

Are Korean Firms Doing Well? Evidence from Shandong Province in China*

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This paper constructs a firm-level data set of manufacturing firms in the Province of Shandong and examines whether the corporate performance, e.g., labor productivity, of foreign-owned firms, particularly of Korean firms, is superior to that of domestically-owned firms. In the regression analysis, we found the following: first, foreign-owned firms achieve significantly better performance. Second, the differences in corporate performance between domestically- and foreign-owned firms are particularly large in chemical and machinery sectors. Third, small sized Korean firms and Korean firms in fabricated materials and machinery sectors have relatively high performance among foreign-owned firms.

JEL Classification: F23, D21

Keywords: foreign direct investment, multinational enterprises,
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1. INTRODUCTION

A large number of Korean multinational enterprises (MNEs) have invested in China. According to the Chinese statistics, by the end of 2004, China has approved foreign direct investment (FDI) by 32,753 Korean companies, where Korean FDI on the contract basis and the implementation basis has amounted to \$50.564 billion and \$25.935 billion, respectively. Since 2002, China has been the largest recipient of Korean FDI. Shandong Province occupies the largest share in China's inward foreign direct investment from Korea and hosts substantial mass of Korean firms. Shandong Province has an advantage in access to their home country and thus enables the Korean firms to save transportation costs and other service link costs.

Corporate performance of foreign-owned firms in comparison with domestically-owned firms is always at issue in academic and semi-academic discussions. Particularly in the context of less developed countries (LDCs) such as China, whether MNEs bring in better technology and managerial know-how and generate beneficial spillover effects on local firms is extremely important for host countries/regions.¹⁾ On the other hand, from the viewpoint of investing countries, whether the performance of out-going firms is satisfactory or not is crucial information in order to consider corporate strategies matched with the host country's investment climate.

Despite such great interest, not many empirical studies have been conducted on the activity of foreign-owned firms in China. A major difficulty in conducting rigorous analysis resides in the lack of ready-made firm/plant-level data.²⁾ Most of the previous studies on the performance of foreign-owned firms in China depend on questionnaire surveys that typically

¹⁾ As for the role of FDI in spillover effects, see, for example, Lee (2004).

²⁾ Quite recently, a few working papers start employing huge firm-level data, China's Annual Survey of Industrial Firms (see Chang, Chung, and Xu, 2007; Fung, *et al.*, 2007; Lundin, *et al.*, 2007). According to these papers, the data can be obtained from the National Bureau of Statistics of China (NBSC) and cover all the state-owned firms and other types of firms with annual sales of at least 5 million RMB over the period from 1998 to 2005. However, due to the confidentiality, we cannot get access to it.

work with fairly small sample sets. Although several provinces publish firm-level data, they do not provide information so as to separate the samples into domestically- and foreign-owned firms.

The purpose of this paper is to investigate corporate performance of firms in different firm nationalities, with particular attention to Korean firms. To do that, we construct a firm-level data set of manufacturing firms in Shandong Province with the flag of firm nationalities by combining information derived from multiple sources. By employing such data, we examine whether the corporate performance, e.g., labor productivity, of foreign-owned firms, particularly of Korean firms, is significantly better than that of domestically-owned firms. In cases of other countries, a number of studies have used micro data in order to measure differences in corporate performance across different firm nationalities.³⁾ In this paper, we regress the corporate performance variables on firm nationality dummies together with some firm-specific characteristics variables and check whether the coefficients for the dummy variables have statistically significant signs or not vis-à-vis domestically-owned firms. To our knowledge, this paper would be the first rigorous empirical paper that compares Korean firms with domestically-owned firms and other foreign-owned firms located in China.

In the regression analysis, we find the following: first, foreign-owned firms achieve significantly higher corporate performance than domestically-owned firms. Second, the differences between domestically- and foreign-owned firms are larger in chemical and machinery sectors than in other sectors. Third, relatively small sized Korean firms and Korean firms in fabricated materials and machinery sectors have relatively high performance, even compared with other foreign-owned firms.

The rest of this paper is organized as follows: section 2 briefly takes a look at the pattern of Korean FDI and the historical relationship between Korea and Shandong Province. In Section 3, we review the previous studies that

³⁾ See, for example, Doms and Jensen (1998) in the case of the United States and Kimura and Kiyota (2007) in the case of Japan. The latter also provides a concise survey of related literature.

analyzed firms' performance in China with using firm/plant-level data. Section 4 compiles firm-level data of Shandong Province and provides basic statistics. Section 5 reports the regression results, and section 6 concludes.

