

# Foreign Ownership and Firm Performance in the Thai Construction Industry

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**Abstract.** This paper examines the relationship between foreign ownership and firm performance in the Thai construction industry, using cross-sectional data from the 2009 Construction Industry Survey of Thailand. The study empirically presents the connection between foreign ownership, construction productivity, construction capability, and average wages in the industry, where there is currently a scarcity of evidence. Caution is taken in determining the estimation techniques used to avoid misleading econometric results. The evidence from regression analysis suggests that foreign presence could positively affect the industry's productivity, construction capability, and average wages. Generally, the results show that foreign firms are more likely to exhibit higher construction productivity and capability, and pay higher average wages than domestically-owned firms. Based on these findings, policy implications for the government and foreign presence in the construction industry should be emphasized and continue to be adopted.

**Keywords:** Foreign direct investment, Productivity, Capability, Wage, Construction industries, Thailand

## 1. Introduction

Recent years have witnessed a huge debate on the role of multinational corporations (MNCs) in host countries and the effect of foreign presence on domestic firms. While the literature has mainly focused on the spillover effects from FDI (Foreign Direct Investment) in manufacturing industries, the role of foreign MNC's presence in construction industries on domestic firms has mostly been neglected. So far, there has been a lack of economic research and analysis concerning the effects of FDI in the construction industry in Thailand. Nonetheless, FDI and foreign presence in construction industries are a growing phenomenon, since regulations and policies are opening up new opportunities for foreign investors. It is thus interesting to examine the effects that these MNCs have on local firms' performance in the construction industry. FDI is an important factor in Thailand insofar as it is able to considerably affect economic development. It is largely assumed to be a provider of knowledge embodied in goods and services, capital, capabilities and markets, job creation, and the stimulation of competition in the industry [1].

The main objective of this paper is to examine the connection between foreign ownership, construction productivity, construction capability, and average wages in various aspects. A cross-sectional econometric analysis is applied, using the 2009 Construction Industry Survey of Thailand. This survey has been collected by the Thai National Statistical Office (NSO) once every 5 years. This is the most reliable data on the construction establishment available so far in Thailand. In the empirical mode for the analysis, we follow the general practice in this research area of FDI evaluation, in which the productivity equation and wage equation of domestic firms in the construction industry are estimated and the statistical relationship between firms' construction productivity, construction capability, average wages, and the effect of foreign presence is examined. This is the main contribution of our analysis to the existing literature, especially for the Thai case, where there is currently a scarcity of evidence from the viewpoint of the construction industry.

The structure of this paper is organized as follows. Following the introduction, section 2 provides an overview of the construction industry in Thailand and describes the data used in our analysis. Section 3 presents the analytical framework and econometric models. Next, section 4 presents and discusses the regression results. Lastly, section 5 summarizes and concludes key inferences and policy implications.

## 2. The Thai Construction Industry and Data

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The 2009 Construction Industry Survey shows that most establishments in this industry are small scale with 1 – 10 persons, of about 83.1 percent. The highlight industry is *construction of buildings*, which has the highest proportion at about 56.8 percent. For persons engaged in the establishment, there are 364,694 persons in total. Of these, about 335,150 persons are employees, who receive an annual remuneration of about 92,873 baht per person. Moreover, the construction in the *Whole Kingdom* establishment contributes value of gross output or receipts, intermediate consumption and value added of about 394,126.9 million baht, 276,181.8 million baht and 117,981.1 million baht respectively [2]. The original sample size consists of 17,944 observations. Of these, 8,765 are enumerated observations (firms which had still existed by the time the census was conducted). The main drawback of this data is the inconsistency of variables and missing values in the survey. This makes it hard to utilize the data, and observation samples are also sharply reduced after cleaning up the data and excluding some impossible and missing values. Finally, the statistical inference for the representative sample from the survey can be summarized in Table 1 as shown beneath.

