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Determinants of Outward FDI for Thai Firms

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Abstract

Using firm-level data from the Thailand Productivity and Investment Climate Survey for 2004 and 2007, we study characteristics of Thai firms that make foreign direct investments. We investigate determinants of outward FDI decisions as well as outward FDI share in total investments. It is found that factors positively affecting outward FDI decisions are the firm's public company and exporting status, the number of plants and workers as well as age and foreign ownership. The only factor found to have a negative effect on outward FDI is the firm's fixed assets. As for the share of outward FDI in total investments, the only factor that positively affects it is export intensity. Surprisingly, we found that firms with their own brands and a higher number of products per worker tend to have a lower share of outward FDI.

Keywords: Firm Decisions, Firm-level Data, Outward FDI, Thailand

1. Introduction

The level of outward FDI from Thailand has increased dramatically in the last 20 years. As reported by the United Nations Conference on Trade and Development, the outward FDI stock of Thailand increased from less than 500 million dollars in 1990 to more than 25,000 million dollars in 2010. This surge in outward FDI was a result of globalization as well as free trade and investment liberalization initiated by the ASEAN Economic Community (AEC. In addition to these external factors, internal factors such as the rise of labor and other production costs also pushed local firms to relocate abroad and seek cheaper resources.

Thai economic development can be accurately depicted by the model of Lewis (1954. In the Lewis (1954 model, all workers initially work in the agricultural sector. As a result, there is labor surplus in the agricultural sector. Wages and labor productivity become low. As capital accumulates in an industrial sector, workers move from the agricultural to the industrial sector. The industry grows rapidly by exploiting the labor surplus. As the labor surplus depletes, wages increase and the growth of the industry can no longer rely on cheap labor. Therefore, firms seek alternative resources by importing foreign labor and investing abroad.

Inarguably, outward FDI is an important strategic tool for the future of Thai economic development. It is crucial to understand the motives and factors determining the decision to invest abroad. A plethora of outward FDI studies exist. Most focus on outward FDI from developed and newly industrialized economies to developing countries. For example, see van Hoesel (1999 and Matthews (2002. However, as pointed out by Pananond (2007, characteristics of outward FDI from developing countries and developed countries differ. In Thailand, there are few studies on outward FDI and its determinants. Most studies on Thai outward FDI either rely on aggregate-level data or case studies of a few large firms. Results from these studies, although valuable, have limited applicability to small and medium-sized firms.

This study employs secondary data from the Productivity and Investment Climate Surveys (PICS conducted by the World Bank. The surveys from 2004 and 2007 cover 1,255 and 1,043 firms, respectively. Unlike the

existing studies mentioned above, this study employs a large dataset of over 2,000 firms, including both small and large firms. Statistically, this sample is sufficiently large to represent the actual population of Thai firms in the surveyed industries. Using this dataset, we investigate determinants of outward FDI decisions and determinants of outward FDI share in the total investments of each firm.

The paper proceeds as follows: the next section reviews related literature. Section 3 provides data description and summary statistics. Section 4 reports regression results on outward FDI determinants. The last section offers conclusions.

2. Related Literature

Existing studies on FDI can be classified into two strands: international business and international economics literature. International business research investigates outward FDI from business perspectives. It focuses on why a firm invests abroad and what kind of benefits firms get from investment. On the other hand, international economists look at outward FDI from a larger economic perspective. Economic studies of FDI focus on how firm characteristics and market structure affects FDI and the mode of firm organization in the general equilibrium.

International Business Literature

amples of studies in international business include Dunning (1983a, b and Rugman (2001. In his seminal papers, Dunning (1983a, b proposed an OLI model. Under this model, there are three potential advantages for a firm to have outward FDI. The first advantage is to own certain special assets (O such as specific production knowledge or monopoly power. The second advantage is location-specific advantages. For example, investing abroad could bring cheap raw materials. The last advantage is internalization of ownership (I which brings benefits of controlling international production and prices. Similarly, Rugman (2001 classifies the motives of foreign direct investment into two main reasons. The first is to avoid limitations such as legal restrictions on financial services. The second is to seek trade and production opportunities.

International Economic Literature

Research in international economics focuses on how market structure and firm heterogeneity affects the mode of production and how firms choose locations. Old generation competitive-market models with homogenous firms based on the Hecksher-Olin model cannot explain the existence of foreign direct investment. Under these models, both exporting and investing abroad result in the same normal profit. Hence, firms have no incentive to invest abroad because investing abroad incurs higher fixed costs than does exporting.