2. SHANDONG PROVINCE AND KOREA

2.1. Korean FDI to Shandong Province

According to the China Foreign Investment Report,⁴⁾ by the end of 2004, 32,753 Korean firms have been established in China, which account for 6.44% of the total foreign-owned companies located in China. In terms of the accumulated number of firms, Korea is the fourth largest investor in China.

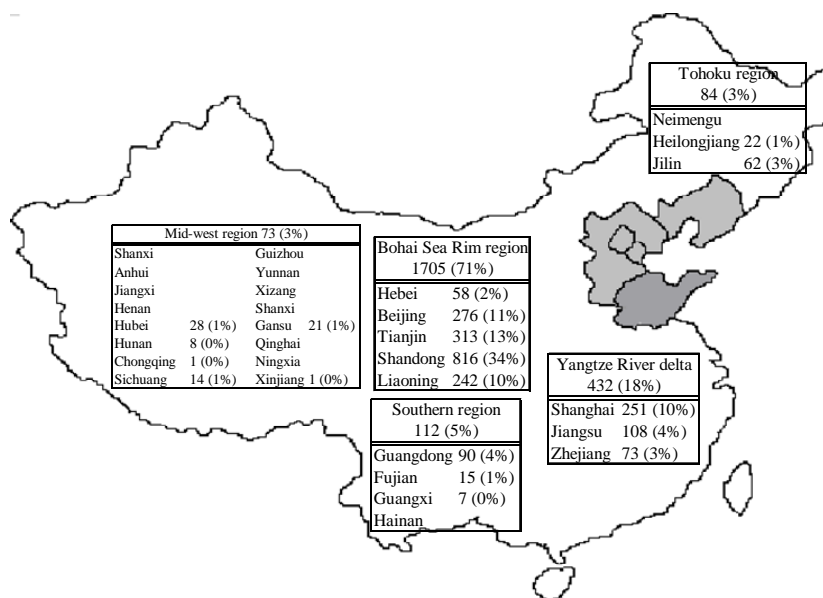
Although different data sources provide quite different figures, it is almost sure that Korea has actively invested in China with considerable concentration on Shandong Province. DACO Industrial Research Institute (2004)⁵⁾ is useful to find out Korean firms' geographical distribution in China in 2004. The geographical distribution is shown in figure 1. In the figure, China is divided into five regions: the mid-west region, the southern region, the northeast region, the Bohai Sea Rim region, and the Yangtze River delta. The Bohai Sea Rim region has an overwhelming 70% share in the total number of Korean firms in China. In particular, there exist 816 Korean firms in Shandong, which account for 34%. Shandong is the province that hosts the largest number of Korean firms.

Investment climate in Shandong is overall favorable. First, Shandong is in an advantageous geographical position. The adjacency to the other parts of Bohai Sea Rim Economic Region (Beijing, Tianjin, and Liaoning) and the Yangtze delta (Shanghai, Jiangsu, and Zhejiang) enables firms to easily access

⁴⁾ <http://www.fdi.gov.cn>

⁵⁾ DACO Industrial Research Institute (2004) covers around 2,500 Korean firms locating in China in 2004 and is based on a survey launched by Korea Trade-Investment Promotion Agency (KOTRA).

Figure 1 Geographical Distribution of Korean-owned Firms in China



Note: The numbers in left hand side and in right hand side indicate the number of Korean firms and its share in the whole number, respectively.

Source: DACO Industrial Research Institute (2004).

human resources, high-technology, and others. Firms can also easily utilize energy resources because of its adjacency to Shanxi. Second, infrastructure is relatively well developed. Shandong has 24 sea ports; Shandong actually marks the highest density of ports in China. There are also seven airports in Shandong, which include three international airports located in Jinan, Qingdao, and Yantai. Third, the Shandong government has conducted various kinds of preferential treatment policies for incoming foreign direct investment including tax incentives.

Shandong is the nearest province to the Korean Peninsula. Therefore, Korean firms locating in Shandong can enjoy low transaction costs in connecting their business with the home country. Due to these favorable climates, Korean firms have actively invested in Shandong and have formed substantial agglomeration.