Table 1: Statistic Summary of Key Variables

Variable	Description	Unit	Obs	Mean	Std. D.	Min	Max
LnTVCL	Total Value of Construction per worker	(ln) baht	605	1.695	2.986	0.000	13.521
LnCapaL	Value of Capability Construction per worker	(ln) baht	605	9.705	4.661	0.000	26.094
LnAvrRemu	Average Remunerations (Wages) per worker	(ln) baht	605	7.278	4.955	0.000	21.599
LnKI	Capital per worker (Capital intensity)	(ln) baht	605	2.704	5.026	0.000	18.028
LnMI	Material per worker (Material intensity)	(ln) baht	605	4.677	5.612	0.000	24.095
LnL	Labor inputs (Total workers employed)	(ln) workers	605	4.506	3.730	0.000	11.791
LnLQ	Labor quality (Skilled workers)	(ln) workers	605	0.497	1.510	0.000	9.616
LnAge	Years of operation	(ln) years	605	2.518	1.040	0.000	4.564
FOR	Foreign presence/Foreign ownership	zero-one dummy	605	0.648	0.478	0.000	1.000
Central	Firms located in the central region	zero-one dummy	605	0.253	0.435	0.000	1.000
Municipal	Firms located in the municipal area	zero-one dummy	605	0.417	0.493	0.000	1.000
Small	Firms with less than 30 employees	zero-one dummy	605	0.818	0.386	0.000	1.000
Large	Firms with more than 30 employees	zero-one dummy	605	0.182	0.386	0.000	1.000

Source: Author's calculation

### 3. Analytical Framework: Econometric Models

The most commonly-used empirical model to test the impact of foreign presence on locally-owned firms is by estimating an augmented Cobb-Douglas production function and adding a proxy for foreign ownership in the industry into the equation. Following Dimelis, S. and H. Louri (2004) [3], a simple form of an augmented production function for the Thai construction industry is used for the analysis. There are 3 equations of interest in this study which can be described as follows.

$$\ln TVCL_{ij} = \beta_0 + \beta_1 \ln KI_{ij} + \beta_2 \ln MI_{ij} + \beta_3 \ln L_{ij} + \beta_4 \ln LQ_{ij} + \beta_5 \ln Age_{ij} + \beta_6 FOR_{ij} + \beta_k X_{ij} + \varepsilon_{ij} \quad (1)$$

$$\ln CapaL_{ij} = \beta_0 + \beta_1 \ln KI_{ij} + \beta_2 \ln MI_{ij} + \beta_3 \ln L_{ij} + \beta_4 \ln LQ_{ij} + \beta_5 \ln Age_{ij} + \beta_6 FOR_{ij} + \beta_k X_{ij} + \mu_{ij} \quad (2)$$

$$\ln AvrRemu_{ij} = \beta_0 + \beta_1 \ln KI_{ij} + \beta_2 \ln MI_{ij} + \beta_3 \ln L_{ij} + \beta_4 \ln LQ_{ij} + \beta_5 \ln Age_{ij} + \beta_6 FOR_{ij} + \beta_k X_{ij} + \delta_{ij} \quad (3)$$

Here,  $i$  indexes the firm and  $j$  indexes the sector or industry.  $X$  is the vector of other control variables including: 1) central area dummy (equal to 1 if firms are in central area - Bangkok and the central region, and zero otherwise), and 2) municipal area dummy (equal to 1 if firms are in municipal area and zero otherwise). Before reviewing our econometric results, we perform several tests including tests for normality of variables and residuals, tests for heteroskedasticity, tests for multicollinearity, and Ramsey's regression specification error (RESET) for functional form misspecification. Figure 1 presents the sample approximation of the distribution of residuals from equation (1) – (3). As we know, one of the important assumptions of the regression model (OLS – Ordinary Least Squares) is that residuals must have normal distribution. Here residuals from all equations seem to follow the normal distribution assumption.

