915)*	(2.274)**	-1.608	(1.854)*
D-score: Lower Costs of Labor	-0.022	-0.028	-0.028	-0.029	-0.028	-0.032	-0.028
	(1.138)	(1.448)	(1.457)	(1.465)	(1.534)	(1.623)	(1.356)
D-score: Skilled Labor	-0.01	-0.011	-0.011	-0.012	-0.009	-0.012	-0.013
	(0.420)	(0.503)	(0.504)	(0.583)	(0.425)	(0.580)	(0.604)
D-score: Synergy	-0.009	-0.01	-0.01	-0.008	0.011	-0.008	-0.017
	(0.396)	(0.447)	(0.446)	(0.374)	(0.505)	(0.329)	(0.739)
D-score: Cutting-Edge Technology	0.049	0.051	0.05	0.055	0.049	0.055	0.053
	(1.753)*	(1.884)*	(1.880)*	(2.106)**	(1.983)**	(2.096)**	(1.993)**
D-score: Living Conditions	0.04	0.044	0.044	0.044	0.037	0.054	0.031
	(1.714)*	(1.877)*	(1.866)*	(1.880)*	-1.632	(2.261)**	-1.342
Manufacturing		0.158	0.159	0.153	0.126	0.123	0.162
		(2.922)***	(3.005)***	(2.908)***	(2.559)**	(2.312)**	(2.988)***
Multinationals			-0.005	-0.016	-0.067	-0.053	-0.09
			(0.106)	(0.322)	(1.338)	(0.994)	(1.599)
Exporters				0.11	0.109	0.116	0.108
				(1.979)**	(2.064)**	(2.039)**	(1.846)*
Full-time Employees					Yes		
Total Assets (US$)						Yes	
Paid-up Capital (US$)							Yes
Observations	314	314	314	314	313	295	283

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

Table 6: Results: Introduction of New Goods (Restricted Sample)

	Pool (three countries)								
	Non Multinationals			Multinationals			Non Exporters		
Sample Restriction	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Probit Regression (Marginal Effects)	Dependent: Introduction of New Goods Last 3 years=1, otherwise 0								
D1: Tax Incentives	-0.024	-0.031	-0.045	-0.015	-0.022	-0.02	-0.043	-0.041	-0.051
	(0.963)	(1.216)	(1.968)**	(0.434)	(0.640)	(0.589)	(1.748)*	(1.643)	(2.030)**
D2: Liberal Trade Policy	-0.035	-0.038	-0.03	-0.021	-0.018	-0.02	0.003	0.003	-0.008
	(1.160)	(1.354)	(1.231)	(0.549)	(0.482)	(0.530)	(0.121)	(0.123)	(0.297)
D3: Customs Procedures	0.024	0.02	0.023	0.01	0.015	0.015	0.004	-0.005	0
	(1.044)	(0.958)	(1.294)	(0.286)	(0.455)	(0.435)	(0.179)	(0.232)	(0.005)
D4: Local Content	0.046	0.039	0.042	0.096	0.09	0.091	0.043	0.039	0.047
	(2.057)**	(1.925)*	(2.307)**	(1.712)*	-1.633	(1.651)*	(1.806)*	(1.739)*	(2.178)**
D5: Physical Infrastructure	-0.035	-0.032	-0.038	-0.007	-0.009	-0.008	-0.019	-0.018	-0.024
	(1.277)	(1.276)	(1.733)*	(0.185)	(0.268)	(0.231)	(0.655)	(0.654)	(0.913)
D6: ICTs	0.014	0.028	0.016	-0.013	-0.02	-0.018	0.015	0.028	0.029
	(0.402)	(0.841)	(0.564)	(0.269)	(0.427)	(0.369)	(0.432)	(0.835)	(0.904)
D7: Utilities	0.013	-0.012	-0.011	-0.038	-0.031	-0.032	0.025	0.006	0.006
	(0.428)	(0.400)	(0.456)	(0.999)	(0.796)	(0.808)	(0.849)	(0.216)	(0.220)
D8: Government Institution	-0.015	-0.003	0.001	0.082	0.085	0.081	0.037	0.039	0.035
	(0.540)	(0.100)	(0.062)	(2.312)**	(2.566)**	(2.371)**	(1.388)	(1.494)	(1.356)
D9: Financial System	-0.024	-0.022	-0.032	0.019	0.021	0.023	-0.008	-0.01	-0.008
	(0.670)	(0.661)	(1.037)	(0.362)	(0.403)	(0.446)	(0.238)	(0.307)	(0.262)
D10: Legal System	-0.042	-0.034	-0.033	-0.112	-0.116	-0.116	-0.089	-0.083	-0.076
	(1.474)	(1.344)	(1.437)	(2.470)**	(2.621)***	(2.611)***	(3.123)***	(3.067)***	(2.947)***
D11: Protection of IPRs	0.014	0.003	0.013	0.006	-0.001	-0.001	0.028	0.024	0.025
	(0.624)	(0.119)	(0.669)	(0.133)	(0.024)	(0.025)	(1.055)	(0.923)	(1.039)
D12: Size of Local Markets	-0.039	-0.014	0.004	0.071	0.075	0.075	0.007	0.022	0.026
	(1.288)	(0.523)	(0.166)	(1.307)	(1.403)	(1.398)	(0.212)	(0.693)	(0.873)
D13: Access to Export Markets	0.062	0.047	0.034	-0.017	-0.015	-0.016	-0.003	-0.012	-0.008
	(2.186)**	(1.685)*	-1.453	-0.385	-0.359	-0.368	-0.098	-0.413	-0.282
D14: Proximity of Suppliers	-0.009	-0.003	0	-0.017	-0.014	-0.01	0.006	0.006	0.01
	(0.270)	(0.102)	(0.015)	(0.370)	(0.305)	(0.216)	(0.167)	(0.164)	(0.314)
D15: Request by Large Companies	-0.025	-0.022	-0.029	-0.079	-0.07	-0.07	-0.051	-0.054	-0.059
	(0.747)	(0.676)	(1.054)	(1.825)*	(1.577)	(1.573)	(1.524)	(1.569)	(1.811)*
D16: Lower Costs of Labor	-0.041	-0.043	-0.033	-0.03	-0.022	-0.023	-0.047	-0.049	-0.043
	(1.538)	(1.716)*	(1.489)	(1.037)	(0.694)	(0.731)	(1.750)*	(1.861)*	(1.629)
D17: Skilled Labor	-0.013	-0.02	-0.01	0.041	0.037	0.035	0.004	0.001	0
	(0.448)	(0.789)	(0.459)	(0.831)	(0.736)	(0.713)	(0.147)	(0.045)	(0.007)
D18: Synergy	0.048	0.048	0.046	-0.114	-0.109	-0.096	-0.001	-0.004	0.011
	(1.673)*	(1.750)*	(2.053)**	(2.523)**	(2.445)**	(1.985)**	(0.037)	(0.151)	(0.426)
D19: Cutting-Edge Technology	0.038	0.044	0.056	0.1	0.098	0.088	0.019	0.024	0.024
	(1.137)	(1.332)	(1.987)**	(2.261)**	(2.170)**	(1.933)*	(0.576)	(0.737)	(0.789)
D20: Living Conditions	0.056	0.061	0.051	-0.03	-0.033	-0.033	0.057	0.06	0.054
	(1.917)*	(2.102)**	(1.888)*	(0.738)	(0.833)	(0.823)	(2.028)**	(2.090)**	(1.931)*
Manufacturing		0.241	0.183		-0.062	-0.066		0.163	0.135
		(3.435)***	(2.929)***		(0.643)	(0.696)		(2.539)**	(2.167)**
Full-time Employees			Yes			Yes			Yes
Observations	201	201	200	113	113	113	237	237	236

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.
Source: ERIA Research Project Mail Survey 2007.

4.2. The New Production Method

Here we examine the full-sample model of the adoption of a new method of production (Table 7). Only two factors are identified. “Local content requirements” is

positively significant at one percent level and “Legal system” is negatively significant at one or five percent level. “Manufacturing” is significantly positive at one or five percent level. From the marginal effect, a one-point increase in D-score for legal system decreases the possibility of introduction of new production method by approximately 6-8 percentage points. On the other hand, firms that attach importance to local content requirements or rules of origin but are not satisfied with them have a higher probability of introducing it; the marginal effect of this factor is about 0.07.

Legal system has a greater impact on MNCs, although this is significant for non-exporters too (Table 8). The probability of introduction by MNCs decreases by about 16 percentage points with a one-point increase in the D-score for legal system. Another noteworthy result for MNCs is the importance of protection of intellectual property rights (IPRs). The marginal effect for IPRs is significantly negative only for MNCs. The marginal effect of it is around -0.20. Other factors that have significantly positive marginal effects are “Customs procedures,” “Financial system,” “Size of local market,” and “Request by large firms.” For their part, non-MNCs can absorb new technologies more often than in the last three years if governments introduced appropriate “Liberal trade policy” or policies to expand “Size of local markets,” which are significantly negative at 5 or 10 percent level. Even for non-exporters, the marginal effect of “Customs procedures” is positive. This implies that both export and import procedures directly or indirectly affect adoption of new technologies by firms.

Table 7: Results: Adoption of New Method (Full-sample)

	Pool (three countries)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Probit Regression (Marginal Effects)	Dependent: Adoption of a New Method of Production Last 3 years =1, otherwise 0						
D1: Tax Incentives	0.017	0.019	0.019	0.019	0.015	0	-0.005
	(0.672)	(0.770)	(0.749)	(0.738)	(0.607)	(0.006)	(0.203)
D2: Liberal Trade Policy	-0.047	-0.049	-0.047	-0.047	-0.053	-0.052	-0.035
	(1.571)	(1.616)	(1.545)	(1.546)	(1.725)*	(1.607)	(1.072)
D3: Customs Procedures	0.029	0.026	0.027	0.027	0.033	0.027	0.033
	(1.263)	(1.095)	(1.153)	(1.153)	(1.382)	(1.073)	(1.273)
D4: Local Content	0.07	0.067	0.068	0.068	0.072	0.068	0.084
	(2.772)***	(2.683)***	(2.703)***	(2.693)***	(2.840)***	(2.597)***	(3.119)***
D5: Physical Infrastructure	-0.03	-0.028	-0.026	-0.026	-0.029	-0.019	-0.034
	(1.090)	(0.991)	(0.918)	(0.919)	(1.053)	(0.658)	(1.131)
D6: ICTs	-0.004	0.012	0.01	0.01	0.013	0.005	0.004
	(0.125)	(0.337)	(0.292)	(0.291)	(0.355)	(0.132)	(0.106)
D7: Utilities	-0.005	-0.026	-0.028	-0.028	-0.031	-0.006	-0.013
	(0.165)	(0.829)	(0.874)	(0.867)	(0.985)	(0.197)	(0.410)
D8: Government Institution	0.019	0.017	0.018	0.018	0.015	0.01	0.018
	(0.666)	(0.585)	(0.623)	(0.629)	(0.508)	(0.349)	(0.599)
D9: Financial System	0.017	0.021	0.021	0.02	0.013	0.01	0.002
	(0.497)	(0.585)	(0.575)	(0.572)	(0.371)	(0.260)	(0.055)
D10: Legal System	-0.081	-0.072	-0.074	-0.074	-0.07	-0.063	-0.073
	(2.622)***	(2.295)**	(2.367)**	(2.368)**	(2.223)**	(1.949)*	(2.197)**
D11: Protection of IPRs	0.023	0.02	0.02	0.02	0.025	0.011	0.01
	(0.837)	(0.723)	(0.717)	(0.719)	(0.890)	(0.394)	(0.325)
D12: Size of Local Markets	-0.032	-0.023	-0.023	-0.023	-0.014	-0.024	-0.007
	(0.948)	(0.693)	(0.689)	(0.677)	(0.425)	(0.648)	(0.179)
D13: Access to Export Markets	0.035	0.028	0.028	0.028	0.026	0.037	0.033
	(1.242)	(1.000)	(1.004)	(0.973)	(0.911)	(1.274)	(1.089)
D14: Proximity of Suppliers	0.004	0.004	0.002	0.002	0.007	0.004	0.017
	(0.127)	(0.117)	(0.062)	(0.065)	(0.216)	(0.118)	(0.446)
D15: Request by Large Companies	0	-0.004	-0.004	-0.004	-0.013	0.011	-0.005
	(0.009)	(0.115)	(0.095)	(0.094)	(0.338)	(0.274)	(0.123)
D16: Lower Costs of Labor	0.001	-0.005	-0.005	-0.005	-0.003	-0.004	0.004
	(0.035)	(0.184)	(0.206)	(0.206)	(0.101)	(0.149)	(0.133)
D17: Skilled Labor	0.044	0.045	0.044	0.044	0.05	0.044	0.042
	(1.529)	(1.573)	(1.554)	(1.552)	(1.751)*	(1.473)	(1.383)
D18: Synergy	0.023	0.025	0.024	0.025	0.041	0.01	0.012
	(0.785)	(0.838)	(0.826)	(0.828)	(1.380)	(0.345)	(0.372)
D19: Cutting-Edge Technology	0.032	0.034	0.033	0.033	0.026	0.033	0.046
	(0.957)	(1.008)	(0.988)	(0.991)	(0.788)	(0.958)	(1.304)
D20: Living Conditions	0.04	0.047	0.046	0.046	0.041	0.04	0.046
	(1.328)	(1.528)	(1.496)	(1.495)	(1.322)	(1.267)	(1.436)
Manufacturing		0.172	0.176	0.175	0.164	0.143	0.183
		(2.765)***	(2.803)***	(2.788)***	(2.548)**	(2.141)**	(2.722)***
Multinationals			-0.039	-0.039	-0.087	-0.124	-0.101
			(0.598)	(0.601)	(1.268)	(1.736)*	(1.396)
Exporters				0.004	0.006	0.047	0.05
				(0.055)	(0.083)	(0.619)	(0.661)
Full-time Employees					Yes		
Total Assets (US$)						Yes	
Paid-up Capital (US$)							Yes
Observations	313	313	313	313	312	294	282

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

Table 8: Results: Adoption of New Method (Restricted Sample)

	Pool (three countries)								
	Non Multinationals			Multinationals			Non Exporters		
Sample Restriction	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Probit Regression (Marginal Effects)	Dependent: Adoption of a New Method of Production Last 3 years =1, otherwise 0								
D1: Tax Incentives	0.058	0.059	0.051	-0.053	-0.03	-0.026	0.021	0.024	0.02
	(1.751)*	(1.766)*	(1.506)	(1.123)	(0.597)	(0.449)	(0.712)	(0.808)	(0.647)
D2: Liberal Trade Policy	-0.082	-0.084	-0.08	0.01	0.001	-0.018	-0.043	-0.043	-0.054
	(1.952)*	(1.995)**	(1.910)*	(0.176)	(0.022)	(0.314)	(1.178)	(1.156)	(1.460)
D3: Customs Procedures	0.017	0.016	0.021	0.118	0.098	0.101	0.054	0.05	0.054
	(0.530)	(0.505)	(0.666)	(2.614)***	(2.074)**	(2.134)**	(1.943)*	(1.770)*	(1.912)*
D4: Local Content	0.088	0.086	0.093	-0.037	-0.021	-0.022	0.043	0.041	0.05
	(2.905)***	(2.850)***	(3.120)***	(0.598)	(0.345)	(0.345)	(1.458)	(1.384)	(1.674)*
D5: Physical Infrastructure	-0.024	-0.026	-0.036	0.007	0.021	0.044	-0.017	-0.018	-0.022
	(0.710)	(0.756)	(1.059)	(0.120)	(0.345)	(0.733)	(0.501)	(0.539)	(0.644)
D6: ICTs	-0.003	0.005	0.003	-0.03	-0.013	0	-0.012	-0.003	0
	(0.074)	(0.105)	(0.067)	(0.427)	(0.186)	(0.007)	(0.305)	(0.073)	(0.007)
D7: Utilities	-0.03	-0.041	-0.038	-0.003	-0.027	-0.048	0.019	0.006	0.003
	(0.776)	(1.037)	(0.987)	(0.039)	(0.391)	(0.690)	(0.487)	(0.167)	(0.092)
D8: Government Institution	-0.001	0.003	0.009	-0.005	-0.02	-0.052	0.019	0.02	0.013
	(0.030)	(0.088)	(0.252)	(0.086)	(0.353)	(0.909)	(0.572)	(0.593)	(0.380)
D9: Financial System	-0.019	-0.02	-0.03	0.173	0.175	0.201	0.009	0.008	0.004
	(0.403)	(0.425)	(0.649)	(2.007)**	(2.015)**	(2.370)**	(0.221)	(0.184)	(0.091)
D10: Legal System	-0.05	-0.048	-0.048	-0.166	-0.155	-0.146	-0.081	-0.077	-0.072
	(1.314)	(1.254)	(1.253)	(2.276)**	(2.092)**	(2.038)**	(2.201)**	(2.093)**	(1.953)*
D11: Protection of IPRs	0.05	0.046	0.051	-0.206	-0.18	-0.202	0.046	0.043	0.048
	(1.580)	(1.462)	(1.624)	(2.933)***	(2.463)**	(2.716)***	(1.429)	(1.349)	(1.492)
D12: Size of Local Markets	-0.085	-0.078	-0.066	0.144	0.137	0.166	-0.075	-0.066	-0.061
	(2.052)**	(1.854)*	(1.541)	(1.720)*	(1.583)	(1.795)*	(1.858)*	(1.632)	(1.466)
D13: Access to Export Markets	0.11	0.106	0.098	-0.059	-0.066	-0.064	0.045	0.04	0.041
	(2.915)***	(2.780)***	(2.539)**	(1.085)	(1.181)	(1.106)	(1.316)	(1.162)	(1.204)
D14: Proximity of Suppliers	0.005	0.007	0.011	-0.086	-0.103	-0.084	0.005	0.006	0.011
	(0.116)	(0.186)	(0.274)	(1.205)	(1.393)	(1.113)	(0.140)	(0.157)	(0.272)
D15: Request by Large Companies	-0.049	-0.05	-0.051	0.208	0.192	0.16	-0.005	-0.007	-0.015
	(1.029)	(1.039)	(1.068)	(2.623)***	(2.452)**	(2.034)**	(0.118)	(0.169)	(0.358)
D16: Lower Costs of Labor	-0.001	0	0.005	0.011	-0.013	-0.021	-0.011	-0.013	-0.002
	(0.025)	(0.001)	(0.157)	(0.285)	(0.295)	(0.458)	(0.346)	(0.419)	(0.053)
D17: Skilled Labor	0.047	0.045	0.047	0.028	0.043	0.043	0.055	0.054	0.057
	(1.372)	(1.314)	(1.389)	(0.375)	(0.551)	(0.565)	(1.678)*	(1.656)*	(1.737)*
D18: Synergy	0.069	0.071	0.064	0.057	0.046	0.136	0.018	0.018	0.033
	(1.794)*	(1.866)*	(1.697)*	(1.043)	(0.849)	(2.156)**	(0.532)	(0.529)	(0.961)
D19: Cutting-Edge Technology	0.061	0.063	0.067	0.002	0.008	-0.044	-0.009	-0.006	-0.006
	(1.465)	(1.514)	(1.612)	(0.030)	(0.131)	(0.724)	(0.233)	(0.161)	(0.145)
D20: Living Conditions	0.061	0.064	0.065	-0.005	0.012	-0.022	0.075	0.078	0.075
	(1.584)	(1.647)*	(1.679)*	(0.102)	(0.240)	(0.411)	(2.119)**	(2.179)**	(2.107)**
Manufacturing		0.097	0.083		0.211	0.231		0.102	0.087
		(1.225)	(1.025)		(1.554)	(1.734)*		(1.422)	(1.178)
Full-time Employees			Yes			Yes			Yes
Observations	200	200	199	113	113	113	236	236	235

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

4.3. The New Market Exploration

In this subsection, we examine the model of the opening of a new market. Table 9, which is the result of the full-sample model, indicates that a one-point increase in the D-score for “physical infrastructure” (10% significant level)” decreases the probability of opening a new market by four percentage points. Likewise, the impact of “Access to cutting-edge technologies” is around 5.5-6.5 percentage points

From the results of non-Exporter model in Table 10, a one-point decrease in “Physical infrastructure” and “Access to cutting-edge technology” increases the probability by 5 and 6.5 percentage points, respectively. As for non-MNCs, the increase in D-scores for “Government institutional infrastructure” and “Access to cutting-edge technologies” has negative impacts on this type of innovation, while firms that place emphasis on “Availability of skilled labor” are active in opening new markets. On the other hand, the innovativeness of MNCs is influenced by “Legal system” and “Proximity to suppliers or subcontractors,” whose marginal effects are around 12 percentage points. The MNC model also shows that path-breaking MNCs place importance on “Tax incentives,” “Financial system,” and “Request by large or related company.”