2.2. History of Korean Entry

According to the official website of the Development Planning Commission of Shandong Province,⁶⁾ the history of Korean firms' investment in Shandong can be divided into four periods. The first was an initiation period between 1988 and 1991. Shandong started private business activities with Korea in 1988, that is, even before the formal diplomatic relation was established. Korean Sanyang Food Co. established the first joint venture with Qingdao Second Food Co. in February 1989. In this period, small-sized firms engaging in labor-intensive activity were the main players in Korean investment. By the end of 1991, 95 Korean firms were established in Shandong, with a contractual FDI of US\$75.25 million.

The second period was a period of active growth between 1992 and 1996. The establishment of diplomatic relation in August 24, 1992 provided a new opportunity for further economic exchanges between Shandong and Korea, resulting in a remarkable increase of Korean FDI in Shandong Province. Korea's contracted FDI grew by 104% annually in 1992-1996, and its total amount became \$3.38 billion in 1996.

The third was the period of 1997-1999 when Asian countries were hit by a currency crisis. Under the influence of the crisis, Korea's contracted FDI decreased by 79% from 1996 to 1997, resulting in \$322 million in 1997 (Shandong Industrial Statistics Yearbook). In 1998, it fell down further to \$290 million, recording the minimum level after the establishment of official diplomatic relation. During this time, the Shandong Government provided Korean firms generous support and help in any possible way including financial lending. As a result, in 1999, the amount of the Korea's FDI into Shandong became \$456 million and recovered from its drop due to the crisis.

The fourth was a period of the second coming investment boom from Korea to Shandong Province. The number of FDI projects by Korean firms kept growing by an average of more than 1,700 projects a year in 2000-2004. The actually implemented Korean FDI grew by an average of 41% annually

⁶⁾ <http://www.sd-china.com>

in these six years, and its total amount reached \$9.5 billion in 2004. At this period, Korean FDI in Shandong Province had the following features: (1) The average investment scale increased greatly to \$2.34 million, which is by \$0.87 million larger than the average investment scale until 2002. (2) Manufacturing sector occupied an overwhelming 91.4% share in all amounts of contracted FDI, which concentrated on IT communication, general or special equipment, textile, chemical material, and processed products.

3. PREVIOUS STUDIES EMPLOYED MICRODATA IN CHINA

To clarify the advantages of our dataset, this section reviews the previous studies that employ firm level data in China. Micro data sources in China can roughly be classified into three: the Third Industrial Census of China, microeconomic data obtained from the NBSC, and various kinds of questionnaire surveys.

The first dataset, the Third Industrial Census of China conducted in 1995, covers 7.34 million samples. The huge dataset is potentially advantageous but is likely to be old since the census is conducted only once every ten years. By using this dataset, Wen, Li, and Lloyd (2002) find that foreign-owned joint ventures and foreign solely-owned enterprises are more efficient on average than enterprises with state ownership, domestic collective ownership, and joint domestic ownership.

Second, Zhang, Zhang, and Zhao (2001) used microdata in Shanghai over the period from 1996 to 1998, which are obtained from the NBSC. The data are firm-level statistics collected from mandatory annual reports of all government and business organizations in China. They find that the non-state-owned firms have a higher average level of productive efficiency than state-owned firms and that whereas competitiveness in export market (a ratio of a firm's export revenue to its total assets) has positive impact on firm productive efficiency, the degree of market competition measured by

Herfindahl index has no impact on productive efficiency.

Third, most of the previous studies depend on various kinds of questionnaire surveys. These studies typically focus on the evaluation of state-owned firm's reform, rather than analyzing the relative performance of foreign firms.

By using a questionnaire survey of industrial SOEs conducted by the NBSC in mid-1998 that covers 40,238 samples, Lin and Zhu (2001) investigate the impact of organizational changes including ownership restructuring conducted as a part of the economic reform in China. Using the same data as in Lin and Zhu (2001), Zhang (2004) evaluates the effects of corporatization and stock market listing on the performance of the Chinese SOEs, and Xu, Zhu, and Lin (2005) examine the effects of reducing politicians' control and agency problems on various reform outcomes.

Hallward-Driemeier, Wallsten, and Xu (2003) employ a survey by the Enterprise Survey Organization of the NBSC. The survey contains 1,500 Chinese firms in five cities (Beijing, Chengdu, Guangzhou, Shanghai, and Tianjin). Their analysis reveals that major determinants of corporate performance in China are the degree of international competition (openness), the existence of entry and exit barriers, labor quality, the availability of information and communication technologies, and the availability of external finance (e.g., bank loans).