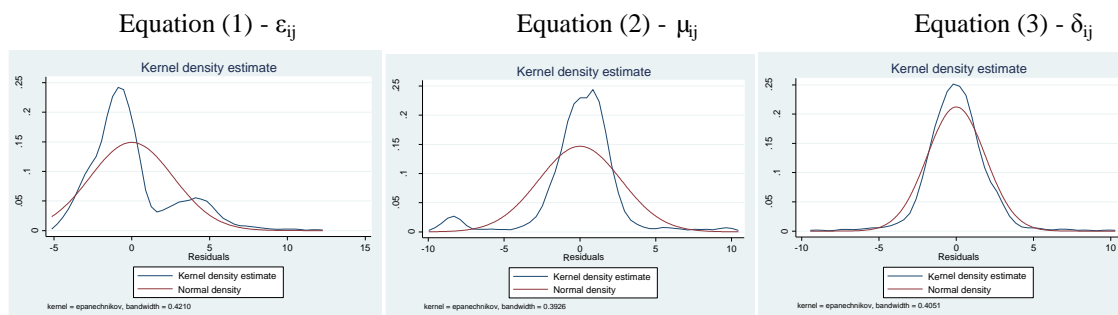


Fig. 1: Tests for Normality of Residuals in All Equations

## 4. Empirical Results

Due to missing information on many key variables, the data was cleaned up by deleting firms which had not responded to one or more the key questions and which had provided seemingly impossible information [4]. Moreover, heteroskedasticity is often present when cross-sectional data is used. For this reason, statistical diagnostic tests are important in determining the appropriate statistical models and estimation techniques to avoid misleading econometric results. Table 2 presents the empirical results from estimating equation (1) – (3) on the 2009 Construction Industry Survey by the ordinary least squares (OLS) method.

Table 2: Impact of Foreign Presence/Ownership on Firms' Performance

	Equation (1) Construction Productivity			Equation (2) Construction Capability			Equation (3) Average Wages		
	LnTVCL			LnCapaL			LnAvrRemu		
	All	Small	Large	All	Small	Large	All	Small	Large
LnKI	0.130*** (4.61)	0.117*** (4.06)	0.208* (2.33)	-0.0184 (-1.01)	-0.0216 (-1.73)	-0.0178 (-0.28)	0.000278 (0.01)	-0.00613 (-0.26)	-0.0431 (-1.07)
LnMI	0.0755* (2.58)	0.0894** (2.76)	-0.0408 (-0.68)	0.0238 (1.51)	0.0733*** (3.87)	-0.143* (-2.33)	0.105*** (4.41)	0.114*** (4.07)	-0.000564 (-0.01)
LnL	0.158* (1.96)	0.360*** (4.52)	-0.210 (-1.38)	0.269*** (5.14)	0.167 (1.53)	0.0415 (0.19)	0.264** (2.74)	0.688*** (4.08)	-0.188 (-1.01)
LnLQ	0.302 (1.84)	0.681** (2.93)	-0.0673 (-0.28)	0.508*** (7.30)	0.438* (2.27)	0.364 (1.45)	0.986*** (7.04)	1.655*** (6.84)	0.459* (2.59)
LnAge	0.143 (1.50)	0.0222 (0.22)	0.127 (0.48)	0.266* (2.31)	0.209 (1.85)	0.413 (0.87)	-0.471*** (-3.85)	-0.571*** (-4.41)	-0.486 (-1.37)
Central	0.346 (1.23)	0.502 (1.70)	-0.226 (-0.34)	0.201 (1.01)	0.135 (0.71)	-0.203 (-0.34)	-0.263 (-0.88)	-0.210 (-0.67)	-0.241 (-0.35)
Municipal	0.152 (0.64)	-0.273 (-1.11)	0.581 (0.87)	0.259 (1.38)	0.00124 (0.01)	0.208 (0.28)	0.844*** (3.86)	0.491* (2.33)	0.653 (1.01)
<b>FOR</b>	<b>2.500*** (3.75)</b>	<b>3.977*** (6.05)</b>	<b>1.703 (1.57)</b>	<b>11.39*** (28.35)</b>	<b>10.60*** (11.91)</b>	<b>10.87*** (9.26)</b>	<b>9.523*** (14.19)</b>	<b>13.03*** (10.40)</b>	<b>7.205*** (6.35)</b>
Constant	-2.002** (-2.71)	-3.596*** (-4.91)	2.323 (1.14)	-0.959 (-1.80)	-0.0295 (-0.03)	2.452 (1.11)	-0.117 (-0.14)	-4.052** (-2.63)	6.085** (2.81)
Observations	605	495	110	483	392	91	597	487	110
R-squared	0.196	0.225	0.246	0.823	0.867	0.766	0.688	0.733	0.621