Table 9: Results: Opening of New Market (Full-sample)

	Pool (three countries)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Probit Regression (Marginal Effects)	Dependent: Opening of a New Market Last 3 years =1, otherwise 0						
D1: Tax Incentives	0.022	0.024	0.023	0.022	0.018	0.007	0.007
	(1.071)	(1.140)	(1.123)	(1.047)	(0.862)	(0.346)	(0.315)
D2: Liberal Trade Policy	0.009	0.009	0.01	0.01	0.006	0.028	0.031
	(0.374)	(0.351)	(0.400)	(0.402)	(0.242)	(1.147)	(1.258)
D3: Customs Procedures	-0.013	-0.015	-0.015	-0.014	-0.012	-0.012	-0.011
	(0.660)	(0.789)	(0.749)	(0.728)	(0.636)	(0.603)	(0.540)
D4: Local Content	0.034	0.033	0.033	0.032	0.033	0.023	0.032
	(1.553)	(1.494)	(1.499)	(1.468)	(1.507)	(1.003)	(1.405)
D5: Physical Infrastructure	-0.043	-0.042	-0.041	-0.042	-0.041	-0.046	-0.039
	(1.811)*	(1.789)*	(1.729)*	(1.743)*	(1.751)*	(1.919)*	-1.593
D6: ICTs	0.025	0.031	0.03	0.029	0.029	0.029	0.018
	(0.893)	(1.088)	(1.047)	(1.031)	(1.025)	(1.047)	(0.627)
D7: Utilities	0.034	0.028	0.028	0.028	0.028	0.043	0.056
	(1.288)	(1.026)	(1.002)	(1.032)	(1.061)	(1.602)	(2.037)**
D8: Government Institution	-0.032	-0.033	-0.033	-0.031	-0.037	-0.033	-0.038
	(1.365)	(1.400)	(1.378)	(1.279)	(1.510)	(1.384)	(1.582)
D9: Financial System	0.027	0.029	0.028	0.028	0.034	0.028	0.042
	(0.882)	(0.964)	(0.946)	(0.933)	(1.173)	(0.922)	(1.439)
D10: Legal System	-0.025	-0.022	-0.022	-0.022	-0.017	-0.029	-0.039
	(0.964)	(0.826)	(0.842)	(0.844)	(0.682)	(1.110)	(1.480)
D11: Protection of IPRs	0.015	0.013	0.013	0.013	0.014	0.017	0.024
	(0.640)	(0.546)	(0.546)	(0.575)	(0.630)	(0.715)	(1.025)
D12: Size of Local Markets	0.006	0.009	0.009	0.011	0.01	0.013	0.02
	(0.208)	(0.335)	(0.350)	(0.414)	(0.365)	(0.484)	(0.708)
D13: Access to Export Markets	0.038	0.036	0.036	0.033	0.036	0.029	0.029
	(1.612)	(1.526)	(1.518)	(1.366)	(1.529)	(1.179)	(1.143)
D14: Proximity of Suppliers	-0.029	-0.029	-0.03	-0.029	-0.025	-0.009	-0.011
	(1.017)	(1.038)	(1.053)	(1.013)	(0.879)	(0.272)	(0.344)
D15: Request by Large Companies	0.025	0.024	0.025	0.025	0.016	0.009	0.004
	(0.896)	(0.878)	(0.892)	(0.910)	(0.607)	(0.341)	(0.133)
D16: Lower Costs of Labor	-0.029	-0.033	-0.033	-0.033	-0.032	-0.022	-0.034
	(1.331)	(1.484)	(1.514)	(1.524)	(1.510)	(1.001)	(1.560)
D17: Skilled Labor	0.037	0.037	0.037	0.037	0.036	0.036	0.027
	(1.535)	(1.553)	(1.554)	(1.540)	(1.548)	(1.514)	(1.116)
D18: Synergy	0.024	0.025	0.025	0.025	0.042	0.029	0.023
	(0.942)	(0.972)	(0.961)	(0.987)	(1.673)*	(1.161)	(0.916)
D19: Cutting-Edge Technology	-0.056	-0.055	-0.056	-0.055	-0.061	-0.065	-0.065
	(2.042)**	(2.045)**	(2.061)**	(2.040)**	(2.347)**	(2.454)**	(2.420)**
D20: Living Conditions	0.001	0.001	0.001	0.001	-0.005	0.007	0.006
	(0.044)	(0.052)	(0.026)	(0.037)	(0.225)	(0.297)	(0.272)
Manufacturing		0.067	0.07	0.067	0.05	0.031	0.032
		(1.247)	(1.302)	(1.250)	(0.928)	(0.573)	(0.573)
Multinationals			-0.023	-0.027	-0.071	-0.052	-0.07
			(0.423)	(0.495)	(1.250)	(0.942)	(1.163)
Exporters				0.037	0.029	0.078	0.072
				(0.607)	(0.475)	(1.261)	(1.130)
Full-time Employees					Yes		
Total Assets (US$)						Yes	
Paid-up Capital (US$)							Yes
Observations	313	313	313	313	312	294	282

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

Table 10: Results: Opening of New Market (Restricted Sample)

	Pool (three countries)								
	Non Multinationals			Multinationals			Non Exporters		
Sample Restriction	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Probit Regression (Marginal Effects)	Dependent: Opening of a New Market Last 3 years =1, otherwise 0								
D1: Tax Incentives	-0.005	-0.005	-0.017	0.108	0.096	0.105	0.014	0.017	0.009
	(0.182)	(0.171)	(0.596)	(2.427)**	(2.070)**	(2.469)**	(0.543)	(0.659)	(0.359)
D2: Liberal Trade Policy	0.027	0.023	0.026	-0.022	-0.021	-0.023	0	0	-0.008
	(0.885)	(0.814)	(0.938)	(0.491)	(0.469)	(0.520)	(0.016)	(0.012)	(0.258)
D3: Customs Procedures	0.001	-0.002	0	-0.055	-0.043	-0.049	-0.023	-0.028	-0.025
	(0.024)	(0.093)	(0.001)	(1.530)	(1.190)	(1.393)	(0.988)	(1.203)	(1.050)
D4: Local Content	0.036	0.031	0.035	0.058	0.053	0.054	0.037	0.036	0.039
	(1.407)	(1.279)	(1.440)	(1.125)	(1.018)	(1.074)	(1.400)	(1.376)	(1.518)
D5: Physical Infrastructure	-0.044	-0.045	-0.048	0.01	0.005	0.019	-0.049	-0.049	-0.051
	(1.544)	(1.599)	(1.781)*	(0.201)	(0.105)	(0.387)	(1.636)	(1.657)*	(1.757)*
D6: ICTs	0.003	0.012	0.009	0.007	0.002	0.014	0.026	0.033	0.034
	(0.084)	(0.364)	(0.268)	(0.149)	(0.031)	(0.279)	(0.791)	(0.969)	(1.006)
D7: Utilities	0.044	0.035	0.039	-0.013	-0.001	-0.018	0.055	0.047	0.049
	(1.424)	(1.127)	(1.333)	(0.235)	(0.021)	(0.328)	(1.782)*	(1.465)	(1.600)
D8: Government Institution	-0.068	-0.064	-0.065	0.032	0.039	0.035	-0.034	-0.033	-0.041
	(2.150)**	(2.071)**	(2.167)**	(0.818)	(0.970)	(0.785)	(1.097)	(1.080)	(1.320)
D9: Financial System	0.014	0.017	0.021	0.11	0.101	0.112	0.037	0.038	0.05
	(0.372)	(0.459)	(0.593)	(1.930)*	(1.740)*	(2.004)**	(1.036)	(1.091)	(1.459)
D10: Legal System	0.008	0.013	0.016	-0.111	-0.114	-0.121	-0.025	-0.022	-0.015
	(0.260)	(0.408)	(0.494)	(2.117)**	(2.145)**	(2.497)**	(0.818)	(0.716)	(0.514)
D11: Protection of IPRs	0.017	0.011	0.015	-0.023	-0.035	-0.035	0.02	0.018	0.018
	(0.645)	(0.425)	(0.587)	(0.416)	(0.604)	(0.640)	(0.758)	(0.688)	(0.673)
D12: Size of Local Markets	0.013	0.023	0.023	-0.005	0.001	-0.001	0.01	0.017	0.013
	(0.432)	(0.734)	(0.776)	(0.085)	(0.024)	(0.018)	(0.313)	(0.506)	(0.385)
D13: Access to Export Markets	0.039	0.034	0.032	0.07	0.071	0.071	0.033	0.03	0.035
	(1.355)	(1.183)	(1.128)	(1.452)	(1.461)	(1.433)	(1.125)	(1.043)	(1.229)
D14: Proximity of Suppliers	-0.01	-0.008	-0.004	-0.125	-0.118	-0.107	-0.041	-0.042	-0.038
	(0.290)	(0.225)	(0.111)	(2.129)**	(2.008)**	(1.832)*	(1.174)	(1.184)	(1.103)
D15: Request by Large Companies	-0.01	-0.007	-0.014	0.107	0.118	0.109	0.013	0.011	0.003
	(0.309)	(0.202)	(0.403)	(1.976)**	(2.085)**	(1.934)*	(0.377)	(0.329)	(0.078)
D16: Lower Costs of Labor	-0.036	-0.04	-0.036	-0.047	-0.033	-0.034	-0.017	-0.021	-0.014
	(1.349)	(1.518)	(1.390)	(1.332)	(0.836)	(0.866)	(0.636)	(0.778)	(0.538)
D17: Skilled Labor	0.054	0.05	0.049	0.044	0.033	0.032	0.044	0.043	0.038
	(2.029)**	(1.920)*	(1.970)**	(0.823)	(0.624)	(0.621)	(1.567)	(1.548)	(1.412)
D18: Synergy	0.042	0.043	0.047	-0.002	0.003	0.044	-0.002	-0.002	0.014
	(1.348)	(1.410)	(1.604)	(0.053)	(0.072)	(0.845)	(0.079)	(0.086)	(0.493)
D19: Cutting-Edge Technology	-0.057	-0.056	-0.051	-0.054	-0.053	-0.082	-0.063	-0.062	-0.065
	(1.765)*	(1.748)*	(1.640)	(1.092)	(1.055)	(1.602)	(1.918)*	(1.905)*	(2.075)**
D20: Living Conditions	0.028	0.024	0.019	-0.061	-0.069	-0.075	0.003	0.003	-0.002
	(0.921)	(0.825)	(0.664)	(1.336)	(1.472)	(1.611)	(0.100)	(0.101)	(0.060)
Manufacturing		0.134	0.101		-0.103	-0.106		0.088	0.06
		(2.086)**	(1.521)		(0.915)	(0.949)		(1.371)	(0.934)
Full-time Employees			Yes			Yes			Yes
Observations	200	200	199	113	113	113	236	236	235

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

4.4. The New Input Exploitation

Here we examine the model of the acquisition of a new source of supply of raw material. As shown in Table 11, the variable “Other companies from the same country are located here” (listed as “Synergy”) has a negative sign (5-10% significant level); the marginal effect of the D-score for this factor is seven percentage points. On the other hand, “Local content requirements” (1%), “Financial system” (5% or 10%), and “Manufacturing” (1%) all have positive signs.

These results are particularly true for MNCs. As shown in Table 12, “Synergy” has a greater influence on the probability of the acquisition of a new source of raw materials; if the D-score for the factor increases by one point, the probability decreases by 17-20 percentage points. “Financial system” is significant at one or five percent only for MNCs. Among other factors, “Legal system” (1%) has a negative marginal effect as is the case with other types of upgrading. For non-MNCs, the present “Government institutional infrastructure” is a discouraging factor, inducing a decrease in probability of about 0.07.

Table 11: Results: Acquisition of New Input (Full-sample)

	Pool (three countries)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Probit Regression (Marginal Effects)	Dependent: Acquisition of a New Source of Supply Last 3 years =1, otherwise 0						
D1: Tax Incentives	0.009	0.014	0.015	0.015	0.013	0.008	0.016
	(0.343)	(0.537)	(0.551)	(0.544)	(0.480)	(0.295)	(0.566)
D2: Liberal Trade Policy	-0.003	-0.005	-0.006	-0.006	-0.008	-0.009	0.001
	(0.095)	(0.146)	(0.180)	(0.180)	(0.273)	(0.274)	(0.044)
D3: Customs Procedures	0.025	0.019	0.018	0.018	0.021	0.028	0.023
	(1.041)	(0.772)	(0.725)	(0.725)	(0.825)	(1.094)	(0.882)
D4: Local Content	0.093	0.088	0.087	0.087	0.091	0.077	0.083
	(3.518)***	(3.350)***	(3.333)***	(3.327)***	(3.450)***	(2.786)***	(2.991)***
D5: Physical Infrastructure	-0.035	-0.03	-0.031	-0.031	-0.034	-0.027	-0.028
	(1.265)	(1.068)	(1.105)	(1.105)	(1.206)	(0.938)	(0.945)
D6: ICTs	-0.001	0.025	0.026	0.026	0.029	0.033	0.038
	(0.026)	(0.673)	(0.695)	(0.694)	(0.763)	(0.865)	(0.961)
D7: Utilities	0.012	-0.022	-0.021	-0.021	-0.025	-0.014	-0.022
	(0.386)	(0.674)	(0.640)	(0.635)	(0.737)	(0.413)	(0.637)
D8: Government Institution	-0.015	-0.019	-0.02	-0.02	-0.022	-0.034	-0.024
	(0.529)	(0.670)	(0.694)	(0.683)	(0.738)	(1.132)	(0.785)
D9: Financial System	0.057	0.067	0.067	0.067	0.061	0.065	0.099
	(1.603)	(1.844)*	(1.856)*	(1.851)*	(1.673)*	(1.706)*	(2.509)**
D10: Legal System	-0.048	-0.037	-0.037	-0.037	-0.034	-0.017	-0.044
	(1.512)	(1.146)	(1.117)	(1.117)	(1.039)	(0.513)	(1.252)
D11: Protection of IPRs	0.011	0.009	0.009	0.009	0.011	0.019	0.026
	(0.391)	(0.294)	(0.303)	(0.304)	(0.383)	(0.618)	(0.822)
D12: Size of Local Markets	-0.013	0.002	0.002	0.002	0.011	0.006	0.021
	(0.379)	(0.068)	(0.065)	(0.071)	(0.322)	(0.152)	(0.537)
D13: Access to Export Markets	-0.01	-0.024	-0.024	-0.024	-0.027	-0.024	-0.036
	(0.359)	(0.854)	(0.859)	(0.849)	(0.936)	(0.786)	(1.173)
D14: Proximity of Suppliers	0.023	0.024	0.025	0.025	0.029	0.019	0.01
	(0.678)	(0.693)	(0.730)	(0.733)	(0.837)	(0.531)	(0.261)
D15: Request by Large Companies	0.032	0.026	0.026	0.026	0.021	0.025	0.005
	(0.866)	(0.722)	(0.706)	(0.707)	(0.585)	(0.659)	(0.119)
D16: Lower Costs of Labor	0.032	0.022	0.022	0.022	0.025	0.028	0.024
	(1.233)	(0.820)	(0.824)	(0.824)	(0.908)	(1.003)	(0.857)
D17: Skilled Labor	0.009	0.01	0.011	0.011	0.013	0	-0.008
	(0.303)	(0.347)	(0.360)	(0.360)	(0.446)	(0.016)	(0.267)
D18: Synergy	-0.068	-0.069	-0.069	-0.068	-0.059	-0.064	-0.081
	(2.157)**	(2.153)**	(2.150)**	(2.147)**	(1.806)*	(1.927)*	(2.444)**
D19: Cutting-Edge Technology	0.023	0.03	0.03	0.03	0.026	0.024	0.03
	(0.683)	(0.854)	(0.862)	(0.862)	(0.742)	(0.659)	(0.839)
D20: Living Conditions	-0.004	0.003	0.004	0.004	0	-0.003	0.018
	(0.116)	(0.106)	(0.126)	(0.126)	(0.009)	(0.083)	(0.577)
Manufacturing		0.283	0.281	0.28	0.274	0.242	0.263
		(4.503)***	(4.444)***	(4.434)***	(4.292)***	(3.595)***	(3.927)***
Multinationals			0.025	0.025	-0.011	-0.028	-0.002
			(0.391)	(0.382)	(0.158)	(0.383)	(0.032)
Exporters				0.003	0.01	0.013	0.003
				(0.046)	(0.130)	(0.173)	(0.036)
Full-time Employees					Yes		
Total Assets (US$)						Yes	
Paid-up Capital (US$)							Yes
Observations	313	313	313	313	312	294	282