Cheng and Wu (2001) investigate key determinants of the performance of foreign firms using a survey of 350 foreign firms locating in Guangdong and Hainan Provinces, which is conducted by three universities in Guangdong and a research institute in Hainan between July 1996 and February 1997. They find that cash contributed by foreign parent companies has a significantly positive impact on current profitability, but not on future performance.

Gong, Xu, and Tan (2003) use a survey on regional protection launched by the World Bank and the Development Research Center (DRC) of Chinese State Council in 2003. The survey covers 1,411 enterprises and 591 individuals that work for local governments, research institutes, universities

or other related public sectors in 12 provinces. By using the survey, they find notable differences in regional protectionism across provinces and across industries.

Wang, Xu, and Zhu (2004) use a panel of pre- and post-listing data of all publicly listed companies in China between 1994 and 2000 to explore the effectiveness of public listing as a means of reforming SOEs in China. Their finding is that public listing significantly lowers state ownership, lessens firm's reliance on debt finance, and allows a firm to increase capital expenditure, at least temporarily. They also find that ownership structure affects post-listing performance but that there is no statistical evidence of a positive effect of public listing on firms' profitability.

Cull and Xu (2005) use survey data during the period of 2000-2002, which were collected in early 2003 by the World Bank jointly with the Enterprise Survey Organization. This dataset covers 2,400 firms locating in 18 cities. Their main finding is that secure property rights are a significant predictor of firm's reinvestment.

4. DATA ISSUES

As seen in the previous section, there is no large updated ready-made dataset that enables us to get access and distinguish firm nationalities. Survey data are likely to have small samples for each province, and census data are too old to analyze activities of foreign-owned firms. In this section, therefore, we construct micro data that can identify firm nationalities by combining different data sources and then present some findings obtained from the basic statistics.

4.1. Data Construction

We construct our dataset as follows: our main data source is "the Main Index of Large- and Medium-scale Industrial Corporation" published both in "Shandong Industrial Statistics Yearbook (2003 and 2004 versions)" and in

“Shandong Statistics Yearbook (2003 and 2004 versions).” The books report information on firms with annual sales of more than 50 million RMB and thus 1,357 and 2,054 firms in 2002 and 2003, respectively. They present the following variables: a city of location, total assets, total debt, total sales, total profit, a number of employees, and value-added. We construct our dataset by incorporating additional information obtained from other sources into this “base file.”

The dataset construction consists of the following steps. First, the ownership type of firms, i.e., domestically- or foreign-owned, and their firm nationalities are obtained from “D&B Major Corporations in P. R. China Vol. 1 Foreign Companies and Joint Ventures.” In this paper, foreign-owned firms are defined as those with equal to or more than 25% equity share by foreigners.⁷⁾ Second, in order to identify foreign-owned firms as precisely as possible, we checked almost all firms’ homepages so as to confirm whether the firms are truly foreign-owned or not. Last, industrial classification is assigned by consulting each firm’s homepage, and the industrial code is attached to the base file. In the end, the complied data

Table 1 Reliability Check

Sector	Number of Firms		Valued-Add (10 thousands RMB)		Labor (person)	
	Statistics	Our Data	Statistics	Our Data	Statistics	Our Data
1	343	308	3,960,650	4,061,582	396,805	379,309
2	366	347	2,875,096	2,963,071	632,586	620,609
3	291	262	4,303,663	7,612,140	366,751	432,535
4	492	430	5,095,119	5,321,164	592,319	571,270
5	581	509	7,004,625	6,691,668	646,158	620,932
6	194	166	1,637,720	1,582,128	242,866	220,715
Total	2,267	2,022	24,876,873	28,231,753	2,877,485	2,845,370

Note: For sectoral codes (major classification), see Appendix. “Statistics” and “our data” mean aggregate data in 2003 reported by the Shandong government and our compiled data, respectively. The value-added in this table is not deflated.

⁷⁾ From this book, we can also obtain the entry mode of each foreign-owned firm, i.e., joint ventures (with domestic firms or other foreign firms) or solely-owned firms (firms with 100% equity share by foreigners).

contain a city of location, total assets, total debt, total sales, total profit, a number of employees, value-added, firm's ownership type, the entry mode, the nationality of foreign-owned firms, and the industrial code of each firm.