Notes: Robust t-statistics in parentheses and \*\*\*, \*\*, \* indicates a statistical significance at 1, 5, 10 percent

Source: Author's calculation

Although residuals from equation (1) seem to skew to the left-hand side, all equations and our model specification can pass other tests mentioned earlier with no additional concern. The main problem in using the survey data stems from the inconsistency of data and missing values.

As can be seen from the estimated results in Table 2, the positive and statistically significant value of FOR suggests that foreign firms (FOR=1) tend to exhibit a higher level of construction productivity (TVCL - Total Value of Construction per worker), construction capability (CapaL - Maximum Value of Capability

Construction per worker) and average wages than domestic firms. The results show that, on average, foreign presence could improve firms' performance in all aspects equally for both small and large firms, except for the sub-sample of large firms with regards to construction productivity. Apart from foreign presence, material intensity, labor inputs and labor quality seem to have an important role in determining firms' performance in the Thai construction industry. Our major finding is that increases in foreign ownership in firms (foreign presence) are positively associated with increases in construction productivity, construction capability and the average wages of domestic firms.

Next, we extend our analysis to explore if the effect of foreign presence is concentrated in some selected industries. The estimated results can be summarized in Table 3 for selected construction industries.

Table 3: Impact of Foreign Presence on Firms' Performance in Selected Industries

Industry	Buildings	Roads Railways	Utility Projects	Site Preparation	Electrical Installation	Conditioning Installation	Building Completion	Other Activities
FOR & Construction Productivity: Dependent Variable - LnTVCL								
FOR	1.74 (1.78)	<b>4.11</b> <b>(3.10)</b>	-0.02 (-0.01)	1.22 (0.56)	1.12 (0.68)	1.06 (0.42)	<b>2.57</b> <b>(1.96)</b>	6.05 (0.80)
Observations	259	75	32	60	49	23	74	16
R <sup>2</sup>	0.32	0.67	0.63	0.37	0.48	0.68	0.36	0.27
FOR & Construction Capability: Dependent Variable - LnCapaL								
FOR	<b>10.89</b> <b>(10.44)</b>	<b>11.96</b> <b>(9.99)</b>	7.52 (1.77)	2.84 (1.00)	<b>16.03</b> <b>(10.47)</b>	3.64 (0.63)	<b>11.66</b> <b>(8.49)</b>	<b>8.96</b> <b>(2.98)</b>
Observations	207	59	26	42	37	18	66	14
R <sup>2</sup>	0.86	0.84	0.91	0.89	0.86	0.83	0.89	0.98
FOR & Average Wages: Dependent Variable - LnAvrRemu								
FOR	<b>10.37</b> <b>(13.85)</b>	<b>6.18</b> <b>(4.84)</b>	<b>6.26</b> <b>(2.13)</b>	<b>13.76</b> <b>(2.67)</b>	<b>14.56</b> <b>(4.93)</b>	2.37 (1.00)	<b>10.42</b> <b>(5.91)</b>	<b>13.38</b> <b>(8.03)</b>
Observations	261	74	32	58	47	21	72	16
R <sup>2</sup>	0.74	0.80	0.72	0.63	0.58	0.76	0.85	0.99