To explain the existence of FDI in a general equilibrium model, Helpman, Melitz and Yeaple (2004) developed a monopolistic competition model with heterogeneous-productivity firms. In this model, each firm can choose one of three modes of productions: i) produces and sells domestically; ii) produces domestically and exports; iii) invests, produces and sells abroad (outward FDI). Different modes of production are associated with different fixed costs. These fixed costs results from tariff and non-tariff barriers and other costs of international trade.

The fixed cost of outward FDI is highest and the fixed cost of exporting is higher than that of domestic sale. The model predicts that firms with different productivity have different modes of production and sale. Firms with low productivity only produce and sell domestically. Firms with intermediate productivity produce domestically and export. Firms with high productivity invest and have production abroad. The model shows that the level of firm heterogeneity in each industry also affects the volume of export over outward FDI in that industry.

Helpman, Melitz and Yeaple (2004) also test the prediction of their model using data from American firms. Empirical results support the theoretical predictions. They found that heterogeneity of firm productivity in each industry positively affects export-outward FDI ratio in each industry. Import tariffs and the cost of international trade in each destination country also affect export-outward FDI ratio of that destination each industry.

Many studies, for example Bernard and Jensen (1999, 2004), Girma, Greenaway and Kneller (2004), Fryges (2004) and Pavcnik (2002), empirically test the relationship between exporting and firm productivity using firm-level

data from various countries. All these empirical studies show that exporters are more productive than non-exporters and confirm Helpman, Melitz and Yeaple (2004)'s prediction.

3. Data Description and Summary

This study employs secondary data from the Productivity and Investment Climate Surveys (PICS conducted by the World Bank in 2004 and 2007. The survey is a joint initiative between the Thailand Productivity Institute and the World Bank. Firms in the survey are from all seven regions of Thailand and involve nine industries, including food processing, textiles, clothing, automotive parts, electronics, electrical appliances, rubber and plastics, wood products and furniture, and machinery and equipment. The survey asks information about outward FDI. Examples of questions are if the firm has outward FDI, how much does the firm invest abroad in percentage of total investments? There are also questions on the benefits and obstacles for a firm from outward FDI. The questionnaire in the surveys of 2004 and 2007 are similar but not identical. The 2007 questionnaire has more detailed focus on outward FDI.

Table 1 shows the number of firms in the samples in 2004 and 2007 classified by industry. There are 1,255 and 1,043 samples in 2004 and 2007, respectively. In total, there are 2,298 samples. As mentioned in a report by the Thai Productivity Institute, there are about 100 firms participating in the two surveys. We could not identify these 100 firms by the information provided in the dataset. Therefore in this study we treat each sample in the two surveys as being from a different firm.

Table 1: Samples

Industry	2004 Survey		2007 Survey	
	# of firms	percent of total	# of firms	percent of total
Food Processing	151	12.03	108	10.35
Textile	165	13.15	149	14.29
Clothing	156	12.43	143	13.71
Automotive Parts	129	10.28	109	10.45
Electronics	163	12.99	65	6.23
Electrical Appliances	81	6.45	28	2.68
Rubber and Plastics	210	16.73	258	24.74
Wood products and Furniture	113	9.00	100	9.59
Machinery and Equipment	87	6.93	83	7.96
Total	1,255	100	1,043	100

Source: Authors' calculations

Table 2 reports the number of firms with outward FDI in each industry. Only 62 firms or 2.7 percent of 2,298 firms invest abroad. From the data in this table, firms with outward FDI do not highly concentrate in any specific industry. They are distributed in all nine industries. Industries with the most outward FDI firms are electronics (14 firms) and clothing (10). Industries with the least outward FDI firms are wooden products and furniture (2), and machinery and equipment (3). Table 3 reports the average percentage of outward FDI to the total investment of firms with outward FDI in each industry. As reported in the last row of the table, the average size of outward FDI relative to total investment of firms with outward FDI is 33.8 percent. In other words, firms with outward FDI spend one third of their investment abroad.

Table 2: Firms with Outward FDI

Industry	# of firms	Percent of Total
Food Processing	7	11.3
Textile	8	12.9
Clothing	10	16.1
Automotive Parts	7	11.3
Electronics	14	22.6
Electrical Appliances	5	8.1
Rubber and Plastics	6	9.7
Wooden products and Furniture	2	3.2
Machinery and Equipment	3	4.8
Total	62	100

Source: Authors' calculations

Table 3: Flow of Outward FDI/Total Investment

Industry	Outward FDI/Total Investment (%)
Food Processing	34.00
Textile	38.43
Clothing	33.50
Automotive Parts	20.71
Electronics	40.27
Electrical Appliances	30.00
Rubber and Plastics	72.60
Wood products and Furniture	10.00
Machinery and Equipment	25.00
Average	33.80

Source: Authors' calculations
Note: This table considers only firms with outward FDI.