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

Table 12: Results: Acquisition of New Input (Restricted Sample)

	Pool (three countries)								
	Non Multinationals			Multinationals			Non Exporters		
Sample Restriction	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Probit Regression (Marginal Effects)	Dependent: Acquisition of a New Source of Supply Last 3 years =1, otherwise 0								
D1: Tax Incentives	0.034	0.032	0.032	-0.009	0.043	0.056	0.021	0.033	0.033
	(1.054)	(0.971)	(0.957)	(0.171)	(0.768)	(0.932)	(0.694)	(1.078)	(1.046)
D2: Liberal Trade Policy	-0.039	-0.041	-0.04	0.025	0.009	-0.01	-0.002	0.001	-0.006
	(0.931)	(1.000)	(0.978)	(0.441)	(0.148)	(0.151)	(0.043)	(0.027)	(0.172)
D3: Customs Procedures	0.019	0.02	0.021	0.048	0.008	0.002	0.038	0.027	0.029
	(0.602)	(0.640)	(0.681)	(1.039)	(0.164)	(0.047)	(1.376)	(0.967)	(1.052)
D4: Local Content	0.104	0.098	0.1	0.078	0.11	0.128	0.098	0.095	0.104
	(3.313)***	(3.193)***	(3.216)***	-1.28	(1.663)*	(1.910)*	(3.235)***	(3.281)***	(3.540)***
D5: Physical Infrastructure	0.017	0.017	0.011	-0.136	-0.118	-0.105	-0.026	-0.026	-0.031
	(0.496)	(0.465)	(0.315)	(1.998)**	(1.687)*	(1.477)	(0.770)	(0.771)	(0.921)
D6: ICTs	-0.052	-0.035	-0.032	-0.017	0.003	0.028	-0.04	-0.017	-0.012
	(1.133)	(0.716)	(0.652)	(0.279)	(0.044)	(0.389)	(0.967)	(0.399)	(0.266)
D7: Utilities	0.049	0.029	0.027	-0.055	-0.106	-0.145	0.007	-0.028	-0.034
	(1.277)	(0.725)	(0.682)	(0.768)	(1.553)	(2.031)**	(0.203)	(0.739)	(0.893)
D8: Government Institution	-0.076	-0.07	-0.064	0.086	0.066	0.051	-0.053	-0.053	-0.059
	(2.064)**	(1.914)*	(1.769)*	(1.561)	(1.170)	(0.831)	(1.549)	(1.528)	(1.664)*
D9: Financial System	0.01	0.015	0.008	0.182	0.211	0.244	0.03	0.032	0.027
	(0.217)	(0.344)	(0.175)	(2.417)**	(2.601)***	(2.952)***	(0.735)	(0.780)	(0.649)
D10: Legal System	0.037	0.042	0.04	-0.213	-0.211	-0.225	-0.005	-0.001	0.004
	(0.875)	(0.993)	(0.956)	(3.178)***	(2.963)***	(3.090)***	(0.135)	(0.017)	(0.111)
D11: Protection of IPRs	-0.011	-0.018	-0.016	0.06	0.126	0.126	0.036	0.035	0.037
	(0.305)	(0.518)	(0.467)	(0.760)	(1.497)	(1.460)	(1.086)	(1.044)	(1.097)
D12: Size of Local Markets	-0.025	-0.005	0.005	-0.02	-0.046	-0.036	-0.001	0.023	0.034
	(0.590)	(0.109)	(0.121)	(0.245)	(0.546)	(0.404)	(0.018)	(0.563)	(0.810)
D13: Access to Export Markets	0.002	-0.016	-0.021	0.003	-0.011	-0.025	-0.005	-0.022	-0.024
	(0.059)	(0.435)	(0.563)	(0.052)	(0.183)	(0.404)	(0.154)	(0.660)	(0.696)
D14: Proximity of Suppliers	0.061	0.071	0.072	-0.09	-0.124	-0.109	0.006	0.007	0.011
	(1.428)	(1.663)*	(1.685)*	(1.374)	(1.790)*	(1.478)	(0.144)	(0.185)	(0.277)
D15: Request by Large Companies	0.019	0.021	0.022	0.124	0.077	0.062	0.044	0.036	0.031
	(0.390)	(0.445)	(0.456)	(1.779)*	(1.163)	(0.863)	(1.019)	(0.843)	(0.719)
D16: Lower Costs of Labor	0.056	0.056	0.06	0	-0.055	-0.053	0.065	0.063	0.074
	(1.564)	(1.556)	(1.630)	(0.006)	(1.060)	(0.967)	(2.018)**	(1.997)**	(2.328)**
D17: Skilled Labor	-0.001	-0.009	-0.009	0.112	0.156	0.161	-0.001	-0.004	-0.005
	(0.032)	(0.269)	(0.259)	(1.693)*	(2.146)**	(2.176)**	(0.022)	(0.133)	(0.161)
D18: Synergy	-0.034	-0.036	-0.041	-0.136	-0.167	-0.103	-0.069	-0.074	-0.065
	(0.840)	(0.886)	(1.003)	(1.841)*	(2.286)**	(1.314)	(1.915)*	(2.021)**	(1.748)*
D19: Cutting-Edge Technology	0.02	0.025	0.027	0.045	0.055	0.008	0.013	0.023	0.024
	(0.482)	(0.598)	(0.627)	(0.686)	(0.826)	(0.116)	(0.332)	(0.572)	(0.576)
D20: Living Conditions	-0.005	-0.006	-0.004	-0.019	0.018	-0.003	0.008	0.014	0.011
	(0.126)	(0.156)	(0.114)	(0.329)	(0.291)	(0.052)	(0.207)	(0.389)	(0.289)
Manufacturing		0.26	0.263		0.422	0.439		0.276	0.272
		(3.237)***	(3.207)***		(2.879)***	(2.932)***		(3.719)***	(3.604)***
Full-time Employees			Yes			Yes			Yes
Observations	200	200	199	113	113	113	236	236	235

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

5. FACTORS PROMOTING ACESSES TO SOURCES OF NEW TECHNOLGOIES AND INFORMATION FOR INDUSTRIAL UPGRADING

We adopt binary probit models to analyze sources of new technologies or information accessed by firms that carried out at least one of the four types of industrial upgrading or innovation analyzed in the previous section. As earlier indicated, special focus is placed on D-scores or factors such as policy measures as well as economic environments that encourage or facilitate innovative firms to access new technologies or information necessary for future upgrading. In addition to full-sample models based on the complete pooled data composed of three countries, MNC, Local and non-Exporter models are estimated to consider effects of different attributes and different targets of marketing.

5.1. Technology Transfer from MNCs

Let us first examine the full-sample model of technology transfer from MNCs. In Table 13, significant variables are indicated with asterisks that present their level of significance. The estimated values of coefficients (βs) in Table 13 are marginal effects, which enable to compare impacts of changes in each variable on the probability of the technology transfer from MNCs. It should be mentioned that factors with negative (positive) signs indicate that a one-point decrease in a D-score, for example by an appropriate policy intervention, increases (decreases) the probability of technology transfer from MNCs by β percentage points. “Full-time employees” is the current

number of employees, precisely the means of each category defined in the questionnaire (Q3-1). This variable is included to control the effects of firm size, although this is not significant.[i]

According to Table 13, there are not any robust marginal effects for D-scores. The positive marginal effect on "Multinationals" indicates the probability of technology transfer among MNCs is more than 30 percent higher than the probability for transfer from MNCs to non-MNCs. This means technology transfers among MNCs occur more often than those from MNCs to local firms.

To consider the technology transfer among MNCs, Table 14 is shown. According to the MNC model, factors with negative signs for MNCs are "Liberal trade policy," "Protection of IPRs," and "Access to export market." The marginal effects for these variables mean that if the D-score for "Liberal trade policy" increases by one point, the probability of technology transfer among MNCs decreases by more than seven percentage points. The changes in the possibility caused by "Protection of IPRs" and "Access to export market" are about 10 and 11 percentage points, respectively. A policy implication from these results for the public sector is that appropriate policies are needed to improve satisfactions with these factors. In contrast, "Government institutional infrastructure," "Size of local market," and "Synergy" have positive marginal effects. This means firms that put emphasis on these factors tend to receive technology transfers from MNCs. Among other factors, the marginal effects of "Utilities" for non-MNCs and "Availability of low-cost labor" for non-exporters are almost same, about -0.08 percentage point.

Table 13: Results: Technology Transfer from MNCs (Full-sample)

	Pool (three countries)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Probit Regression (Marginal Effects)	Dependent: Technology transfer from multinational companies =1, otherwise 0						
D1: Tax Incentives	-0.011	-0.01	-0.005	-0.003	-0.007	-0.02	-0.023
	(0.420)	(0.392)	(0.177)	(0.108)	(0.257)	(0.726)	(0.749)
D2: Liberal Trade Policy	0.016	0.016	-0.004	-0.004	-0.005	0.003	0.017
	(0.496)	(0.492)	(0.126)	(0.120)	(0.133)	(0.073)	(0.474)
D3: Customs Procedures	0.004	0.002	-0.011	-0.011	-0.009	-0.023	-0.007
	(0.142)	(0.097)	(0.461)	(0.453)	(0.371)	(0.892)	(0.255)
D4: Local Content	0.043	0.042	0.036	0.037	0.044	0.027	0.032
	(1.633)	(1.594)	(1.366)	(1.403)	(1.640)	(0.950)	(1.071)
D5: Physical Infrastructure	-0.019	-0.018	-0.036	-0.036	-0.043	-0.03	-0.066
	(0.658)	(0.633)	(1.235)	(1.231)	(1.447)	(1.025)	(2.096)**
D6: ICTs	-0.041	-0.034	-0.023	-0.022	-0.022	-0.021	0.002
	(1.181)	(0.962)	(0.616)	(0.587)	(0.586)	(0.561)	(0.054)
D7: Utilities	-0.022	-0.032	-0.017	-0.019	-0.023	-0.009	-0.019
	(0.713)	(0.990)	(0.522)	(0.567)	(0.707)	(0.251)	(0.555)
D8: Government Institution	0.018	0.017	0.008	0.005	0.004	-0.004	0.006
	(0.611)	(0.551)	(0.247)	(0.161)	(0.109)	(0.126)	(0.175)
D9: Financial System	0.035	0.036	0.047	0.048	0.042	0.033	0.031
	(0.986)	(1.021)	(1.268)	(1.297)	(1.141)	(0.862)	(0.772)
D10: Legal System	0	0.005	0.022	0.021	0.028	0.031	0.028
	(0.014)	(0.145)	(0.629)	(0.623)	(0.814)	(0.888)	(0.771)
D11: Protection of IPRs	-0.005	-0.006	-0.003	-0.003	-0.001	-0.001	-0.004
	(0.177)	(0.216)	(0.090)	(0.118)	(0.022)	(0.019)	(0.116)
D12: Size of Local Markets	0.019	0.023	0.029	0.026	0.039	0.03	0.042
	(0.545)	(0.672)	(0.810)	(0.734)	(1.107)	(0.786)	(1.070)
D13: Access to Export Markets	0.005	0.002	-0.008	-0.004	-0.007	-0.004	-0.015
	(0.167)	(0.054)	(0.265)	(0.146)	(0.227)	(0.133)	(0.451)
D14: Proximity of Suppliers	-0.007	-0.008	0.009	0.008	0.009	0.021	0.017
	(0.195)	(0.221)	(0.256)	(0.223)	(0.264)	(0.538)	(0.414)
D15: Request by Large Companies	0.03	0.028	0.019	0.019	0.014	0.021	0.02
	(0.829)	(0.752)	(0.517)	(0.521)	(0.386)	(0.558)	(0.506)
D16: Lower Costs of Labor	-0.046	-0.049	-0.045	-0.046	-0.046	-0.035	-0.02
	(1.760)*	(1.854)*	-1.594	-1.608	-1.606	-1.205	-0.665
D17: Skilled Labor	-0.012	-0.013	-0.01	-0.01	-0.008	-0.017	-0.015
	(0.395)	(0.428)	(0.322)	(0.327)	(0.238)	(0.515)	(0.431)
D18: Synergy	-0.006	-0.006	-0.001	-0.002	0.007	-0.005	0.003
	(0.222)	(0.191)	(0.039)	(0.066)	(0.237)	(0.160)	(0.100)
D19: Cutting-Edge Technology	0.025	0.027	0.031	0.031	0.027	0.031	0.028
	(0.726)	(0.789)	(0.887)	(0.880)	(0.749)	(0.853)	(0.766)
D20: Living Conditions	0.028	0.031	0.042	0.041	0.039	0.033	0.034
	(0.950)	(1.031)	(1.290)	(1.273)	(1.198)	(1.027)	(1.004)
Manufacturing		0.089	0.062	0.066	0.04	0.007	0.046
		(1.387)	(0.931)	(0.983)	(0.580)	(0.098)	(0.641)
Multinationals			0.368	0.373	0.342	0.317	0.354
			(5.798)***	(5.797)***	(5.135)***	(4.444)***	(4.892)***
Exporters				-0.044	-0.035	-0.023	0.018
				(0.590)	(0.461)	(0.287)	(0.228)
Full-time Employees					Yes		
Total Assets (US$)						Yes	
Paid-up Capital (US$)							Yes
Observations	294	294	294	294	293	276	263

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

Table 14: Results: Technology Transfer from MNCs (Restricted Sample)

	Pool (three countries)								
	Non Multinationals			Multinationals			Non Exporters		
Sample Restriction	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Probit Regression (Marginal Effects)	Dependent: Technology transfer from multinational companies =1, otherwise 0								
D1: Tax Incentives	-0.002	-0.004	-0.025	-0.05	-0.053	-0.05	-0.017	-0.018	-0.032
	(0.054)	(0.113)	(0.641)	(1.282)	(1.344)	(1.493)	(0.516)	(0.543)	(0.931)
D2: Liberal Trade Policy	0.049	0.049	0.066	-0.078	-0.074	-0.076	-0.002	0	-0.004
	(1.189)	(1.203)	(1.611)	(1.837)*	(1.704)*	(2.302)**	(0.044)	(0.007)	(0.096)
D3: Customs Procedures	-0.038	-0.038	-0.037	0.042	0.046	0.035	-0.004	-0.007	-0.001
	(1.182)	(1.182)	(1.110)	(1.238)	(1.352)	(1.351)	(0.143)	(0.209)	(0.024)
D4: Local Content	0.045	0.044	0.059	0.006	0.002	0.012	0.026	0.024	0.037
	(1.371)	(1.355)	(1.816)*	(0.135)	(0.052)	(0.437)	(0.806)	(0.764)	(1.122)
D5: Physical Infrastructure	-0.034	-0.033	-0.053	-0.018	-0.017	-0.007	-0.002	-0.002	-0.007
	(0.930)	(0.921)	(1.419)	(0.526)	(0.523)	(0.267)	(0.058)	(0.042)	(0.184)
D6: ICTs	-0.018	-0.015	-0.016	-0.005	-0.01	0.01	-0.018	-0.014	-0.011
	(0.395)	(0.339)	(0.337)	(0.122)	(0.266)	(0.318)	(0.429)	(0.323)	(0.270)
D7: Utilities	-0.077	-0.081	-0.087	0.057	0.062	0.046	-0.006	-0.015	-0.023
	(1.922)*	(1.995)**	(2.164)**	(1.374)	-1.479	(1.654)*	(0.174)	(0.395)	(0.597)
D8: Government Institution	-0.026	-0.025	-0.014	0.066	0.073	0.042	0.012	0.012	0.001
	(0.612)	(0.580)	(0.309)	(2.073)**	(2.218)**	(1.131)	(0.330)	(0.332)	(0.028)
D9: Financial System	0.019	0.019	0.007	0.01	0.008	-0.01	0.007	0.005	0.008
	(0.397)	(0.401)	(0.150)	(0.216)	(0.174)	(0.332)	(0.173)	(0.123)	(0.193)
D10: Legal System	0.029	0.029	0.019	0.035	0.027	0.041	0.009	0.009	0.019
	(0.699)	(0.701)	(0.454)	(0.775)	(0.594)	(1.551)	(0.241)	(0.237)	(0.505)
D11: Protection of IPRs	0.031	0.03	0.039	-0.106	-0.113	-0.098	0.005	0.005	0.008
	(0.922)	(0.893)	(1.131)	(2.353)**	(2.406)**	(2.997)***	(0.141)	(0.157)	(0.228)
D12: Size of Local Markets	0.001	0.003	0.021	0.172	0.171	0.155	0.011	0.016	0.024
	(0.030)	(0.071)	(0.496)	(2.905)***	(2.958)***	(3.580)***	(0.256)	(0.373)	(0.556)
D13: Access to Export Markets	0.05	0.048	0.047	-0.113	-0.115	-0.082	0.011	0.009	0.012
	(1.299)	(1.252)	(1.216)	(2.328)**	(2.398)**	(2.543)**	(0.323)	(0.244)	(0.350)
D14: Proximity of Suppliers	-0.016	-0.015	-0.019	0.075	0.077	0.071	-0.021	-0.021	-0.023
	(0.366)	(0.344)	(0.453)	-1.516	-1.621	(2.370)**	(0.517)	(0.513)	(0.557)
D15: Request by Large Companies	0.025	0.025	0.023	-0.062	-0.055	-0.06	0.038	0.036	0.027
	(0.519)	(0.518)	(0.477)	(1.201)	(1.088)	(1.665)*	(0.837)	(0.788)	(0.609)
D16: Lower Costs of Labor	-0.058	-0.058	-0.055	-0.001	0.005	-0.007	-0.083	-0.087	-0.077
	(1.585)	(1.583)	(1.458)	(0.040)	(0.163)	(0.246)	(2.425)**	(2.483)**	(2.189)**
D17: Skilled Labor	0.022	0.021	0.024	-0.073	-0.075	-0.066	0.019	0.018	0.017
	(0.591)	(0.563)	(0.629)	(1.524)	(1.578)	(2.182)**	(0.545)	(0.511)	(0.482)
D18: Synergy	-0.027	-0.027	-0.042	0.134	0.138	0.165	-0.039	-0.039	-0.027
	(0.703)	(0.712)	(1.066)	(2.813)***	(2.999)***	(3.457)***	(1.159)	(1.157)	(0.765)
D19: Cutting-Edge Technology	0.026	0.026	0.035	-0.008	-0.01	-0.048	-0.032	-0.029	-0.031
	(0.574)	(0.577)	(0.721)	(0.181)	(0.231)	(1.230)	(0.747)	(0.676)	(0.733)
D20: Living Conditions	0.054	0.055	0.062	-0.01	-0.013	-0.022	0.006	0.008	0.005
	(1.302)	(1.330)	(1.483)	(0.258)	(0.361)	(0.729)	(0.169)	(0.211)	(0.150)
Manufacturing		0.038	0.011		-0.057	-0.012		0.07	0.054
		(0.445)	(0.130)		(0.614)	(0.177)		(0.900)	(0.685)
Full-time Employees			Yes			Yes			Yes
Observations	186	186	185	108	108	108	222	222	221

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

5.2. Technical Assistance from Foreign Agencies

Here we analyze the factors promoting technical assistance from foreign agencies. According to Table 15, a one-point increase of D-score for “Financial system” increases the probability of foreign technical assistance by 10 percentage points. If the D-score for “Protection of IPRs” decreases by one point, the probability increases by 4.3 percentage points. The positive marginal effect of “Multinationals” indicates MNCs tend to make better use of technical assistance programs provided by foreign agencies.