To double-check the coverage of our data, we compare our data in 2003 with the official aggregate data publicized by the Shandong government. The result is reported in table 1. We can immediately see that our data on the number of firms, value-added, and employment in most sectors are considerably close to the official statistics.

4.2. Data Description

We here provide some findings in the basic statistics of our dataset. Not only variables directly available, such as labor, but also real value-added per worker and real sales per worker are examined. The latter two variables are calculated by dividing value-added and total sales by employment and then by deflating those variables by the price indices of each sector in Shandong Province. The price indices are obtained from the Shandong Statistics Yearbook.

Table 2 reports the number of observations as well as mean values and standard deviations of variables by the ownership type of firms. Here, the following is to be noted: first, the mean value and standard deviation of each variable are quite stable between two years. This means that the over-time volatility of our data is low. Second, mean values of real value-added, labor, and real total sales are larger for domestically-owned firms than for foreign-owned firms despite the fact that, in usual developing countries, foreign-owned firms are almost always larger. Larger size of domestically-owned firms may be due to the fact that the scale of state-owned firms is generally huge in China due to the government's preferential treatments for them. Third, the mean value of real value-added per worker in foreign-owned firms is higher than that in domestically-owned firms. Also in the real sales per worker, foreign-owned firms have a higher mean value. Therefore, the basic statistics immediately show that foreign-

Table 2 Basic Statistics

	All Firms			Foreign-owned Firms			Domestic-owned Firms		
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
Real Valued-Added (10 thousands RMB)									
2002	1,342	13,365	76,406	180	6,846	10,009	1,162	14,375	81,975
2003	2,021	13,316	68,712	292	7,853	14,555	1,729	14,238	74,011
Labor (person)									
2002	1,356	1,582	3,092	181	831	962	1,175	1,697	3,285
2003	2,054	1,400	2,848	293	888	885	1,761	1,485	3,046
Real Total Sales (10 thousands RMB)									
2002	1,342	42,835	156,068	180	23,434	35,321	1,162	45,840	166,954
2003	2,021	42,109	145,072	292	25,233	44,899	1,729	44,959	155,584
Real Valued-Added per Worker (10 thousands RMB)									
2002	1,341	9	12	180	13	17	1,161	8	11
2003	2,021	10	13	292	11	20	1,729	9	12
Real Sales per Worker (10 thousands RMB)									
2002	1,341	29	42	180	46	63	1,161	27	38
2003	2,021	30	41	292	36	69	1,729	29	35

owned firms are likely to have relatively high performance than domestically-owned firms in Shandong Province.

In table 3, mean values of major variables in foreign-owned firms are provided by firm nationality. First, HMT firms (Hong Kong, Macao, or Taiwan) are the largest in terms of the number of firms. There are 46 and 72 HMT firms in 2002 and 2003, respectively. The number of Korean firms (27 in 2002 and 48 in 2003) is the second largest, and that of Japanese firms (25 in 2002 and 29 in 2003) and that of the United States (12 in 2002 and 22 in 2003) come next to them. Second, there are some doubts on the accuracy of original individual data for some nationalities. Mean values of real value-added per worker and real sales per worker for firms from Malaysia, Denmark, and Thailand seem to be abnormally high. Excluding these 3 countries,⁸⁾ however, the advanced-country-owned firms have relatively high values in both real value-added per worker and real sales per worker, though the developing-country-owned firms are relatively large in scale.

⁸⁾ In regression analysis in the next section, we do not exclude these 3 countries though.