Table 4: Types of Outward FDI

Industry/Types	Distribution Center	Sale Office	Plant
Food Processing	2	1	3
Textile	1	1	2
Clothing	0	0	3
Automotive Parts	2	2	4
Electronics	3	1	2
Electrical Appliances	0	1	1
Rubber and Plastics	1	0	3
Wood products and Furniture	0	0	2
Machinery and Equipment	1	1	1
All industries	10	7	21

Source: Authors' calculations
Note: The data on types of FDI is available only in 2007 survey.

Table 4 shows the number of outward firms in each industry classified by types of FDI from the survey in 2007. The survey categorizes outward FDI into the three following types: distribution centers, sale offices, and production plants. The most popular type of FDI is production plants. The last row of the table shows that 21 (55 %) of all 38 FDI projects is for production plants.

Table 5 shows the number of outward FDI firms categorized by destination countries. The most popular destination is China (33 %) followed by the U.S.A. (24 %), other Asian countries (17 %), other countries (22%), Africa (3 %) and Europe (0 %).

Table 5: Outward FDI Destination

Industry/Destinations	China	America	Africa	Asia	Europe	Others
Food Processing	3	1	0	2	0	0
Textile	3	3	0	1	0	2
Clothing	3	2	0	2	0	4
Automotive Parts	2	2	0	4	0	0
Electronics	7	4	1	1	0	0
Electrical Appliances	2	1	1	0	0	2
Rubber and Plastics	0	2	0	0	0	3
Wood products and Furniture	0	0	0	0	0	2
Machinery and Equipment	1	0	0	1	0	1
All industries (%)	21 (33.33)	15 (23.81)	2 (3.17)	11 (17.46)	0 (0.00)	14 (22.22)

Source: Authors' calculations

4. Determinants of Outward FDI: Regression Analysis

In this section, we investigate determinants of outward FDI. In section 4.1, we first broadly study the relationship between firm productivity and modes of production as proposed by Helpman, Melitz and Yeaple (2004. In sections 4.2 and 4.3, we study determinants of outward FDI decisions and outward FDI share in total investments.

4.1 Firms' Productivity and Modes o Production

In this section, we test the relationship of firm productivity and modes of production as predicted in Helpman, Melitz and Yeaple (2004's model. The model predicts that firm modes of production are determined by productivity as follows: firms with low productivity only produce and sell domestically. Firms with intermediate productivity produce domestically and export. Firms with high productivity sell and also invest abroad. To test whether this idea is consistent with our firm data, we classify our samples into three groups. The first groups include all firms. The second and the third groups respectively include all exporters and all firms with outward FDI.

We then find the average labor productivity of firms in each group. Labor productivity is used as a proxy for firm productivity. Theoretically, according to Helpman, Melitz and Yeaple (2004), the third group is most productive and the second group more productive than the first. Empirical results are shown in Table 6. Results support theoretical predictions only in the clothing, rubber and plastics and machinery industries. The last row shows the average of firm productivity for all firms in each group. Contrary to theoretical prediction, exporting firms are more productive than outward FDI firms. Our empirical results do not support Helpman, Melitz and Yeaple (2004)'s prediction.

Table 6: Labor Productivity and Modes of Production

Industries	All firms (million baht/worker)	Exporting Firms (million baht/worker)	Outward FDI Firms (million baht/worker)
Food Processing	2.04	1.74	1.18
Textile	1.10	1.38	0.84
Clothing	0.50	0.57	0.69
Automotive Parts	1.70	2.20	1.73
Electronics	1.85	2.20	1.53
Electrical Appliances	2.05	2.76	0.94
Rubber and Plastics	2.94	4.71	7.61
Furniture	0.63	0.61	0.78
Machinery and Equipment	1.03	1.27	1.34
All industries	1.63	2.05	1.80

Source: Authors' calculations

4.2 Determinants of Outward FDI Decision

We now investigate determinants of outward FDI decision. We define outward FDI decisions of a firm as a dummy variable whose value is 1 if the firm has outward FDI. We first study correlations of outward FDI decision and related variables. We separate variables related to FDI into the following five groups: firm characteristics, innovation, international trade, factors of production, and productivity.

Table 7 shows the correlation of each variable in the five groups with the outward FDI decision. Firm characteristics include public company status, number of domestic plants, number of workers, age, fixed assets and annual

income. Public company status is defined as a dummy variable whose value is 1 for a public company. All firm-characteristic variables have significant positive correlation with the outward FDI decision at a 90% confidence level.