As shown in Table 16, the marginal effects of “Financial system” continue to be significantly positive even after dividing the sample firms into three types. But the impact of the increase in the D-score by one point is different among them; the marginal effect for MNCs is about 0.14, which is larger than for non-MNCs (about 0.104) and twice the effect for non-exporters (0.065). “Liberal trade policy” and “Protection of IPRs” have negative marginal effects on MNCs. The negative sign of “Government institutional infrastructure” and the positive sign of “Customs procedure” are estimated for non-MNCs.

Table 15: Results: Technical Assistance from Foreign Agencies (Full-sample)

	Pool (three countries)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Probit Regression (Marginal Effcts)	Dependent: Technical assistance from foreign agencies =1, otherwise 0						
D1: Tax Incentives	0.01	0.01	0.013	0.012	0.012	0.011	-0.018
	(0.392)	(0.401)	(0.498)	(0.460)	(0.449)	(0.398)	(0.647)
D2: Liberal Trade Policy	-0.033	-0.033	-0.04	-0.04	-0.042	-0.033	-0.007
	(1.105)	(1.115)	(1.345)	(1.351)	(1.412)	(1.100)	(0.249)
D3: Customs Procedures	0.026	0.026	0.021	0.021	0.022	0.012	0.022
	(1.126)	(1.134)	(0.912)	(0.905)	(0.951)	(0.526)	(0.915)
D4: Local Content	0.024	0.024	0.023	0.022	0.026	0.015	0.035
	(0.936)	(0.954)	(0.871)	(0.841)	(1.008)	(0.556)	(1.241)
D5: Physical Infrastructure	0.038	0.038	0.034	0.034	0.034	0.033	0.018
	(1.395)	(1.399)	(1.229)	(1.221)	(1.212)	(1.183)	(0.627)
D6: ICTs	-0.006	-0.009	-0.004	-0.004	-0.003	0.001	-0.002
	(0.192)	(0.274)	(0.119)	(0.125)	(0.081)	(0.027)	(0.065)
D7: Utilities	-0.003	0.001	0.006	0.007	0.003	-0.001	-0.011
	(0.106)	(0.018)	(0.194)	(0.224)	(0.107)	(0.033)	(0.353)
D8: Government Institution	-0.011	-0.01	-0.015	-0.013	-0.016	-0.024	-0.016
	(0.375)	(0.350)	(0.522)	(0.455)	(0.539)	(0.820)	(0.553)
D9: Financial System	0.099	0.098	0.102	0.101	0.099	0.108	0.114
	(2.816)***	(2.797)***	(2.917)***	(2.890)***	(2.835)***	(2.995)***	(3.002)***
D10: Legal System	-0.027	-0.029	-0.023	-0.023	-0.022	-0.018	-0.004
	(0.880)	(0.937)	(0.758)	(0.750)	(0.699)	(0.577)	(0.123)
D11: Protection of IPRs	-0.043	-0.043	-0.043	-0.043	-0.041	-0.029	-0.042
	(1.698)*	(1.685)*	(1.700)*	(1.673)*	-1.625	-1.139	-1.541
D12: Size of Local Markets	0.005	0.004	0.004	0.006	0.014	0.004	0.006
	(0.157)	(0.125)	(0.127)	(0.171)	(0.417)	(0.111)	(0.153)
D13: Access to Export Markets	0.013	0.014	0.011	0.009	0.008	-0.001	0.001
	(0.466)	(0.511)	(0.405)	(0.322)	(0.274)	(0.048)	(0.020)
D14: Proximity of Suppliers	0.023	0.023	0.031	0.031	0.033	0.055	0.068
	(0.707)	(0.721)	(0.960)	(0.974)	(1.034)	(1.607)	(1.942)*
D15: Request by Large Companies	-0.011	-0.01	-0.011	-0.011	-0.016	-0.02	-0.034
	(0.315)	(0.280)	(0.330)	(0.317)	(0.445)	(0.551)	(0.943)
D16: Lower Costs of Labor	-0.003	-0.002	-0.002	-0.002	0	0.005	0.016
	(0.131)	(0.085)	(0.063)	(0.067)	(0.003)	(0.201)	(0.624)
D17: Skilled Labor	-0.02	-0.019	-0.018	-0.018	-0.015	-0.022	-0.011
	(0.701)	(0.685)	(0.642)	(0.635)	(0.521)	(0.763)	(0.368)
D18: Synergy	0.005	0.004	0.005	0.006	0.014	0.013	0.001
	(0.161)	(0.145)	(0.180)	(0.202)	(0.487)	(0.441)	(0.030)
D19: Cutting-Edge Technology	0.017	0.017	0.018	0.018	0.014	0.018	0.019
	(0.521)	(0.499)	(0.538)	(0.534)	(0.414)	(0.527)	(0.563)
D20: Living Conditions	0.017	0.016	0.018	0.018	0.014	0.007	0.027
	(0.579)	(0.549)	(0.626)	(0.628)	(0.493)	(0.223)	(0.909)
Manufacturing		-0.035	-0.047	-0.049	-0.059	-0.057	-0.057
		(0.563)	(0.752)	(0.785)	(0.950)	(0.871)	(0.868)
Multinationals			0.133	0.131	0.104	0.101	0.087
			(2.132)**	(2.059)**	(1.589)	(1.474)	(1.247)
Exporters				0.027	0.031	0.027	0.066
				(0.378)	(0.424)	(0.371)	(0.873)
Full-time Employees					Yes		
Total Assets (US$)						Yes	
Paid-up Capital (US$)							Yes
Observations	293	293	293	293	292	275	262

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

Table 16: Results: Technical Assistance from Foreign Agencies (Restricted Sample)

	Pool (three countries)								
	Non Multinationals			Multinationals			Non Exporters		
Sample Restriction	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Probit Regression (Marginal Effects)	Dependent: Technical assistance from foreign agencies =1, otherwise 0								
D1: Tax Incentives	-0.015	-0.014	-0.031	0.1	0.087	0.088	0.017	0.017	0.014
	(0.453)	(0.423)	(1.026)	(1.876)*	(1.536)	(1.525)	(0.587)	(0.571)	(0.475)
D2: Liberal Trade Policy	-0.019	-0.019	-0.011	-0.106	-0.1	-0.101	-0.055	-0.055	-0.061
	(0.552)	(0.553)	(0.329)	(1.896)*	(1.773)*	(1.788)*	(1.621)	(1.635)	(1.818)*
D3: Customs Procedures	0.05	0.049	0.056	-0.054	-0.044	-0.044	0.021	0.022	0.025
	(1.810)*	(1.796)*	(2.053)**	(1.201)	(0.958)	(0.965)	(0.798)	(0.831)	(0.923)
D4: Local Content	0.042	0.042	0.06	-0.054	-0.06	-0.06	0	0.001	0.011
	(1.440)	(1.438)	(2.157)**	(0.777)	(0.848)	(0.844)	(0.012)	(0.030)	(0.395)
D5: Physical Infrastructure	0.052	0.052	0.035	0.017	0.013	0.015	0.05	0.05	0.05
	(1.559)	(1.587)	(1.022)	(0.297)	(0.234)	(0.266)	(1.483)	(1.496)	(1.458)
D6: ICTs	-0.029	-0.03	-0.029	0.037	0.028	0.029	0.005	0.003	0.005
	(0.712)	(0.736)	(0.717)	(0.554)	(0.426)	(0.435)	(0.137)	(0.076)	(0.136)
D7: Utilities	-0.015	-0.013	-0.012	0.074	0.086	0.084	-0.003	0.001	-0.005
	(0.455)	(0.399)	(0.339)	(1.141)	(1.326)	(1.282)	(0.077)	(0.029)	(0.141)
D8: Government Institution	-0.066	-0.067	-0.062	0.045	0.055	0.053	0.001	0	-0.006
	(1.788)*	(1.816)*	(1.667)*	(0.866)	(1.026)	(0.980)	(0.025)	(0.014)	(0.188)
D9: Financial System	0.104	0.104	0.107	0.143	0.136	0.138	0.065	0.065	0.066
	(2.461)**	(2.457)**	(2.591)***	(1.835)*	(1.763)*	(1.763)*	(1.681)*	(1.695)*	(1.726)*
D10: Legal System	0.023	0.023	0.019	-0.089	-0.095	-0.095	-0.024	-0.025	-0.021
	(0.643)	(0.622)	(0.525)	(1.349)	(1.436)	(1.438)	(0.723)	(0.744)	(0.641)
D11: Protection of IPRs	-0.026	-0.026	-0.024	-0.106	-0.124	-0.126	-0.045	-0.045	-0.044
	(0.926)	(0.893)	(0.827)	(1.486)	(1.714)*	(1.708)*	(1.540)	(1.539)	(1.527)
D12: Size of Local Markets	-0.024	-0.025	-0.01	0.076	0.086	0.088	0.006	0.004	0.013
	(0.660)	(0.689)	(0.269)	(0.921)	(1.055)	(1.079)	(0.157)	(0.108)	(0.347)
D13: Access to Export Markets	0.028	0.03	0.024	0.018	0.02	0.02	0.024	0.026	0.025
	(0.865)	(0.894)	(0.737)	(0.285)	(0.315)	(0.316)	(0.739)	(0.786)	(0.773)
D14: Proximity of Suppliers	0.043	0.042	0.044	-0.008	-0.001	0.001	0.045	0.046	0.048
	(1.150)	(1.123)	(1.151)	(0.129)	(0.011)	(0.010)	(1.218)	(1.235)	(1.300)
D15: Request by Large Companies	0.023	0.024	0.019	-0.107	-0.1	-0.103	0.013	0.015	0.01
	(0.559)	(0.580)	(0.470)	(1.346)	(1.248)	(1.248)	(0.345)	(0.389)	(0.255)
D16: Lower Costs of Labor	-0.01	-0.01	-0.001	-0.023	-0.008	-0.008	-0.029	-0.029	-0.02
	(0.317)	(0.327)	(0.043)	(0.472)	(0.147)	(0.154)	(0.992)	(0.977)	(0.663)
D17: Skilled Labor	-0.027	-0.026	-0.03	-0.01	-0.015	-0.015	-0.014	-0.013	-0.012
	(0.800)	(0.769)	(0.851)	(0.147)	(0.233)	(0.227)	(0.455)	(0.435)	(0.400)
D18: Synergy	-0.001	-0.001	-0.008	0.042	0.049	0.053	-0.007	-0.007	0.002
	(0.042)	(0.043)	(0.237)	(0.680)	(0.807)	(0.801)	(0.223)	(0.225)	(0.058)
D19: Cutting-Edge Technology	0.016	0.016	0.021	-0.029	-0.029	-0.032	-0.031	-0.032	-0.034
	(0.417)	(0.405)	(0.551)	(0.405)	(0.411)	(0.437)	(0.805)	(0.839)	(0.890)
D20: Living Conditions	-0.005	-0.006	-0.006	0.095	0.084	0.082	0.013	0.012	0.008
	(0.143)	(0.161)	(0.182)	(1.655)*	(1.464)	(1.417)	(0.387)	(0.362)	(0.231)
Manufacturing		-0.024	-0.069		-0.116	-0.116		-0.032	-0.047
		(0.327)	(0.907)		(0.887)	(0.894)		(0.461)	(0.662)
Full-time Employees			Yes			Yes			Yes
Observations	186	186	185	107	107	107	222	222	221

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

5.3. Technical Cooperation with Local Government

In the full-sample model, only “Financial system” and “Request by large/related firms” yield significant D-scores, whose marginal effects are around 0.06 and -0.06, respectively. The marginal effect for “Multinationals” is negative, suggesting that local firms tend to have closer relation with local governments than with MNCs.

There are no common significant variables among non-MNC, MNC, and non-Exporter models. In the case of non-MNCs, the negative marginal effect for “Request by large/related company” (10%) and the positive marginal effect for “Synergy” (5%) are significant. This implies that local firms dissatisfied with their relations with large firms or are placing less significance on it do not tend to cooperate with local governments, while those that place importance on forging relations with local firms work closely with local public bodies.

“Financial system,” “Access to cutting-edge technology,” and “Access to export market” are significantly positive for non-exporters. Although the interpretation on “Access to export market” is not easy, non-exporting firms who put emphasis on the former two factors tend to work together with local governments. On the other hand, as “Availability of skilled labor” is negative, the satisfaction with “Availability of skilled labor” discourages non-exporters from cooperating with local governments.

For MNCs, the marginal effects on “Liberal trade policy” and “Utilities” are positive. This indicates that MNCs need to establish closer relation with local governments to solve these policy-related issues in case they find problems in these. In contrast, “Government institutional infrastructure” has a negative sign, suggesting that MNCs hesitate to have cooperative relation with local government if the government institution is not well-established.

Table 17: Results: Technical Cooperation with Local Government (Full-sample)

	Pool (three countries)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Probit Regression (Marginal Effects)	Dependent: Technical cooperation with local government =1, otherwise 0						
D1: Tax Incentives	0.022	0.023	0.018	0.018	0.018	0.017	0.03
	(0.868)	(0.882)	(0.713)	(0.711)	(0.720)	(0.657)	(1.056)
D2: Liberal Trade Policy	0.004	0.003	0.013	0.013	0.013	0.019	0.015
	(0.122)	(0.104)	(0.405)	(0.405)	(0.405)	(0.576)	(0.447)
D3: Customs Procedures	-0.005	-0.005	0.002	0.002	0.003	0.006	0.012
	(0.210)	(0.200)	(0.098)	(0.098)	(0.109)	(0.243)	(0.454)
D4: Local Content	0.027	0.028	0.031	0.031	0.031	0.029	0.018
	(1.094)	(1.140)	(1.231)	(1.224)	(1.250)	(1.081)	(0.658)
D5: Physical Infrastructure	0.004	0.003	0.01	0.01	0.009	0.018	0.025
	(0.131)	(0.121)	(0.369)	(0.369)	(0.341)	(0.639)	(0.826)
D6: ICTs	-0.018	-0.024	-0.032	-0.032	-0.03	-0.037	-0.051
	(0.539)	(0.746)	(0.952)	(0.952)	(0.915)	(1.086)	(1.467)
D7: Utilities	0.018	0.026	0.021	0.021	0.02	0.019	0.027
	(0.604)	(0.857)	(0.700)	(0.702)	(0.672)	(0.615)	(0.827)
D8: Government Institution	-0.042	-0.04	-0.034	-0.034	-0.034	-0.03	-0.04
	(1.474)	(1.398)	(1.195)	(1.177)	(1.160)	(0.990)	(1.327)
D9: Financial System	0.06	0.058	0.056	0.056	0.053	0.061	0.088
	(1.683)*	(1.642)	(1.607)	(1.600)	(1.513)	(1.655)*	(2.213)**
D10: Legal System	0.016	0.012	0.004	0.004	0.004	0	0
	(0.517)	(0.374)	(0.118)	(0.118)	(0.121)	(0.015)	(0.012)
D11: Protection of IPRs	-0.006	-0.006	-0.007	-0.007	-0.006	-0.006	-0.006
	(0.248)	(0.216)	(0.271)	(0.271)	(0.249)	(0.211)	(0.204)
D12: Size of Local Markets	-0.027	-0.029	-0.029	-0.029	-0.026	-0.031	-0.03
	(0.816)	(0.896)	(0.877)	(0.873)	(0.772)	(0.839)	(0.792)
D13: Access to Export Markets	0.024	0.028	0.031	0.031	0.03	0.029	0.025
	(0.841)	(0.979)	(1.094)	(1.065)	(1.033)	(0.899)	(0.780)
D14: Proximity of Suppliers	0.027	0.028	0.019	0.019	0.02	0.026	0.039
	(0.846)	(0.865)	(0.596)	(0.594)	(0.614)	(0.729)	(1.061)
D15: Request by Large Companies	-0.064	-0.064	-0.059	-0.059	-0.06	-0.063	-0.076
	(1.780)*	(1.769)*	(1.631)	(1.630)	(1.647)*	(1.641)	(1.890)*
D16: Lower Costs of Labor	0.014	0.017	0.014	0.014	0.014	0.017	0.017
	(0.568)	(0.681)	(0.552)	(0.552)	(0.571)	(0.640)	(0.629)
D17: Skilled Labor	-0.04	-0.039	-0.04	-0.04	-0.04	-0.033	-0.043
	(1.424)	(1.368)	(1.433)	(1.434)	(1.408)	(1.141)	(1.431)
D18: Synergy	0.048	0.048	0.045	0.045	0.046	0.04	0.032
	(1.543)	(1.540)	(1.422)	(1.421)	(1.453)	(1.191)	(0.962)
D19: Cutting-Edge Technology	0.053	0.05	0.048	0.048	0.047	0.037	0.047
	(1.537)	(1.467)	(1.420)	(1.420)	(1.409)	(1.047)	(1.352)
D20: Living Conditions	0.005	0.004	-0.001	-0.001	-0.001	0	-0.013
	(0.177)	(0.121)	(0.033)	(0.033)	(0.038)	(0.004)	(0.419)
Manufacturing		-0.079	-0.064	-0.064	-0.064	-0.055	-0.09
		(1.292)	(1.049)	(1.049)	(1.035)	(0.835)	(1.376)
Multinationals			-0.174	-0.174	-0.178	-0.126	-0.176
			(2.763)***	(2.745)***	(2.755)***	(1.795)*	(2.412)**
Exporters				0	0.003	0.026	0.004
				(0.005)	(0.040)	(0.331)	(0.048)
Full-time Employees					Yes		
Total Assets (US$)						Yes	
Paid-up Capital (US$)							Yes
Observations	293	293	293	293	292	275	262