Table 3 Mean Values of Major Variables by Firm Nationality

	Real Valued-Added (10 thousands RMB)		Labor (person)		Real Total Sales (10 thousands RMB)		Real Valued-Added per Worker (10 thousands RMB)		Real Sales per Worker (10 thousands RMB)	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
Australia	7,612 (1)		278 (1)		21,559 (1)		26 (1)		78 (1)	
Canada		1,650 (1)		338 (1)		8,248 (1)		4 (1)		21 (1)
Denmark	20,981 (1)	32,066 (1)	730 (1)	900 (1)	74,622 (1)	93,064 (1)	29 (1)	36 (1)	102 (1)	103 (1)
France	5,237 (3)	13,935 (2)	370 (3)	549 (2)	21,696 (3)	39,855 (2)	16 (3)	25 (2)	67 (3)	72 (2)
Germany	4,341 (5)	4,803 (6)	218 (5)	489 (6)	10,787 (5)	13,982 (6)	25 (5)	12 (6)	63 (5)	35 (6)
HMT	6,315 (46)	7,100 (72)	912 (46)	916 (72)	20,046 (46)	20,138 (72)	10 (46)	8 (72)	34 (46)	24 (72)
Indonesia	4,959 (2)	15,406 (1)	1,494 (2)	2,100 (1)	46,312 (2)	77,085 (1)	2 (2)	7 (1)	30 (2)	371 (1)
Italy		4,261 (3)		394 (3)		16,902 (3)		13 (3)		49 (3)
Japan	7,693 (25)	8,240 (29)	966 (25)	1,051 (29)	27,714 (25)	33,369 (29)	17 (25)	12 (29)	55 (25)	49 (29)
Korea	7,393 (27)	10,836 (48)	773 (27)	830 (48)	30,895 (27)	33,456 (48)	13 (27)	18 (48)	58 (27)	55 (48)
Malaysia	29,746 (1)	46,130 (1)	348 (1)	393 (1)	109,726 (1)	180,532 (1)	85 (1)	117 (1)	315 (1)	459 (1)
Philippines	2,002 (1)	2,369 (1)	925 (1)	830 (1)	7,627 (1)	9,158 (1)	2 (1)	3 (1)	8 (1)	11 (1)
Singapore	2,545 (4)	3,295 (7)	411 (4)	668 (7)	11,814 (4)	17,393 (7)	7 (4)	5 (7)	33 (4)	25 (7)
Sweden	3,305 (1)		150 (1)		9,094 (1)		22 (1)		61 (1)	
Switzerland	5,590 (4)	11,195 (2)	215 (4)	469 (2)	18,412 (4)	27,703 (2)	27 (4)	23 (2)	89 (4)	56 (2)
Thailand	43,316 (1)	35,254 (1)	1,995 (1)	2,001 (1)	107,125 (1)	93,069 (1)	22 (1)	18 (1)	54 (1)	47 (1)
UAE		3,524 (1)		689 (1)		19,487 (1)		5 (1)		28 (1)
UK	4,388 (2)	5,605 (4)	519 (2)	506 (4)	15,072 (2)	16,682 (4)	11 (2)	12 (4)	36 (2)	37 (4)
USA	7,876 (12)	9,644 (22)	558 (13)	1,105 (23)	20,441 (12)	31,613 (22)	17 (12)	11 (22)	46 (12)	38 (22)
Total	7,148 (136)	8,694 (202)	784 (137)	896 (203)	24,903 (136)	28,009 (202)	14 (136)	13 (202)	50 (136)	41 (202)

Note: The parenthesis indicates the number of firms.

In summary, foreign-owned firms have higher economic performance than domestically-owned firms in Shandong Province if we do not control anything. In particular, the performance is much higher in cases of firms originated from developed countries. In the next section, we will confirm these findings in regression analysis.

5. EMPIRICAL ANALYSIS

In this section, by using our dataset, we empirically test whether foreign-owned firms perform better than domestically-owned firms. We then examine differences in corporate performance between foreign-owned and domestically-owned firms with separate samples by scale and by sector. Last, differences among Korean firms and the other firms including non-Korean foreign-owned firms are investigated.

5.1. Foreign-owned Firms vs. Domestically-owned Firms

First, differences in corporate performance between foreign-owned and domestically-owned firms are examined. We regress the following “baseline equation”

$$\begin{aligned} \ln Z_{irs} = & \beta_0 + \beta_1 \cdot \text{foreign}_{irs} + \beta_2 \cdot \text{scale499}_{irs} + \cdots + \beta_6 \cdot \text{scale4999}_{irs} \\ & + \beta_7 \cdot \text{year2002}_{irs} + \beta_8 \text{Sector1}_{irs} + \cdots + \beta_{36} \text{Sector29}_{irs} \\ & + \beta_{37} \text{city1}_{irs} + \cdots + \beta_{52} \text{city16}_{irs} + \varepsilon_{irs}, \end{aligned} \quad (1)$$

where Z is either real value-added per worker or real sales per worker. i , r , and s denote firm i , region r , and sector s . Variable *foreign* is a dummy variable that takes 1 when the firm concerned is a foreign-owned firm and 0 otherwise. To control scale-specific, industry-specific, and regional-specific