The innovation group include own brands, number of products per worker, number of innovators per worker and government support. Own brands are a dummy variable with value equal to 1 for firms with own brand. Government support is also a dummy variable if the firm receives innovation support from the government. Only own brands and the number of products per worker have a significant positive relationship with outward FDI decision.

The international trade group includes exporter status, exports/total sale, imported input/total input and foreign ownership. All variables except exports/total sale have significant positive relationships with outward FDI decision. Surprisingly, exports/total sale and outward FDI decision have a negative relationship with it.

The last group includes the average education of workers; average annual income of workers; firm income/total workers; skilled workers/total workers; unskilled workers/total workers; professional workers/total workers; skilled worker wage/total wages; unskilled worker wage/total wages; professional worker wage/total wages; fixed asset/total wages; fixed asset per worker and profit/fixed assets. Most variables in this group have no significant relationship with outward FDI decision. The two variables in this group that have positive correlation with outward FDI decision are average education of workers and professional worker wage/total wages.

After investigating the correlation in Table 7, we try to find factors determining outward FDI decision using probit regression. To our knowledge, there is no well-accepted theoretical model for outward FDI. Without any good theoretical guidelines, we use the following statistical approach: from Table 7 we first select ten explanatory variables with minimum p-value for correlations with outward FDI decision. Then we estimate probit regression and drop the variable with the least significant coefficient (highest p-value) and re-estimate the new regression after dropping the variable. We repeat this process until we get the estimated equation in which all explanatory variables are significant at a 90-per-cent confidence level. Table 8 reports the last four estimation results. Equation (4) in table 8 is the last estimation in which all variables are significant. This equation shows that public company status, number of domestic plants, workers, exporter status, age and foreign ownership

positively affect outward FDI decision. On the other hand, the size of fixed assets has a negative effect on outward FDI decision. A potential explanation for this negative relationship is that firms with outward FDI are labor intensive firms with small fixed capital assets and these firms invest abroad to seek cheaper labor.

Table 7: Correlation of Outward FDI Decision and Other Variables

	Correlation	**p-value**
Firm's Characteristic		
Public Company Status	0.174	0.000
# of domestic plants	0.130	0.000
# of workers	0.130	0.000
Age	0.075	0.000
Fixed assets (million baht)	0.061	0.003
Annual income (million baht)	0.046	0.028
Innovation		
Own brands	0.038	0.068
# of products per worker	-0.021	0.319
# of innovators per worker	-0.092	0.001
Government support	0.002	1.000
International Trade		
Exporter status	0.110	0.000
Exports/total sale (%)	-0.059	0.055
Imported input/total input(%)	0.064	0.002
Foreign ownership(%)	0.054	0.009
Factors of Production and Productivity		
Average education of workers (year)	0.043	0.042
Average annual income of workers	0.029	0.159
Firm's income/total workers	0.018	0.379
killed workers/total workers	0.018	0.379
Unskilled workers/total workers	-0.022	0.301
Professional workers/total workers	0.031	0.131
Wage of skilled workers/total wages	0.023	0.277
Wage of unskilled workers/total wages	0.011	0.608
Wage of professional workers/total wages	0.039	0.064
Fixed asset/total wages	-0.003	0.896
Fixed asset per worker	0.029	0.160
Profit/fixed assets	-0.004	0.843

Source: Authors' calculations

Table 8: Determinant of Outward FDI Decision

Variables/Models	[1]	[2]	[3]	[4]
Public Company	0.0826*** [0.000]	0.0822*** [0.000]	0.0836*** [0.000]	0.0848*** [0.000]
Domestic Plants	0.00475** [0.033]	0.00477** [0.034]	0.00481** [0.033]	0.00464** [0.035]
Workers (1000 persons)	1.04e-05*** [0.002]	1.05e-05*** [0.002]	1.03e-05*** [0.003]	0.00936*** [0.006]
Exporter status	0.0200*** [0.002]	0.0209*** [0.001]	0.0222*** [0.001]	0.0222*** [0.001]
Age	0.000448* [0.069]	0.000441* [0.073]	0.000422* [0.082]	0.000440* [0.073]
Foreign ownership	0.000164* [0.069]	0.000164* [0.068]	0.000171* [0.052]	0.000160* [0.061]
Fixed assets (million baht)	-6.28* [0.060]	-6.33* [0.0585]	-6.14* [0.0670]	-7.95e-6** [0.007]
Exports/Sale	1.42E-05 [0.364]			
Annual income	0.00 [0.283]	0.00 [0.292]	0.00 [0.313]	
Worker education	0.00123 [0.342]	0.00118 [0.356]		
# of observations	2,265	2,265	2,292	2,292
Pseudo R-squared	0.141	0.141	0.137	0.135