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

Table 18: Results: Technical Cooperation with Local Government (Restricted Sample)

	Pool (three countries)								
	Non Multinationals			Multinationals			Non Exporters		
Sample Restriction	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Probit Regression (Marginal Effects)	Dependent: Technical cooperation with local government =1, otherwise 0								
D1: Tax Incentives	0.017	0.019	0.023	0.065	0.06	0.068	0.016	0.013	0.015
	(0.498)	(0.548)	(0.668)	(1.602)	(1.428)	(1.539)	(0.550)	(0.431)	(0.475)
D2: Liberal Trade Policy	-0.02	-0.021	-0.023	0.098	0.101	0.099	0.02	0.017	0.018
	(0.477)	(0.491)	(0.552)	(2.020)**	(2.058)**	(2.038)**	(0.530)	(0.455)	(0.482)
D3: Customs Procedures	0.041	0.04	0.039	-0.054	-0.049	-0.058	0.024	0.03	0.03
	(1.276)	(1.253)	(1.227)	(1.543)	(1.373)	(1.649)*	(0.832)	(1.054)	(1.051)
D4: Local Content	0.044	0.045	0.042	-0.049	-0.053	-0.05	0.031	0.033	0.032
	(1.438)	(1.472)	(1.377)	(0.890)	(0.949)	(0.957)	(1.076)	(1.142)	(1.086)
D5: Physical Infrastructure	0.016	0.018	0.023	-0.029	-0.033	-0.034	-0.031	-0.031	-0.03
	(0.453)	(0.495)	(0.628)	(0.625)	(0.731)	(0.763)	(0.916)	(0.886)	(0.885)
D6: ICTs	-0.047	-0.051	-0.049	0.01	0.005	0.021	-0.018	-0.033	-0.032
	(1.076)	(1.174)	(1.130)	(0.183)	(0.096)	(0.422)	(0.458)	(0.847)	(0.833)
D7: Utilities	-0.007	-0.001	-0.005	0.107	0.114	0.11	0.026	0.046	0.045
	(0.178)	(0.023)	(0.123)	(2.200)**	(2.293)**	(2.251)**	(0.712)	(1.232)	(1.214)
D8: Government Institution	-0.029	-0.031	-0.029	-0.083	-0.076	-0.09	-0.051	-0.052	-0.047
	(0.735)	(0.777)	(0.734)	(1.842)*	(1.746)*	(2.110)**	(1.494)	(1.507)	(1.375)
D9: Financial System	0.071	0.07	0.066	0.071	0.071	0.078	0.095	0.1	0.094
	(1.614)	(1.583)	(1.496)	(1.120)	(1.123)	(1.216)	(2.309)**	(2.403)**	(2.263)**
D10: Legal System	0.044	0.042	0.04	-0.075	-0.081	-0.075	0.015	0.01	0.007
	(1.102)	(1.050)	(1.006)	(1.605)	(1.705)*	(1.620)	(0.426)	(0.287)	(0.193)
D11: Protection of IPRs	0.014	0.017	0.017	-0.088	-0.1	-0.11	0.017	0.018	0.019
	(0.462)	(0.546)	(0.533)	(1.399)	(1.542)	(1.721)*	(0.533)	(0.585)	(0.614)
D12: Size of Local Markets	-0.028	-0.032	-0.032	-0.012	-0.008	0.006	-0.048	-0.061	-0.058
	(0.705)	(0.790)	(0.770)	(0.187)	(0.131)	(0.095)	(1.232)	(1.527)	(1.447)
D13: Access to Export Markets	0.059	0.063	0.063	0.039	0.04	0.032	0.056	0.069	0.067
	(1.534)	(1.633)	(1.632)	(0.724)	(0.740)	(0.614)	(1.581)	(1.932)*	(1.878)*
D14: Proximity of Suppliers	0.024	0.02	0.019	-0.015	-0.01	-0.007	0.007	0.006	0.005
	(0.558)	(0.491)	(0.454)	(0.273)	(0.183)	(0.130)	(0.180)	(0.160)	(0.142)
D15: Request by Large Companies	-0.076	-0.076	-0.073	-0.052	-0.044	-0.057	-0.068	-0.068	-0.065
	(1.666)*	(1.679)*	(1.617)	(0.886)	(0.743)	(0.910)	(1.637)	(1.640)	(1.576)
D16: Lower Costs of Labor	0.006	0.006	0.004	0.017	0.025	0.033	0.017	0.023	0.02
	(0.164)	(0.179)	(0.119)	(0.466)	(0.644)	(0.802)	(0.571)	(0.721)	(0.649)
D17: Skilled Labor	-0.057	-0.054	-0.052	-0.013	-0.019	-0.022	-0.062	-0.058	-0.057
	(1.657)*	(1.576)	(1.521)	(0.249)	(0.352)	(0.421)	(1.924)*	(1.789)*	(1.774)*
D18: Synergy	0.08	0.081	0.079	-0.014	-0.009	0.027	0.039	0.04	0.035
	(2.059)**	(2.087)**	(2.042)**	(0.274)	(0.186)	(0.497)	(1.067)	(1.086)	(0.972)
D19: Cutting-Edge Technology	0.061	0.058	0.057	0.054	0.052	0.03	0.101	0.095	0.095
	(1.431)	(1.378)	(1.356)	(0.953)	(0.923)	(0.533)	(2.563)**	(2.412)**	(2.432)**
D20: Living Conditions	-0.003	-0.004	-0.001	0	-0.006	-0.02	0.001	-0.003	0
	(0.068)	(0.094)	(0.029)	(0.006)	(0.131)	(0.409)	(0.031)	(0.072)	(0.013)
Manufacturing		-0.07	-0.051		-0.067	-0.08		-0.177	-0.167
		(0.873)	(0.621)		(0.651)	(0.757)		(2.429)**	(2.268)**
Full-time Employees			Yes			Yes			Yes
Observations	186	186	185	107	107	107	221	221	220

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

5.4. Technical Cooperation with Local Business Organization

Here we analyze the factors promoting technical cooperation with local business

organization. According to Table 19, if the D-score for “Synergy” increases by one point, the probability that firms have technical cooperation with local business organization decreases by 7-10 percentage points. This implies that companies willing to build a closer inter-business linkage tend to develop cooperative relations with local business organization. The positive marginal effect of “Living conditions” indicates that firms that pursue localization seek technical cooperation with local organization. The negative sign (about -0.3) for “Multinationals” means the ratio of MNCs gaining cooperation with such business organization is 30 percent lower than for local firms.

As shown in Table 20, “Synergy” has a greater influence on MNCs than on non-MNCs and non-exporters. Its marginal effect on MNCs is about -0.12, greater than for non-MNCs (-0.06) and non-exporters (-0.08). This indicates that weak inter-firm linkages hamper cooperation with local business organization. “Living conditions” is not significant only for MNCs. The signs of “Local content requirements” are different between MNCs and non-MNCs; the marginal effects on this factor are positive for non-MNCs but negative for MNCs. The positive marginal effects of “Access to cutting-edge technology” for all but MNCs mean that innovative activities by domestic firms are partly based on closer relation with local business organization. Positive marginal effects on infrastructure-related factors such as “Physical infrastructure” for MNCs and “Utilities” for non-MNCs suggest local business organizations can play important role in mitigating business obstacles caused by local infrastructure. On the other hand, weak ICT infrastructures, which can be a key platform for collaboration, discourage such cooperation as implied by the negative effect of “telecommunications or IT infrastructure” for non-MNCs. What should be noted is the negative effect of “Manufacturing” for MNCs, which invokes limited cooperative relation between MNCs

and local business associations in the manufacturing sector.

Table 19: Results: Technical Cooperation with Local Business Organization (Full-sample)

	Pool (three countries)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Probit Regression (Marginal Effects)	Dependent: Technical cooperation with local business organization =1, otherwise 0						
D1: Tax Incentives	-0.008	-0.007	-0.014	-0.016	-0.018	-0.023	-0.015
	(0.299)	(0.271)	(0.495)	(0.555)	(0.613)	(0.794)	(0.495)
D2: Liberal Trade Policy	-0.003	-0.002	0.015	0.015	0.015	0.018	0.016
	(0.099)	(0.071)	(0.489)	(0.485)	(0.477)	(0.555)	(0.470)
D3: Customs Procedures	-0.021	-0.021	-0.008	-0.008	-0.007	-0.007	-0.004
	(0.835)	(0.823)	(0.293)	(0.303)	(0.279)	(0.261)	(0.149)
D4: Local Content	0.011	0.015	0.02	0.019	0.021	0.032	0.017
	(0.417)	(0.566)	(0.734)	(0.702)	(0.754)	(1.129)	(0.590)
D5: Physical Infrastructure	0.029	0.028	0.039	0.039	0.039	0.033	0.029
	(0.977)	(0.960)	(1.319)	(1.321)	(1.318)	(1.083)	(0.923)
D6: ICTs	-0.03	-0.039	-0.052	-0.053	-0.053	-0.051	-0.048
	(0.838)	(1.083)	(1.396)	(1.420)	(1.414)	(1.359)	(1.238)
D7: Utilities	0.023	0.035	0.027	0.028	0.027	0.038	0.034
	(0.742)	(1.105)	(0.853)	(0.886)	(0.832)	(1.164)	(1.013)
D8: Government Institution	-0.038	-0.036	-0.026	-0.023	-0.025	-0.019	-0.031
	(1.279)	(1.214)	(0.835)	(0.746)	(0.794)	(0.606)	(0.949)
D9: Financial System	0.003	0.001	-0.008	-0.009	-0.011	-0.016	-0.01
	(0.084)	(0.022)	(0.209)	(0.242)	(0.310)	(0.436)	(0.242)
D10: Legal System	-0.004	-0.011	-0.023	-0.023	-0.021	-0.021	-0.013
	(0.131)	(0.324)	(0.690)	(0.671)	(0.611)	(0.601)	(0.353)
D11: Protection of IPRs	0.024	0.026	0.024	0.024	0.026	0.015	0.01
	(0.889)	(0.937)	(0.865)	(0.875)	(0.933)	(0.554)	(0.328)
D12: Size of Local Markets	-0.028	-0.033	-0.031	-0.028	-0.025	-0.036	-0.038
	(0.804)	(0.947)	(0.895)	(0.820)	(0.712)	(0.936)	(0.967)
D13: Access to Export Markets	0.012	0.017	0.022	0.019	0.019	0.032	0.029
	(0.405)	(0.576)	(0.723)	(0.613)	(0.590)	(0.990)	(0.863)
D14: Proximity of Suppliers	0.022	0.022	0.012	0.012	0.013	0.015	0.007
	(0.649)	(0.647)	(0.330)	(0.348)	(0.366)	(0.383)	(0.176)
D15: Request by Large Companies	0	0.003	0.014	0.014	0.011	0.027	0.016
	(0.007)	(0.092)	(0.379)	(0.380)	(0.294)	(0.668)	(0.401)
D16: Lower Costs of Labor	-0.041	-0.037	-0.043	-0.043	-0.042	-0.047	-0.028
	(1.496)	(1.342)	(1.582)	(1.570)	(1.519)	(1.643)	(0.961)
D17: Skilled Labor	0.002	0.004	-0.003	-0.003	-0.001	0.006	0.004
	(0.073)	(0.125)	(0.092)	(0.091)	(0.040)	(0.171)	(0.127)
D18: Synergy	-0.071	-0.074	-0.083	-0.083	-0.079	-0.097	-0.103
	(2.350)**	(2.486)**	(2.778)***	(2.743)***	(2.540)**	(3.004)***	(3.136)***
D19: Cutting-Edge Technology	0.055	0.053	0.052	0.052	0.05	0.038	0.048
	(1.612)	(1.520)	(1.476)	(1.480)	(1.432)	(1.063)	(1.340)
D20: Living Conditions	0.084	0.081	0.079	0.079	0.078	0.088	0.073
	(2.721)***	(2.639)***	(2.484)**	(2.500)**	(2.442)**	(2.766)***	(2.261)**
Manufacturing		-0.116	-0.094	-0.097	-0.103	-0.093	-0.104
		(1.821)*	(1.420)	(1.457)	(1.544)	(1.314)	(1.472)
Multinationals			-0.285	-0.29	-0.305	-0.249	-0.324
			(4.269)***	(4.326)***	(4.449)***	(3.424)***	(4.373)***
Exporters				0.033	0.037	0.052	0.03
				(0.435)	(0.495)	(0.669)	(0.379)
Full-time Employees					Yes		
Total Assets (US$)						Yes	
Paid-up Capital (US$)							Yes
Observations	292	292	292	292	291	274	261

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

Table 20: Results: Technical Cooperation with Local Business Organization (Restricted Sample)

	Pool (three countries)								
	Non Multinationals			Multinationals			Non Exporters		
Sample Restriction	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Probit Regression (Marginal Effects)	Dependent: Technical cooperation with local business organization =1, otherwise 0								
D1: Tax Incentives	-0.055	-0.055	-0.055	0.068	0.028	0.023	-0.021	-0.022	-0.022
	(1.839)*	(1.820)*	(1.796)*	(1.172)	(0.478)	(0.394)	(0.666)	(0.716)	(0.706)
D2: Liberal Trade Policy	0.021	0.021	0.022	0.002	0.032	0.029	0.043	0.043	0.042
	(0.550)	(0.552)	(0.579)	(0.031)	(0.471)	(0.415)	(1.133)	(1.129)	(1.106)
D3: Customs Procedures	0.018	0.018	0.019	-0.111	-0.085	-0.087	0.008	0.011	0.012
	(0.623)	(0.619)	(0.659)	(2.322)**	(1.783)*	(1.871)*	(0.273)	(0.382)	(0.390)
D4: Local Content	0.062	0.062	0.063	-0.168	-0.205	-0.205	0.024	0.028	0.03
	(2.160)**	(2.172)**	(2.164)**	(2.640)***	(3.001)***	(3.047)***	(0.762)	(0.904)	(0.943)
D5: Physical Infrastructure	0.026	0.026	0.024	0.109	0.104	0.12	0	0.002	0.001
	(0.838)	(0.838)	(0.738)	(1.759)*	(1.668)*	(2.020)**	(0.005)	(0.049)	(0.019)
D6: ICTs	-0.079	-0.08	-0.079	0.004	-0.027	-0.024	-0.007	-0.017	-0.016
	(1.836)*	(1.826)*	(1.804)*	(0.066)	(0.412)	(0.360)	(0.166)	(0.399)	(0.375)
D7: Utilities	0.065	0.065	0.064	-0.116	-0.077	-0.088	0.032	0.045	0.043
	(1.895)*	(1.883)*	(1.838)*	(1.659)*	(1.057)	(1.211)	(0.878)	(1.209)	(1.149)
D8: Government Institution	-0.028	-0.028	-0.024	-0.058	-0.021	-0.035	-0.048	-0.049	-0.048
	(0.769)	(0.780)	(0.671)	(1.133)	(0.412)	(0.633)	(1.266)	(1.309)	(1.270)
D9: Financial System	-0.054	-0.054	-0.059	0.128	0.101	0.108	0.005	0.007	0.003
	(1.280)	(1.280)	(1.371)	(1.714)*	(1.366)	(1.450)	(0.114)	(0.162)	(0.061)
D10: Legal System	0.017	0.017	0.015	-0.09	-0.119	-0.108	-0.03	-0.033	-0.033
	(0.461)	(0.460)	(0.410)	(1.352)	(1.795)*	(1.612)	(0.838)	(0.919)	(0.909)
D11: Protection of IPRs	0.003	0.003	0.004	0.049	0.001	-0.017	0.037	0.04	0.041
	(0.089)	(0.091)	(0.129)	(0.619)	(0.008)	(0.206)	(1.088)	(1.163)	(1.200)
D12: Size of Local Markets	-0.022	-0.022	-0.018	-0.047	-0.013	0.001	-0.031	-0.042	-0.037
	(0.621)	(0.630)	(0.491)	(0.635)	(0.164)	(0.011)	(0.765)	(1.038)	(0.910)
D13: Access to Export Markets	0.018	0.018	0.016	0.117	0.134	0.133	-0.001	0.007	0.006
	(0.543)	(0.543)	(0.495)	(1.916)*	(2.209)**	(2.210)**	(0.042)	(0.207)	(0.158)
D14: Proximity of Suppliers	0.009	0.009	0.01	0.006	0.033	0.037	0.055	0.053	0.054
	(0.254)	(0.250)	(0.261)	(0.084)	(0.454)	(0.494)	(1.288)	(1.257)	(1.272)
D15: Request by Large Companies	0.01	0.01	0.011	0.038	0.071	0.055	-0.035	-0.03	-0.031
	(0.223)	(0.224)	(0.242)	(0.558)	(0.995)	(0.754)	(0.769)	(0.682)	(0.700)
D16: Lower Costs of Labor	-0.051	-0.051	-0.05	-0.048	-0.003	0.001	-0.02	-0.018	-0.015
	(1.585)	(1.588)	(1.560)	(0.929)	(0.062)	(0.016)	(0.581)	(0.518)	(0.447)
D17: Skilled Labor	0.011	0.011	0.011	-0.058	-0.094	-0.092	-0.024	-0.021	-0.02
	(0.326)	(0.332)	(0.332)	(0.851)	(1.279)	(1.222)	(0.668)	(0.572)	(0.563)
D18: Synergy	-0.058	-0.058	-0.062	-0.141	-0.122	-0.083	-0.076	-0.079	-0.079
	(1.699)*	(1.705)*	(1.807)*	(2.423)**	(2.133)**	(1.242)	(2.168)**	(2.274)**	(2.225)**
D19: Cutting-Edge Technology	0.066	0.066	0.068	0.057	0.053	0.03	0.086	0.08	0.082
	(1.739)*	(1.733)*	(1.774)*	(0.760)	(0.665)	(0.370)	(2.101)**	(1.941)*	(1.986)**
D20: Living Conditions	0.103	0.103	0.105	0.065	0.018	0.008	0.141	0.139	0.14
	(3.026)***	(3.024)***	(3.040)***	(1.081)	(0.278)	(0.118)	(3.878)***	(3.863)***	(3.842)***
Manufacturing		-0.004	-0.002		-0.375	-0.385		-0.128	-0.125
		(0.059)	(0.032)		(2.779)***	(2.805)***		(1.645)	(1.588)
Full-time Employees			Yes			Yes			Yes
Observations	186	186	185	106	106	106	220	220	219

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

5.5. Technical Cooperation with Local University or R&D Institute

According to Table 21, if the D-score for “Physical infrastructure” decreases one point, the possibility of technical cooperation with local university or R&D institute increases about eight percentage points. In the same way, about six percentage points are derived for “Availability of low-cost labor.” Positive marginal effect is estimated for “Local content requirements.” A one-point increase in the D-score for this factor results in increasing the possibility by about five percent. Again, “Multinationals” get less cooperation from local university.