Notes: Robust t-statistics in parentheses and \*\*\*, \*\*, \* indicates a statistical significance at 1, 5, 10 percent

Source: Author's calculation

Originally, there were 11 types of industry in the 2009 Construction Industry Survey (ISIC Rev.4 code from listing). We only select and analyze in detail some industries which both provide enough observations and information representative enough for the analysis. The selected industries and the empirical results of the effect of foreign presence on firms' performance are shown in Table 3. The positive and statistical significance of the coefficients of foreign ownership (FOR) mean that there is a positive effect at firm level and indicate that foreign firms are generally more productive and pay higher wages than domestic firms even when we analyze the aspect separately in each industry.

As suggested by the empirical results from Table 2 and Table 3, the impact of foreign ownership is strongest for average wages that we observe positive effects in almost every type of industry while the impact is weakest in the aspect of total value of construction per worker (construction productivity). Moreover, we also find relatively strong evidence for the positive impact of foreign ownership on the value of capability construction per worker (construction capability). All in all, R<sup>2</sup> is usually high for the case of FOR and average wages and also lowest for the case of construction productivity.

## 5. Conclusions and Policy Implications

This paper analyzes the relationship and impact of foreign ownership on domestic firms operating in the construction industry of Thailand. It covers the empirical analysis for representative firms in the construction industry, while most existing studies deal only with manufacturing industries. The study seeks to add to our understanding of the value of FDI in Thailand, where foreign MNCs are expanding in almost every industry,

including the construction industry. Although numerous attempts have been made to study FDI in the Thai manufacturing sector, the issue of the impact of FDI in the construction industry remains unresolved.

A large body of literature has investigated the effect of multinational corporations and domestic firms in the Thai manufacturing industry. Nonetheless, the effect of the entry of MNCs in construction industries has not been investigated with the same emphasis. As a result, this paper aims to examine the role and relationship between foreign presence and firms' performance by using a sample of Thai construction industries from the 2009 construction industry survey. The main contribution of our study to this field of literature is that we are among the first to investigate and empirically test the impact of foreign presence in the Thai construction industry. The estimated results show that foreign presence has a significant and positive effect on domestic firms. We find that foreign firms are generally more productive and pay higher average wages than domestic firms and can conclude that the relationship between construction productivity and foreign ownership in general is rather weak, while the relationship between wages and foreign ownership is stronger. This is also true for the case of Thai manufacturing [5]. Our main finding from the analysis is that allowing foreign MNCs to enter and attracting more FDI in construction industries may be the key channel through which FDI spillovers contribute to the improved performance of firms and establishments in the construction industry. Therefore, policy implications that help decrease the barrier of entry of FDI into the Thai construction industry should continue to be adopted in order to attract more FDI into the industry and promote the beneficial effect of spillovers from foreign firms operating in the industry.

Our analysis provides the Thai government with potentially useful information for industrial policy regarding FDI. Hosting FDI could benefit domestic firms via increased productivity and average wages paid within the industry. Of course, our analysis here is by no means complete. We acknowledge that selection bias and simultaneity problems may be present. However, our data includes only existing firms and no information provided from the survey in terms of firm dynamics. In addition, this survey is conducted only once every 5 years, making it impossible for us to create panel data analysis for the Thai construction industry. The estimation method of Olley and Pakes (1996) [6] may help resolve the issue of selection bias and another panel data analysis method could also be preferred. However, this is impossible in our paper due to the limitations and nature of the data provided by the National Statistical Office of Thailand (NSO). Unfortunately, the NSO still has no plan to collect more data in the construction industry. We hope that based on this paper; there will be some fruitful studies in the future examining the Thai construction industry to help formulate a conclusion and policy design for the Thai government.

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