Source: Authors' calculations

Note: Numbers in parentheses arep-values.The coefficients reported are marginal effects evaluated at means. *** p-value<0.01, ** p-value <0.05, * p-value <0.1

4.3 Determinants of Outward FDI Share in Total Investment

In the previous section, we investigate factors that affect firm outward FDI decision. Now we use a linear regression model to investigate factors that affect the percentage share of outward FDI in the total investments of each firm with positive outward FDI. Therefore, we only employ a sample of 62 outward FDI firms. Similar to the previous section, variables are first selected using correlation coefficients and their p-values. Table 9 reports the correlation of the percentage share of outward FDI in total investment with variables on firm characteristics, innovation, international trade, and factors of produc-

tions and productivity. The significant correlation coefficients are shown in italics. Only own brands and exports/total sales have significant correlation with outward FDI share.

The results of the linear regression on outward share in total investment are reported in Table 10. Column (3) in Table 10 shows the estimated equation in which all variables are significant. It shows that firms with own brands and many products per worker have lower outward FDI shares than other firms. This result implies that firms with high outward FDI share tend to be OEM firms without their own brands. In addition to having own brands and a number of products per worker, exports/total sales also have a positive impact on outward FDI shares in total investment.

Table 9: Correlation of Outward FDI Share and Other Variables

	Correlation	**p-value**
Firm's Characteristic		
Public Company Status	-0.198	0.123
# of domestic plants	0.202	0.115
# of workers	-0.005	0.972
Age	0.016	0.904
Fixed assets (million baht)	0.007	0.959
Annual income (million baht)	-0.108	0.403
Innovation		
Own brands	-0.321	0.011
# of products per worker	-0.188	0.144
# of innovators per worker	-0.019	0.905
Government support	-0.1264	0.3315
International Trade		
Exporter status	0.062	0.631
Exports/total sale (%)	0.320	0.011
Imported input/total input(%)	-0.050	0.719
Foreign ownership(%)	-0.150	0.244
Factors of Production and Productivity		
Average education of workers (year)	-0.100	0.443
Average annual income of workers	-0.102	0.430
Firm's income/total workers	-0.103	0.424
Skilled workers/total workers	-0.101	0.435

Table 9: Correlation of Outward FDI Share and Other Variables (cont.)

	Correlation	p-value
Unskilled workers/total workers	0.134	0.299
Professional workers/total workers	-0.055	0.670
Wage of skilled workers/total wages	-0.089	0.492
Wage of unskilled workers/total wages	0.026	0.840
Wage of professional workers/total wages	-0.078	0.548
Fixed asset/total wages	0.007	0.959
Fixed asset per worker	-0.066	0.617
Profit/fixed assets	-0.129	0.318

Source: Authors' calculations

Table 10: Determinant of Outward FDI Shares in Total Investment

Variables/Models	[1]	[2]	[3]
Own brands	-17.040 [0.106]	-18.15* [0.090]	-20.95** [0.036]
Exports/sales	0.264** [0.036]	0.277** [0.026]	0.284** [0.024]
Public company	-12.67* [0.098]	-9.774 [0.207]	
Domestic plants	3.215 [0.260]		
# of products/workers	-32.03*** [0.000]	-35.31*** [0.000]	-33.13*** [0.000]
Constant	23.71* [0.053]	31.83*** [0.008]	31.19*** [0.009]
# of observations R-squared	62 0.258	62 0.236	62 0.227

Source: Authors' calculations

Note: Numbers in parentheses are p-values. The coefficients reported are marginal effects evaluated at means. *** p-value<0.01, ** p-value <0.05, * p-value <0.1

5. Conclusions

Outward FDI has become an important tool for economic development in Thailand. Understanding determinants of outward FDI is crucial for policy makers. We have studied outward FDI of Thai firms, using the Thailand Productivity and Investment Climate Surveys of 2004 and 2007. Determinants of outward FDI decision and share in total investments are investigated. Results show that factors positively affecting firm decision to invest abroad are public company status, the number of domestic plants, number of workers, age, and foreign ownership. The only factor found to have a negative effect on outward FDI is firm fixed assets. This result indicates that firms with outward FDI tend to be labor intensive firms that do not accumulate much capital. We also studied determinants of outward FDI share in total investment, finding that exports/total sale positively affect outward FDI share. Having own brands and the number of products per workers negatively affect outward FDI share. That is, firms with high outward FDI share tend to be OEM firms without their own brands.

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