Table 4 Foreign-owned Firms vs. Domestically-owned Firms

	Productivity		Sales	
Foreign	0.251** (0.045)	0.099* (0.043)	0.228** (0.039)	0.078* (0.038)
Constant	2.166** (0.064)	2.798** (0.076)	3.565** (0.056)	4.086** (0.066)
Scale	No	Yes	No	Yes
Year	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes
City	No	Yes	No	Yes
Obs.	3,340	3,340	3,340	3,340
R-square	0.1275	0.2380	0.1512	0.2679

Note: Heteroskedasticity-consistent standard errors (White) are in parentheses. ** and * show 1% and 5% significance, respectively.

elements, scale dummy variables⁹⁾ (category variables divided according to the number of employees, i.e., less than 499, 500-999, 1000-1499, 1500-2499, 2500-4999, and more than 5000), and sector dummy variables (minor classification), and regional dummy variables¹⁰⁾ are added. By regressing this equation with real value-added per worker (productivity equation) and real sales per worker (sales equation) separately, we investigate whether a coefficient for the foreign dummy variable is significantly positive or not.

Regression results are shown in table 4. We can immediately see that the coefficients for the foreign dummy variables in both equations are significantly positive, regardless of controlling firms' scale and location.¹¹⁾ With these pooled data, we can conclude that, in Shandong Province, foreign-owned firms overall have significantly better performance than domestically-owned firms.

⁹⁾ As argued in the previous section, state-owned firms have relatively large scale compared even with foreign-owned firms in our sample set.

¹⁰⁾ There are 17 cities in Shandong Province.

¹¹⁾ These results are unchanged even if we exclude the firms of 3 countries that have abnormally high mean values of real value-added per worker and real sales per worker as described in section 4.2.

Table 5 Foreign-owned Firms vs. Domestically-owned Firms by Scale

# of Employees	0-499	500-999	1000-1499	1500-2499	2500-4999	5000-
Productivity						
Foreign	0.246** (0.070)	0.146* (0.070)	0.044 (0.125)	-0.154 (0.131)	-0.717** (0.270)	-1.613** (0.275)
Constant	2.819** (0.116)	2.409** (0.130)	2.119** (0.185)	2.185** (0.220)	1.982** (0.333)	2.561** (0.450)
Scale	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes	Yes	Yes
City	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	806	1,143	509	482	277	123
R-square	0.1780	0.1622	0.2714	0.3613	0.3758	0.7428
Sales						
Foreign	0.205** (0.060)	0.190** (0.061)	0.081 (0.100)	-0.195 (0.123)	-0.798** (0.218)	-1.700** (0.301)
Constant	4.187** (0.099)	3.618** (0.112)	3.356** (0.149)	3.331** (0.206)	3.295** (0.269)	3.710** (0.493)
Scale	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes	Yes	Yes
City	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	806	1,143	509	482	277	123
R-square	0.2102	0.1714	0.3336	0.3271	0.4290	0.7177

Note: Only a coefficient for foreign dummy variable is reported. Heteroskedasticity-consistent standard errors (White) are in parentheses. ** and * show 1% and 5% significance, respectively.

Second, differences in the performance are examined by the size of firm. We regress the baseline equation above with samples separated by scale. Results are reported in table 5. Foreign-owned firms with less than a thousand employees have significantly positive coefficients in both equations. On the other hand, foreign-owned firms with more than 2,500 employees have lower productivity and sales. Relatively small sized foreign-owned firms in terms of employees perform better than domestically-owned firms, while the performance of large-sized foreign-owned firms is worse.

It is somewhat surprising that large-sized domestically-owned firms present better performance than foreign-owned-firms. This may indicate that the drastic reform of large-sized state-owned firms in the 1990s, e.g., massive layoffs, succeeds in raising their productivity. In addition, large-scaled state-owned firms in our sample are top-class firms even in the entire China such as Haier and at the same time seem to be easy to get support from the local government. Thus, the significantly negative coefficient for foreign ownership in the sample of large-sized firms may suggest