By firm-level attribute, “Physical infrastructure” is significantly negative for non-MNCs and non-exporters, while “Availability of low-cost labor” is negative for MNCs and non-exporters. Among other factors, non-MNCs emphasizing “Customs procedures” and “Local content requirements” tend to be active in technical cooperation with local R&D institutes. MNCs have a positive marginal effect of “Financial system” (about 0.13) and a negative one of “Legal system” (about -0.16). A characteristic of non-exporter is those putting importance on “Living conditions” are likely partners for local universities.

Table 21: Results: Technical Cooperation with Local University or R&D Institute (Full-sample)

	Pool (three countries)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Probit Regression (Marginal Effects)	Dependent: Technical cooperation with local univeristy or R&D insitutes =1, otherv						
D1: Tax Incentives	0.032	0.031	0.028	0.027	0.027	0.024	0.027
	(1.156)	(1.155)	(1.033)	(0.983)	(0.958)	(0.824)	(0.858)
D2: Liberal Trade Policy	-0.01	-0.01	-0.003	-0.003	-0.004	-0.009	0.014
	(0.334)	(0.334)	(0.082)	(0.083)	(0.110)	(0.263)	(0.389)
D3: Customs Procedures	0.029	0.029	0.037	0.037	0.038	0.038	0.033
	(1.185)	(1.186)	(1.457)	(1.451)	(1.483)	(1.472)	(1.216)
D4: Local Content	0.047	0.047	0.05	0.049	0.052	0.044	0.056
	(1.777)*	(1.780)*	(1.848)*	(1.820)*	(1.935)*	(1.528)	(1.870)*
D5: Physical Infrastructure	-0.078	-0.078	-0.075	-0.075	-0.077	-0.074	-0.079
	(2.619)***	(2.618)***	(2.503)**	(2.500)**	(2.532)**	(2.370)**	(2.422)**
D6: ICTs	0.036	0.035	0.03	0.029	0.033	0.035	0.012
	(1.023)	(1.000)	(0.830)	(0.820)	(0.914)	(0.968)	(0.326)
D7: Utilities	0.028	0.028	0.023	0.024	0.02	0.021	0.035
	(0.894)	(0.878)	(0.729)	(0.755)	(0.617)	(0.625)	(1.019)
D8: Government Institution	-0.029	-0.029	-0.022	-0.021	-0.023	-0.018	-0.023
	(0.953)	(0.950)	(0.718)	(0.660)	(0.719)	(0.560)	(0.698)
D9: Financial System	0.061	0.061	0.059	0.058	0.054	0.055	0.082
	(1.703)*	(1.701)*	-1.64	-1.617	-1.511	-1.462	(2.127)**
D10: Legal System	-0.019	-0.019	-0.026	-0.026	-0.024	-0.016	-0.036
	(0.587)	(0.591)	(0.795)	(0.792)	(0.736)	(0.483)	(1.045)
D11: Protection of IPRs	0.019	0.019	0.016	0.017	0.018	0.014	0.015
	(0.690)	(0.691)	(0.602)	(0.615)	(0.668)	(0.498)	(0.496)
D12: Size of Local Markets	0.034	0.034	0.035	0.037	0.044	0.043	0.063
	(1.008)	(1.003)	(1.033)	(1.070)	(1.288)	(1.146)	(1.613)
D13: Access to Export Markets	0.031	0.031	0.036	0.033	0.033	0.043	0.038
	(1.060)	(1.061)	(1.207)	(1.111)	(1.105)	(1.314)	(1.138)
D14: Proximity of Suppliers	0.032	0.032	0.025	0.026	0.026	0.033	0.018
	(0.948)	(0.948)	(0.727)	(0.744)	(0.746)	(0.880)	(0.455)
D15: Request by Large Companies	-0.005	-0.005	0.001	0.002	-0.004	0.004	0.003
	(0.147)	(0.144)	(0.039)	(0.049)	(0.108)	(0.111)	(0.073)
D16: Lower Costs of Labor	-0.064	-0.064	-0.068	-0.068	-0.065	-0.064	-0.072
	(2.393)**	(2.389)**	(2.576)***	(2.569)**	(2.439)**	(2.279)**	(2.497)**
D17: Skilled Labor	0.002	0.002	-0.001	-0.001	0.004	0.002	-0.025
	(0.068)	(0.070)	(0.023)	(0.025)	(0.135)	(0.070)	(0.778)
D18: Synergy	0.013	0.013	0.012	0.012	0.022	0.007	-0.004
	(0.424)	(0.423)	(0.373)	(0.380)	(0.695)	(0.219)	(0.113)
D19: Cutting-Edge Technology	-0.04	-0.04	-0.042	-0.042	-0.048	-0.051	-0.035
	(1.174)	(1.175)	(1.220)	(1.225)	(1.393)	(1.443)	(0.969)
D20: Living Conditions	0.05	0.049	0.047	0.047	0.043	0.044	0.061
	(1.625)	(1.624)	(1.505)	(1.512)	(1.366)	(1.381)	(1.861)*
Manufacturing		-0.004	0.008	0.006	-0.003	0.003	-0.048
		(0.060)	(0.127)	(0.098)	(0.051)	(0.041)	(0.694)
Multinationals			-0.158	-0.161	-0.194	-0.142	-0.206
			(2.405)**	(2.429)**	(2.851)***	(1.937)*	(2.713)***
Exporters				0.026	0.031	0.038	0.047
				(0.332)	(0.410)	(0.471)	(0.573)
Full-time Employees					Yes		
Total Assets (US$)						Yes	
Paid-up Capital (US$)							Yes
Observations	292	292	292	292	291	274	261

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

Table 22: Results: Technical Cooperation with Local University or R&D Institute (Restricted Sample)

	Pool (three countries)								
	Non Multinationals			Multinationals			Non Exporters		
Sample Restriction	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Probit Regression (Marginal Effects)	Dependent: Technical cooperation with local univeristy or R&D insitutes =1, otherwise 0								
D1: Tax Incentives	0.002	0.001	-0.001	0.098	0.08	0.093	0.018	0.018	0.019
	(0.057)	(0.019)	(0.037)	(1.797)*	(1.424)	(1.575)	(0.567)	(0.577)	(0.612)
D2: Liberal Trade Policy	0.008	0.008	0.01	0.004	0.013	0.012	-0.026	-0.026	-0.027
	(0.187)	(0.182)	(0.233)	(0.070)	(0.212)	(0.189)	(0.692)	(0.693)	(0.732)
D3: Customs Procedures	0.058	0.059	0.061	0.006	0.019	0.009	0.036	0.035	0.036
	(1.784)*	(1.805)*	(1.842)*	(0.128)	(0.410)	(0.216)	(1.231)	(1.216)	(1.239)
D4: Local Content	0.087	0.086	0.09	-0.083	-0.09	-0.089	0.053	0.052	0.055
	(2.765)***	(2.723)***	(2.816)***	(1.324)	(1.401)	(1.493)	(1.651)*	-1.644	(1.729)*
D5: Physical Infrastructure	-0.076	-0.079	-0.085	-0.058	-0.07	-0.048	-0.074	-0.074	-0.076
	(2.164)**	(2.258)**	(2.396)**	(1.022)	(1.238)	(0.891)	(1.983)**	(1.988)**	(2.032)**
D6: ICTs	-0.006	0.001	0.002	0.105	0.094	0.106	0.013	0.014	0.017
	(0.135)	(0.013)	(0.043)	(1.609)	(1.460)	(1.602)	(0.333)	(0.346)	(0.419)
D7: Utilities	0.019	0.013	0.011	0.071	0.087	0.066	0.061	0.06	0.057
	(0.517)	(0.327)	(0.288)	(1.129)	(1.331)	(1.042)	(1.692)*	(1.600)	(1.508)
D8: Government Institution	-0.049	-0.047	-0.041	-0.047	-0.031	-0.049	-0.019	-0.019	-0.017
	(1.215)	(1.168)	(0.995)	(1.022)	(0.710)	(1.022)	(0.519)	(0.517)	(0.473)
D9: Financial System	0.055	0.056	0.048	0.135	0.13	0.153	0.051	0.051	0.045
	(1.166)	(1.180)	(1.006)	(1.968)**	(1.951)*	(2.278)**	(1.217)	(1.212)	(1.070)
D10: Legal System	0.014	0.015	0.013	-0.152	-0.16	-0.164	-0.005	-0.005	-0.005
	(0.324)	(0.372)	(0.321)	(2.385)**	(2.520)**	(2.704)***	(0.135)	(0.128)	(0.147)
D11: Protection of IPRs	0.028	0.024	0.026	-0.026	-0.054	-0.076	0	0	0.001
	(0.842)	(0.735)	(0.781)	(0.367)	(0.744)	(1.057)	(0.009)	(0.013)	(0.030)
D12: Size of Local Markets	0.031	0.037	0.046	0.043	0.059	0.079	0	0	0.007
	(0.750)	(0.896)	(1.094)	(0.650)	(0.894)	(1.272)	(0.010)	(0.011)	(0.168)
D13: Access to Export Markets	0.062	0.057	0.053	0.024	0.028	0.028	0.048	0.048	0.046
	(1.602)	(1.472)	(1.378)	(0.445)	(0.518)	(0.526)	(1.394)	(1.368)	(1.324)
D14: Proximity of Suppliers	0.018	0.02	0.02	0.003	0.014	0.011	0.012	0.012	0.013
	(0.438)	(0.488)	(0.477)	(0.039)	(0.200)	(0.148)	(0.313)	(0.317)	(0.333)
D15: Request by Large Companies	-0.02	-0.019	-0.017	0.076	0.092	0.079	0.045	0.045	0.043
	(0.429)	(0.405)	(0.368)	(1.040)	(1.212)	(1.053)	(1.055)	(1.044)	(1.010)
D16: Lower Costs of Labor	-0.053	-0.053	-0.051	-0.109	-0.089	-0.085	-0.095	-0.096	-0.093
	(1.510)	(1.549)	(1.472)	(2.468)**	(1.966)**	(1.702)*	(2.719)***	(2.749)***	(2.657)***
D17: Skilled Labor	-0.008	-0.01	-0.01	0.011	0.002	0.015	0.023	0.023	0.024
	(0.218)	(0.271)	(0.275)	(0.178)	(0.031)	(0.231)	(0.698)	(0.693)	(0.723)
D18: Synergy	0.024	0.024	0.018	-0.021	-0.008	0.047	-0.021	-0.021	-0.021
	(0.626)	(0.610)	(0.457)	(0.396)	(0.158)	(0.776)	(0.596)	(0.596)	(0.592)
D19: Cutting-Edge Technology	-0.045	-0.044	-0.042	-0.006	-0.013	-0.051	-0.063	-0.063	-0.062
	(1.101)	(1.059)	(1.015)	(0.089)	(0.208)	(0.794)	(1.605)	(1.594)	(1.586)
D20: Living Conditions	0.051	0.053	0.055	0.082	0.064	0.041	0.065	0.065	0.066
	(1.331)	(1.389)	(1.445)	(1.472)	(1.104)	(0.714)	(1.779)*	(1.792)*	(1.801)*
Manufacturing		0.087	0.085		-0.166	-0.185		0.011	0.016
		(1.071)	(1.029)		(1.413)	(1.538)		(0.148)	(0.208)
Full-time Employees			Yes			Yes			Yes
Observations	185	185	184	107	107	107	220	220	219

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

5.6. Technology Transfer from or Cooperation with Local Companies

Let us examine the factors promoting technology transfer from local firms in the full-sample model. According to Table 23, “Tax incentives,” “Customs procedures,” and “Multinationals” have negative marginal effects, while “Liberal trade policy,” “Access to export market,” and “Living conditions” have positive marginal effects. Among these, a one-point increase of D-score for “Living conditions” increases the probability of technical transfer from local firms by 11 percentage points. This suggests that technology transfer from local firms will be promoted by encouraging firms to be more localized. The negative sign for “Multinationals” implies again the less possibility of technological cooperation between MNCs and local firms.

Even after dividing the complete data set into three according to firm-level attributes, “Access to export market” and “Living conditions” have the same signs as the full-sample model. “Tax incentives” is not significant for MNCs; however, “Customs procedures” and “Liberal trade policy” are significant only for MNCs and non-exporters, respectively. “Size of local market” has a significant impact on technology transfer from local firms to non-exporters. The probability of linkage for technological cooperation between MNCs in the “Manufacturing” sector is at least 30 percent less than in other sectors.

Table 23: Results: Technology Transfer from Local Companies (Full-sample)

	Pool (three countries)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Probit Regression (Marginal Effects)	pendent: Technology transfer from or cooperation with local companies =1, otherwis						
D1: Tax Incentives	-0.054	-0.055	-0.059	-0.055	-0.058	-0.055	-0.048
	(2.044)**	(2.049)**	(2.157)**	(2.035)**	(2.115)**	(1.972)**	(1.662)*
D2: Liberal Trade Policy	0.064	0.064	0.072	0.072	0.072	0.082	0.071
	(1.991)**	(1.978)**	(2.216)**	(2.189)**	(2.210)**	(2.349)**	(2.005)**
D3: Customs Procedures	-0.069	-0.067	-0.062	-0.061	-0.062	-0.055	-0.061
	(2.545)**	(2.498)**	(2.318)**	(2.301)**	(2.326)**	(2.011)**	(2.115)**
D4: Local Content	0.001	0.004	0.006	0.007	0.007	0	-0.002
	(0.055)	(0.159)	(0.213)	(0.269)	(0.268)	(0.014)	(0.085)
D5: Physical Infrastructure	-0.008	-0.01	-0.007	-0.007	-0.007	-0.005	0.01
	(0.259)	(0.345)	(0.224)	(0.231)	(0.224)	(0.168)	(0.321)
D6: ICTs	0.055	0.047	0.044	0.045	0.044	0.042	0.017
	(1.527)	(1.300)	(1.211)	(1.255)	(1.212)	(1.156)	(0.456)
D7: Utilities	-0.023	-0.012	-0.017	-0.019	-0.018	-0.016	-0.012
	(0.740)	(0.361)	(0.523)	(0.593)	(0.550)	(0.479)	(0.334)
D8: Government Institution	-0.01	-0.008	-0.003	-0.009	-0.014	-0.007	-0.018
	(0.321)	(0.247)	(0.107)	(0.276)	(0.443)	(0.213)	(0.561)
D9: Financial System	-0.002	-0.005	-0.007	-0.004	0.003	0.007	0.011
	(0.051)	(0.122)	(0.187)	(0.108)	(0.067)	(0.181)	(0.263)
D10: Legal System	0.002	-0.002	-0.007	-0.008	-0.005	-0.014	-0.006
	(0.057)	(0.070)	(0.199)	(0.217)	(0.132)	(0.392)	(0.159)
D11: Protection of IPRs	0.015	0.016	0.016	0.014	0.014	0.011	0.027
	(0.542)	(0.568)	(0.552)	(0.502)	(0.496)	(0.371)	(0.905)
D12: Size of Local Markets	-0.039	-0.044	-0.043	-0.048	-0.05	-0.062	-0.074
	(1.083)	(1.211)	(1.179)	(1.300)	(1.362)	(1.560)	(1.761)*
D13: Access to Export Markets	0.082	0.087	0.091	0.098	0.1	0.095	0.106
	(2.726)***	(2.861)***	(2.982)***	(3.128)***	(3.211)***	(2.808)***	(3.103)***
D14: Proximity of Suppliers	0.015	0.016	0.01	0.007	0.008	0.026	0.038
	(0.418)	(0.449)	(0.295)	(0.208)	(0.218)	(0.690)	(0.963)
D15: Request by Large Companies	-0.025	-0.021	-0.019	-0.019	-0.025	-0.03	-0.029
	(0.656)	(0.567)	(0.507)	(0.519)	(0.659)	(0.775)	(0.720)
D16: Lower Costs of Labor	-0.024	-0.02	-0.022	-0.022	-0.021	-0.019	-0.031
	(0.911)	(0.756)	(0.812)	(0.821)	(0.784)	(0.656)	(1.095)
D17: Skilled Labor	-0.001	0	-0.004	-0.004	-0.003	0.004	-0.009
	(0.021)	(0.003)	(0.136)	(0.120)	(0.101)	(0.132)	(0.278)
D18: Synergy	-0.012	-0.014	-0.016	-0.017	-0.009	-0.023	-0.019
	(0.382)	(0.440)	(0.477)	(0.529)	(0.273)	(0.643)	(0.537)
D19: Cutting-Edge Technology	0.022	0.018	0.017	0.017	0.014	0.001	0.004
	(0.602)	(0.505)	(0.458)	(0.449)	(0.381)	(0.038)	(0.106)
D20: Living Conditions	0.115	0.112	0.112	0.11	0.106	0.115	0.111
	(3.366)***	(3.293)***	(3.239)***	(3.206)***	(3.083)***	(3.266)***	(3.110)***
Manufacturing		-0.104	-0.09	-0.085	-0.099	-0.07	-0.113
		(1.592)	(1.371)	(1.274)	(1.470)	(0.988)	(1.608)
Multinationals			-0.124	-0.114	-0.134	-0.042	-0.085
			(1.881)*	(1.721)*	(1.934)*	-0.585	-1.158
Exporters				-0.078	-0.082	-0.069	-0.082
				(1.008)	(1.055)	(0.867)	(1.008)
Full-time Employees					Yes		
Total Assets (US$)						Yes	
Paid-up Capital (US$)							Yes
Observations	293	293	293	293	292	275	262

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

Table 24: Results: Technology Transfer from Local Companies (Restricted Sample)

	Pool (three countries)								
	Non Multinationals			Multinationals			Non Exporters		
Sample Restriction	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Probit Regression (Marginal Effects)	Dependent: Technology transfer from or cooperation with local companies =1, otherwise 0								
D1: Tax Incentives	-0.085	-0.087	-0.087	0.045	0.002	0.008	-0.091	-0.093	-0.101
	(2.643)***	(2.694)***	(2.643)***	(0.803)	(0.037)	(0.136)	(3.009)***	(3.053)***	(3.279)***
D2: Liberal Trade Policy	0.062	0.062	0.062	0.055	0.079	0.082	0.069	0.068	0.063
	(1.541)	(1.544)	(1.543)	(0.820)	(1.164)	(1.162)	(1.854)*	(1.826)*	(1.678)*
D3: Customs Procedures	-0.041	-0.042	-0.044	-0.144	-0.12	-0.129	-0.043	-0.04	-0.04
	(1.231)	(1.246)	(1.287)	(2.858)***	(2.367)**	(2.574)**	(1.411)	(1.310)	(1.307)
D4: Local Content	0.026	0.025	0.022	-0.057	-0.078	-0.073	0.011	0.013	0.02
	(0.877)	(0.842)	(0.724)	(0.908)	(1.208)	(1.137)	(0.357)	(0.435)	(0.644)
D5: Physical Infrastructure	-0.007	-0.007	-0.002	0.001	-0.017	-0.005	-0.008	-0.007	-0.008
	(0.198)	(0.191)	(0.059)	(0.016)	(0.275)	(0.085)	(0.210)	(0.197)	(0.210)
D6: ICTs	0.049	0.053	0.053	0.048	0.025	0.032	0.037	0.03	0.028
	(1.113)	(1.181)	(1.169)	(0.685)	(0.377)	(0.469)	(0.894)	(0.712)	(0.660)
D7: Utilities	-0.023	-0.029	-0.027	-0.013	0.022	0.011	0	0.01	0.011
	(0.631)	(0.743)	(0.695)	(0.205)	(0.325)	(0.156)	0.000	(0.261)	(0.305)
D8: Government Institution	-0.021	-0.019	-0.026	-0.034	-0.001	-0.008	-0.013	-0.014	-0.026
	(0.521)	(0.474)	(0.651)	(0.647)	(0.021)	(0.150)	(0.373)	(0.392)	(0.679)
D9: Financial System	-0.009	-0.008	0.001	0.037	0.022	0.026	-0.02	-0.021	-0.009
	(0.204)	(0.184)	(0.025)	(0.467)	(0.273)	(0.327)	(0.471)	(0.470)	(0.202)
D10: Legal System	0.017	0.018	0.02	-0.063	-0.08	-0.076	-0.008	-0.009	-0.001
	(0.419)	(0.424)	(0.488)	(0.909)	(1.141)	(1.100)	(0.196)	(0.213)	(0.015)
D11: Protection of IPRs	-0.002	-0.004	-0.006	0.112	0.064	0.056	-0.006	-0.004	-0.006
	(0.074)	(0.127)	(0.187)	(1.436)	(0.793)	(0.679)	(0.173)	(0.116)	(0.170)
D12: Size of Local Markets	-0.037	-0.034	-0.043	-0.073	-0.053	-0.045	-0.067	-0.074	-0.079
	(0.880)	(0.802)	(1.008)	(0.977)	(0.686)	(0.566)	(1.620)	(1.755)*	(1.839)*
D13: Access to Export Markets	0.105	0.103	0.107	0.103	0.119	0.117	0.084	0.09	0.096
	(2.896)***	(2.797)***	(2.886)***	(1.620)	(1.880)*	(1.864)*	(2.317)**	(2.465)**	(2.632)***
D14: Proximity of Suppliers	0.043	0.043	0.043	-0.108	-0.087	-0.09	0.001	0.001	0.001
	(0.957)	(0.959)	(0.943)	(1.440)	(1.145)	(1.159)	(0.021)	(0.013)	(0.020)
D15: Request by Large Companies	-0.057	-0.058	-0.06	0.03	0.058	0.048	-0.009	-0.006	-0.014
	(1.253)	(1.262)	(1.319)	(0.434)	(0.803)	(0.643)	(0.206)	(0.137)	(0.326)
D16: Lower Costs of Labor	0.008	0.008	0.006	-0.095	-0.052	-0.05	-0.05	-0.046	-0.041
	(0.237)	(0.221)	(0.185)	(1.719)*	(0.928)	(0.888)	(1.452)	(1.341)	(1.151)
D17: Skilled Labor	0.004	0.003	0.002	-0.008	-0.038	-0.037	0.017	0.019	0.019
	(0.132)	(0.087)	(0.067)	(0.123)	(0.569)	(0.543)	(0.491)	(0.538)	(0.547)
D18: Synergy	0.017	0.018	0.023	-0.096	-0.078	-0.048	-0.033	-0.033	-0.021
	(0.391)	(0.416)	(0.552)	(1.717)*	(1.408)	(0.739)	(0.855)	(0.847)	(0.541)
D19: Cutting-Edge Technology	0.02	0.022	0.02	0.034	0.03	0.008	0.026	0.022	0.023
	(0.472)	(0.519)	(0.472)	(0.472)	(0.388)	(0.100)	(0.619)	(0.522)	(0.539)
D20: Living Conditions	0.126	0.127	0.125	0.151	0.116	0.11	0.154	0.152	0.148
	(3.052)***	(3.046)***	(3.034)***	(2.313)**	(1.685)*	-1.583	(3.787)***	(3.749)***	(3.625)***
Manufacturing		0.057	0.056		-0.333	-0.341		-0.103	-0.132
		(0.692)	(0.665)		(2.469)**	(2.525)**		(1.320)	(1.675)*
Full-time Employees			Yes			Yes			Yes
Observations	186	186	185	107	107	107	221	221	220

Note: Robust z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: ERIA Research Project Mail Survey 2007.

6. SUMMARY AND POLICY IMPLICATIONS

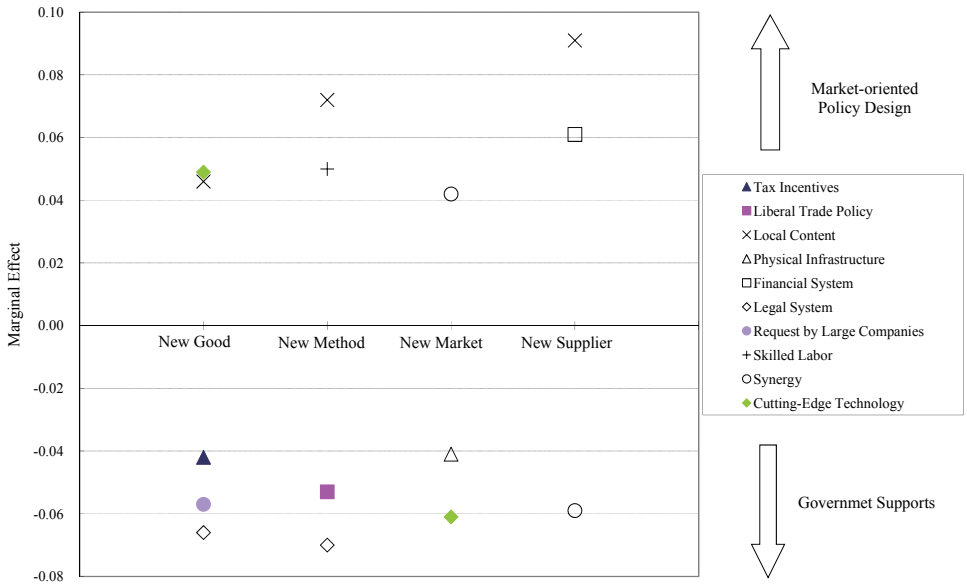
6.1. Stimulating Factors for Innovation

We show the ways fostering innovation based on empirical results. Let us first summarize the empirical results of the full-sample models. Figure 2 illustrates the significant marginal effects for four categories of innovation, which are obtained from the estimations (3) in Tables 5, 7, 9, and 11 as an experiment. In total, 10 of 20 D-scores are significant in at least one of the four innovation models. This enables to simplify interpretation on the result of estimations. Based on Figure 2, it is difficult to identify a common factor that explains all four categories of upgrading. Some variables are positive in a model, but they are not significant or negative in other models. Among these 10 factors, "local content requirements" has significantly positive marginal effects on all but the opening of new market. Another important result excluded from Figure 2 is that the manufacturing sector tends to result in a higher rate of innovations than other sectors.

Figure 2 also reveals policy directions and priorities obvious at a glance. Policy priorities should be placed on variables with larger absolute values of marginal effect, if we do not consider costs of policy implementation. In the figure, these are "Local content requirements" or "Rules of origin" and "Legal system." Policy directions depend on the signs of marginal effect. A negative marginal effect of a variable suggests government support or intervention to increase the level of satisfaction with the variable because it will result in increasing the possibility of generating innovation. This is a widely accepted idea on industrial or cluster policy. On the other hand, a positive marginal effect of a variable suggests the importance of business environments and

market circumstances, notably stiffer market competition fueled by market forces. Appropriate institutional arrangements or mechanism to encourage market competition is a key policy issue, although this may not necessarily lead to deregulation.

Figure 2: Marginal Effects on Innovations (Full-sample)



Source: ERIA Research Project Mail Survey 2007.

The results of the estimation of sample restriction models provide detailed information indispensable to examine policy issues from a more practical point of view. Figure 3 presents in a graph the significant marginal effects for MNCs and local firms (non-MNCs) of the estimations (3) in Tables 6, 8, 10, and 12. The design of these figures is almost the same as in Figure 2. A key finding is that legal system has a negative impact on all innovation types carried out by MNCs. Another is that significantly positive coefficients are conspicuous especially in the figure for local firms, so that we expect market competition as one of the key driving forces for innovation.

However, promoting factors are different among the types of upgrading and among capital structure. That there are significant differences in the probability of innovation between MNCs and non MNCs is a very important finding.

6.2. Stimulating Factors for Accessing Sources of New Technologies or Information

We derive ways in finding sources of new technologies or information based on empirical results. Let us first summarize the results of the full-sample models of sources of new technologies or information. It is obvious from Figure 4, which is developed from the estimations (5) in Tables 13, 15, 17, 19, 21, and 23, that only one or two variables are significant for each model except technology transfers from local universities or R&D institute and from local firms. On the other hand, the marginal effects of "Multinationals" are relatively robust although the estimated coefficients are not presented in Figure 4. The estimated signs for the dummy variable for MNCs are significantly positive in the models of technology transfers from MNCs and foreign agencies, and negative in the other models. This implies that networks for technology transfer between MNCs and foreign bodies and those between local firms and local bodies separately co-exist in a country.

The results of the estimation (3) of sample restriction models are depicted in Figure 5, which is based on the significant marginal effects for MNCs and local firms (non-MNCs). This picture clarifies the complete differences in factors affecting access to new technologies between MNCs and local firms. Only two variables are identified as common. One is "Financial system" for the model of technology transfer from foreign agencies and the other is "Access to export market" for the model of technology transfer from local firms.

Figure 3: Marginal Effects on Innovations (Sample-restricted)

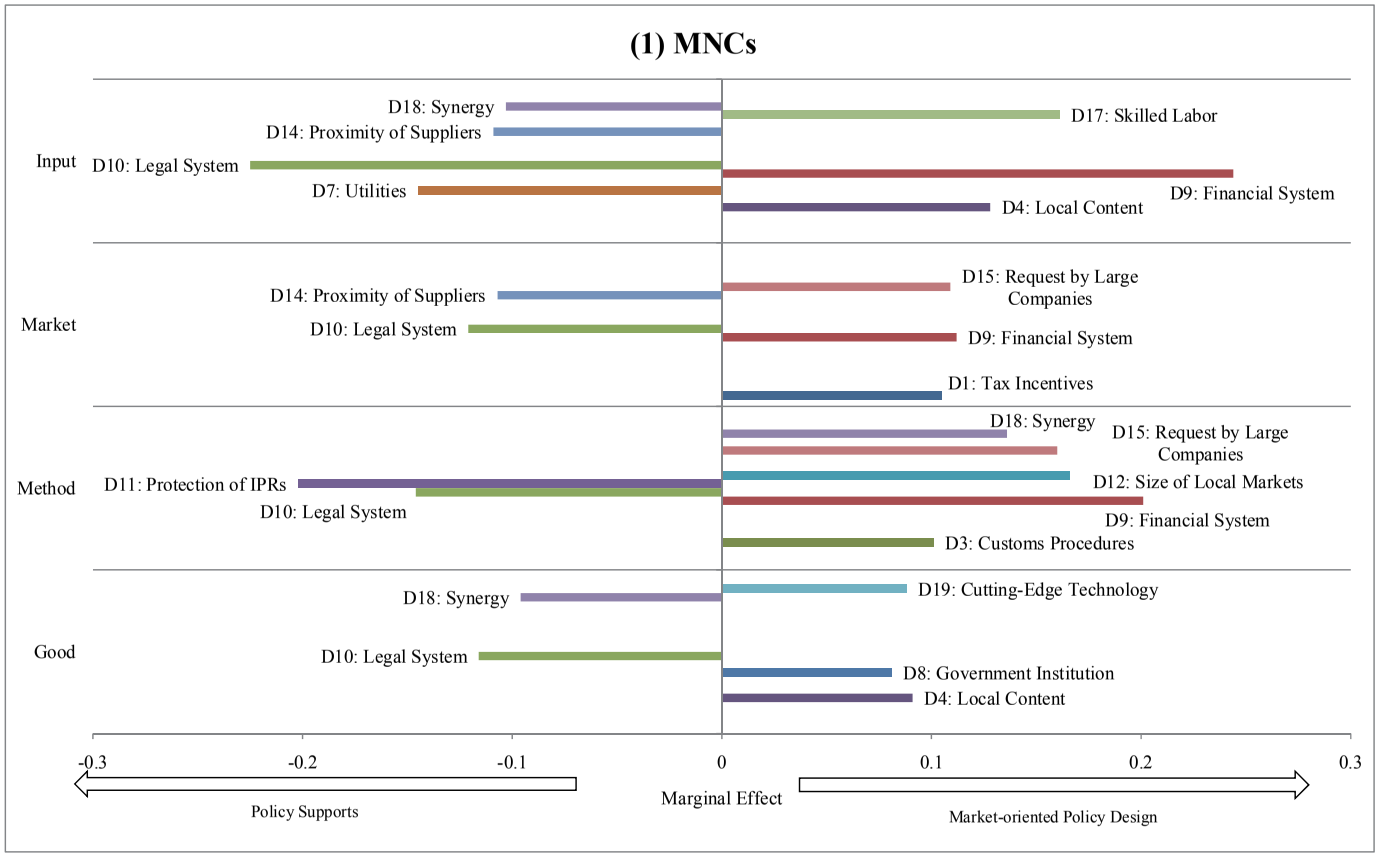
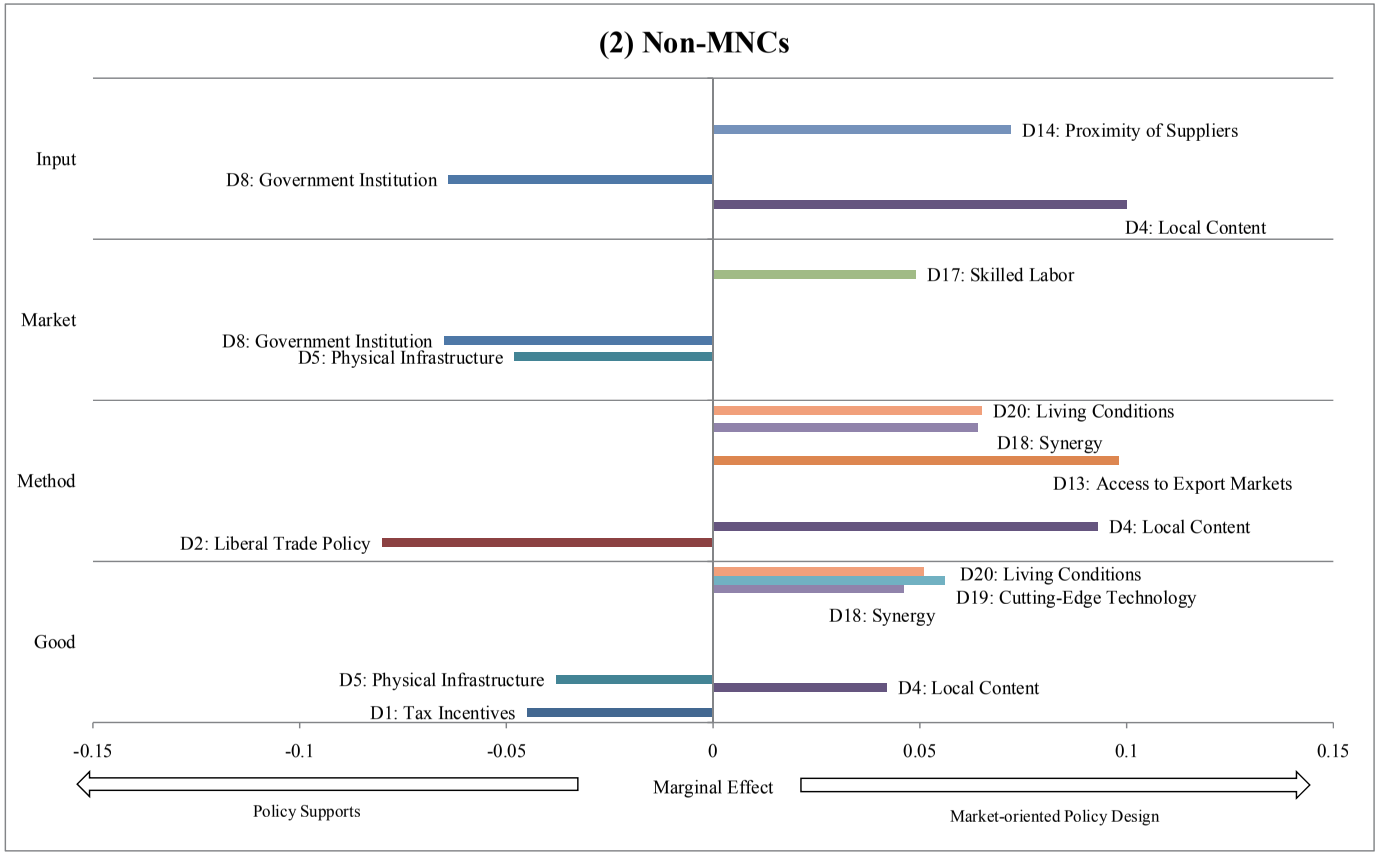
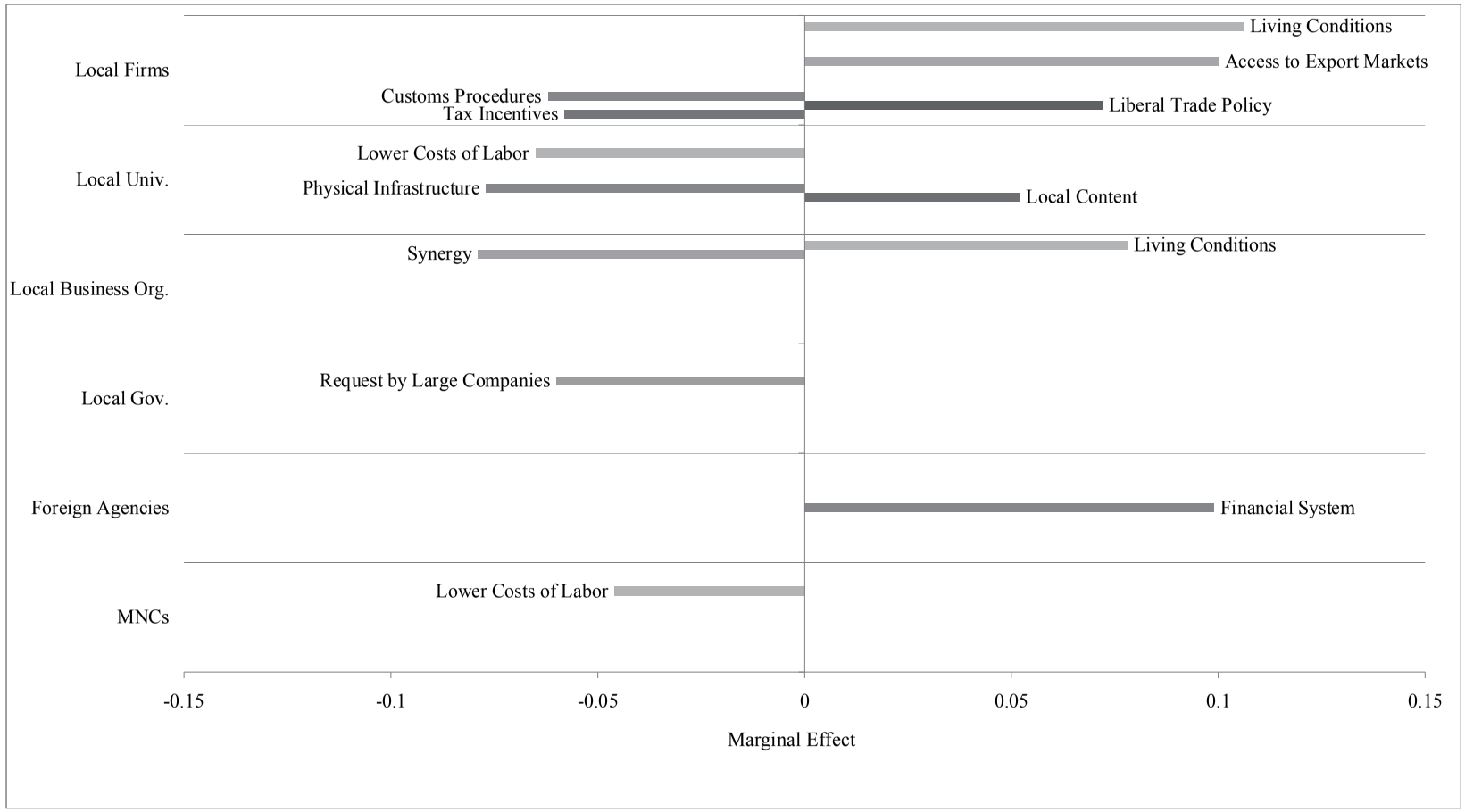


Figure 3 (continued)



Source: ERIA Research Project Mail Survey 2007.

Figure 4: Marginal Effects on Sources of New Technologies (Full-sample)



Note: The coefficient on "Low-cost of labor" of technology transfer from MNCs is not significant.

Source: ERIA Research Project Mail Survey 2007.

Figure 5: Marginal Effects on Sources of New Technologies (Sample-restricted)

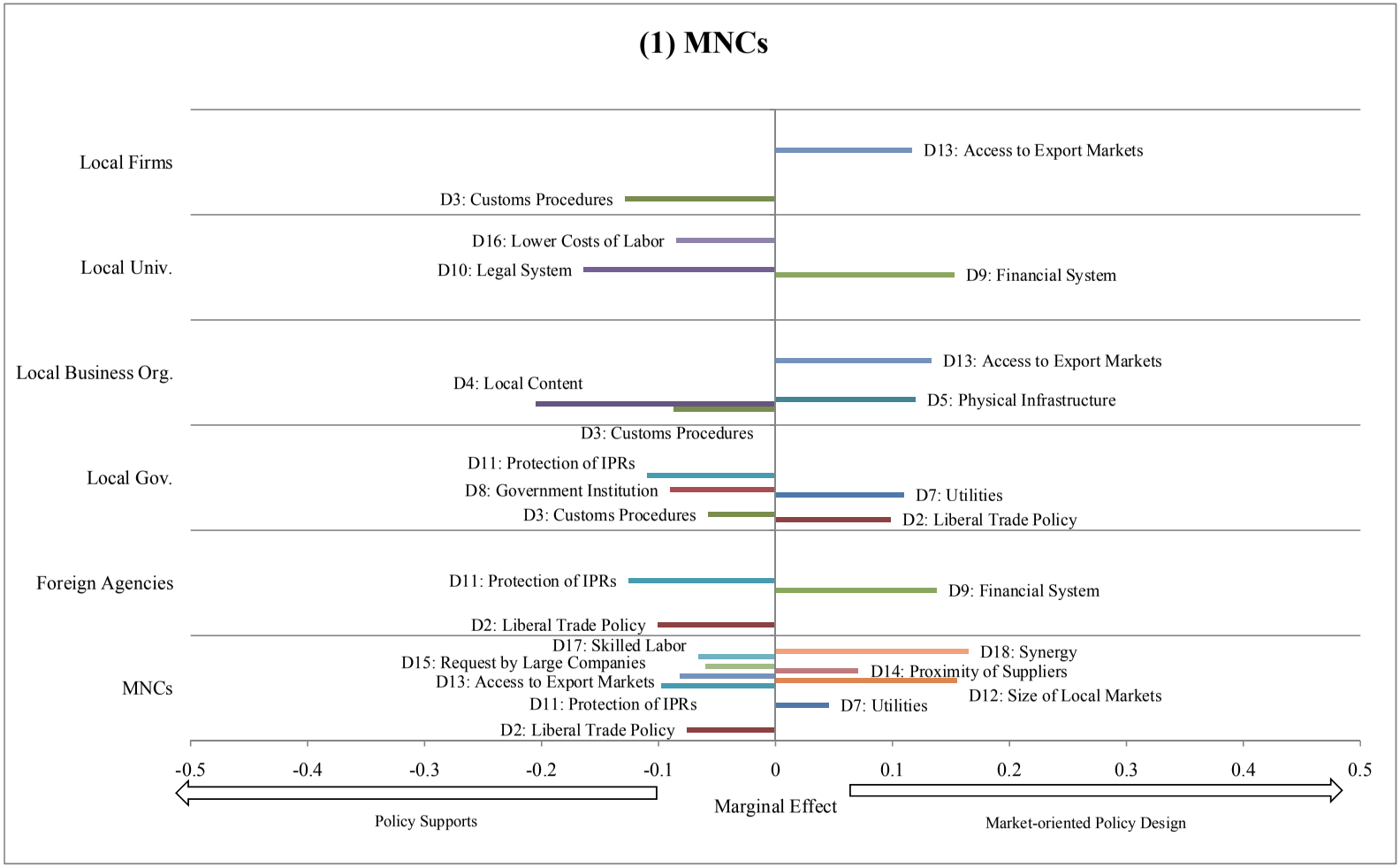
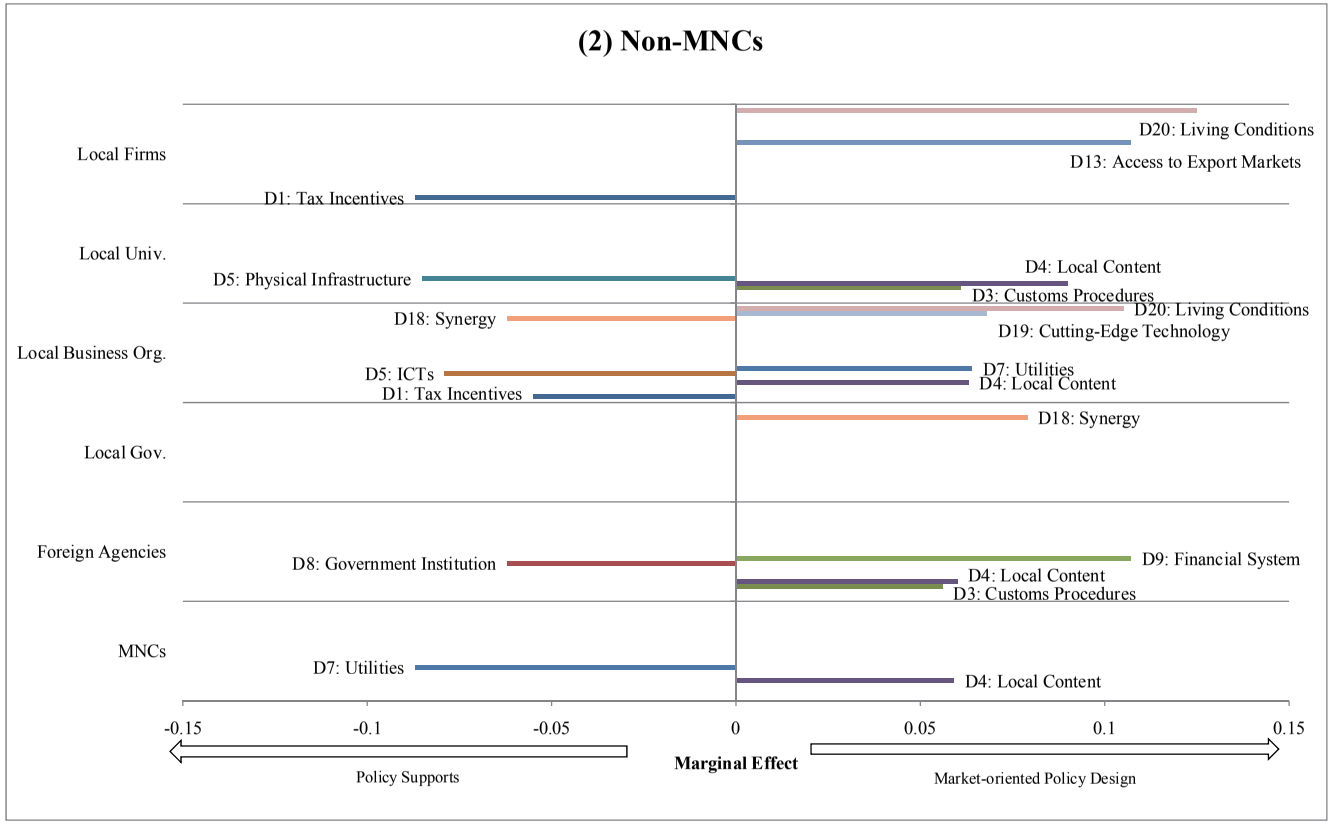


Figure 5 (continued)



Source: ERIA Research Project Mail Survey 2007.

6.3. Policy Implications

In the section of empirical results, we analyze the following specific issues: (1) factors promoting access to sources of new technologies and information and industrial upgrading and (2) the effects of these factors on emergence of product and process innovation in each establishment and linkage between related parties. We are going to explore ways to tighten the causal relationship between industrial agglomeration and fostering innovation systems using evidence-based policymaking based on economic theory and empirical results.

As pointed out by Duranton (2008), it will be difficult for local firms to manipulate the factors that affect the formation of industrial cluster. It will not be easy as well for local governors to manipulate the factors that affect the upgrading of industrial cluster. It is very difficult to find common factors consistently affecting innovations and sources of new technologies by MNCs and local firms. According to the results of the estimations, it is almost impossible for a government to achieve both innovation and business linkages for technology transfer simultaneously through a policy instrument, although the creation of business linkages is not a goal of the policy.

If we pay attention to the finding that MNCs and local firms seem to have separate networks, we can get another perspective. Tables 25 and 26 are tabulated results of estimation (3) of both innovation and technology source models, respectively. We can find several combinations of innovation and sources of new technologies with the same signs of marginal effects for a specific D-score. For example, in Table 26, a one-point decrease of D-score for tax incentives increases the possibilities of introduction of new goods, technical cooperation with local business organization, and technology transfer

from local firms by local firms. This means that by defining policy targets by economic entities, it seems possible for governments to design and implement cluster policies more cost effectively and efficiently. However, the policy issue related to linkage between MNCs and local firms to encourage technology transfer from MNCs is remained.

7. CONCLUDIND REMARKS

We examine factors affecting decisionmaking on innovation at the firm level. The pooled data, composed of sub-data sets of Indonesia, Thailand, and Viet Nam, are used for these analyses. Specifically, four categories of industrial upgrading or innovation are defined according to Schumpeter's concept, and access to different sources of new technologies and information necessary for upgrading are regressed on a "D-score," which is a simple difference between these degrees of importance and of satisfaction with factors promoting industrial agglomeration and innovation.

From these analyses, it can be inferred that MNCs tend to transfer technologies to other MNCs but have less technical cooperation or assistance from local governments in comparison with local companies. MNCs that are not satisfied with the local financial system tend to receive technical assistance from foreign agencies including official development assistance (ODA). However, those who have problems with physical infrastructure tend to depend on technical cooperation or assistance from local business organizations that are familiar with the local situation.

Table 25: Results: Multinational Companies (Restricted Sample: Estimation (3))

	MNCs									
	Innovation				Sources of New Technologies or Information					
Sample Restriction	Goods	Method	Market	Input	MNCs	Foreign Agencies	Local Gov.	Local Business Org.	Local Univ.	Local Firms
Probit Regression (Marginal Effects)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
D1: Tax Incentives			0.105							
D2: Liberal Trade Policy					-0.076	-0.101	0.099			
D3: Customs Procedures		0.101					-0.058	-0.087		-0.129
D4: Local Content	0.091			0.128				-0.205		
D5: Physical Infrastructure								0.120		
D6: ICTs										
D7: Utilities				-0.145	0.046		0.110			
D8: Government Institution	0.081						-0.090			
D9: Financial System		**0.201**	**0.112**	**0.244**		**0.138**			**0.153**	
D10: Legal System	**-0.116**	**-0.146**	**-0.121**	**-0.225**					**-0.164**	
D11: Protection of IPRs		**-0.202**			**-0.098**	**-0.126**	**-0.110**			
D12: Size of Local Markets		**0.166**			**0.155**					
D13: Access to Export Markets					-0.082			0.133		0.117
D14: Proximity of Suppliers			-0.107	-0.109	0.071					
D15: Request by Large Companies		0.160	0.109		-0.060					
D16: Lower Costs of Labor									-0.085	
D17: Skilled Labor				0.161	-0.066					
D18: Synergy	-0.096	**0.136**		-0.103	**0.165**					
D19: Cutting-Edge Technology	0.088									
D20: Living Conditions										
Manufacturing		0.231		0.439				-0.385		-0.341
Full-time Employees	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	113	113	113	113	108	107	107	106	107	107

Source: ERIA Research Project Mail Survey 2007.

Table 26: Results: Non-multinational/Local Companies (Restricted Sample: Estimation (3))

	non-MNCs									
Sample Restriction	Goods	Method	Market	Input	MNCs	Foreign Agencies	Local Gov.	Local Business Org.	Local Univ.	Local Firms
Probit Regression (Marginal Effects)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
D1: Tax Incentives	**-0.045**							**-0.055**		**-0.087**
D2: Liberal Trade Policy		-0.080								
D3: Customs Procedures						0.056			0.061	
D4: Local Content	**0.042**	**0.093**		**0.100**	**0.059**	**0.060**		**0.063**	**0.090**	
D5: Physical Infrastructure	**-0.038**		**-0.048**						**-0.085**	
D6: ICTs								-0.079		
D7: Utilities					-0.087			0.064		
D8: Government Institution			**-0.065**	**-0.064**		**-0.062**				
D9: Financial System						0.107				
D10: Legal System										
D11: Protection of IPRs										
D12: Size of Local Markets										
D13: Access to Export Markets		**0.098**								**0.107**
D14: Proximity of Suppliers				0.072						
D15: Request by Large Companies										
D16: Lower Costs of Labor										
D17: Skilled Labor			0.049							
D18: Synergy	**0.046**	**0.064**					**0.079**	-0.062		
D19: Cutting-Edge Technology	**0.056**							**0.068**		
D20: Living Conditions	**0.051**	**0.065**						**0.105**		**0.125**
Manufacturing	0.183			0.263						
Full-time Employees	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	200	199	199	199	185	185	185	185	184	185

Source: ERIA Research Project Mail Survey 2007.

On the other hand, local firms that face problems with infrastructure and financial system acquire technologies and information through technical assistance from foreign agencies. However, a well-designed government institutional infrastructure is an important factor for non-MNCs to encourage firms to receive technical assistances from foreign agencies. Technical cooperation or assistance from local universities or R&D institutes is also important for firms unsatisfied with the financial system.

These findings partly reflect the present situation of MNCs and non-MNCs having different networks to obtain new technologies and information. In other words, MNCs are carefully observing the capabilities of local firms before making a decision on whether to establish closer linkage with them.

Another key issue is that we have to show how to extend our approach to characterize counterfactual evidence using the estimated model to estimate the impacts of local public policy related to fostering industrial agglomeration on the emergence of innovation. This will enable us to have comparable characteristics of each industrial cluster and show alternative policy recommendations.

NOTE

[i] In the other models, in addition to the number of full-time employees, the current amounts of total assets and paid-up capital are included as control variables and most of them are not statistically significant.

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