Table 6 Foreign-owned Firms vs. Domestically-owned Firms by Sector

	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6
Productivity						
Foreign	0.213 (0.115)	-0.204* (0.087)	0.464** (0.148)	0.137 (0.086)	0.168 (0.097)	-0.093 (0.114)
Constant	2.688** (0.121)	2.303** (0.153)	2.925** (0.228)	2.683** (0.139)	2.157** (0.135)	2.260** (0.230)
Scale	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes	Yes	Yes
City	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	538	563	461	673	818	287
R-square	0.1967	0.2981	0.3154	0.2491	0.1934	0.2184
Sales						
Foreign	0.160 (0.101)	-0.150* (0.075)	0.332** (0.123)	0.080 (0.080)	0.186* (0.081)	-0.066 (0.088)
Constant	4.074** (0.106)	3.413** (0.132)	3.902** (0.189)	3.653** (0.129)	3.282** (0.117)	3.281** (0.178)
Scale	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes	Yes	Yes
City	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	538	563	461	673	818	287
R-square	0.2501	0.3000	0.3377	0.2439	0.2130	0.3157

Note: Heteroskedasticity-consistent standard errors (White) are in parentheses. ** and * show 1% and 5% significance, respectively. For sectoral codes (major classification), see the Appendix.

that policy preferential treatments by the local government contribute to improving the performance of large-sized state-owned firms.

Third, differences in the performance are examined by sector (major classification). Results are reported in table 6. The coefficients for foreign dummies in sectors 3 (petroleum, industrial chemicals) and 5 (machinery) are positive and significant in the sales. Sector 3 has a positive and significant foreign dummy coefficient also in the productivity. On the other hand, the coefficient in sector 2 (textiles, wearing apparel) is estimated as significantly negative. In sum, the corporate performance of foreign-owned firms is better in chemical and machinery sectors but is worse in textile sector than domestically-owned firms. The latter result may indicate that domestically-owned firms in industries in which China has had comparative advantage are likely to get support from the government.

5.2. Korean Firms and Other Foreign-owned Firms

To examine differences in the performance between Korean firms and the other firms including non-Korean foreign-owned firms, we introduce a series of nationality dummy variables for Japan, Korea, HMT (Hong Kong, Macao, and Taiwan), the USA, the UK, France, Germany, and others. For instance, Japan dummy variable takes unity if the nationality of a foreign-owned firm is Japanese.

Regression results are shown in table 7. The coefficients for Japan, France, and Other dummies are significantly positive in all equations. The coefficients for Korea are estimated to be significantly positive in most of the equations. This result indicates that Korean firms largely have higher performance than not only domestically-owned firms but foreign-owned firms with some nationalities. Such higher performance of Korean firms may be due to the proximity to the home country, which enables them to enjoy low transaction costs in connecting their business with the home country.

Table 7 Corporate Performance by Firm Nationality

	Productivity		Sales	
	Japan	0.405** (0.115)	0.239* (0.109)	0.415** (0.100)
Korea	0.322** (0.107)	0.185 (0.102)	0.356** (0.093)	0.230** (0.088)
HMT	0.109 (0.083)	-0.068 (0.079)	0.045 (0.072)	-0.126 (0.068)
USA	0.343* (0.147)	0.216 (0.138)	0.337** (0.128)	0.205 (0.119)
UK	0.354 (0.355)	0.031 (0.334)	0.283 (0.309)	-0.004 (0.288)
France	0.906* (0.394)	0.832* (0.370)	1.029** (0.343)	0.995** (0.320)
Germany	0.851** (0.262)	0.373 (0.248)	0.593** (0.229)	0.115 (0.214)
Other	0.595** (0.150)	0.455** (0.143)	0.671** (0.131)	0.510** (0.123)
Constant	2.140** (0.065)	2.774** (0.077)	3.542** (0.057)	4.062** (0.067)
Scale	No	Yes	No	Yes
Year	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes
City	No	Yes	No	Yes
Obs.	3,214	3,214	3,214	3,214
R-square	0.1370	0.2442	0.1653	0.2789

Note: Heteroskedasticity-consistent standard errors (White) are in parentheses. ** and * show 1% and 5% significance, respectively.

Then, the differences among Korean firms and the other firms are examined by scale. Results are in table 8. The coefficients for Japan, the USA, France, Germany, and Other with a relatively small number of employees are significantly positive, while the coefficients for Japan and the USA with a relatively large number of employees are estimated to be significantly negative. The coefficients for Korean firms with 0-499 employees in both equations and with 500-999 employees in real sales per worker are estimated to be significantly positive. The result of such higher performance of small sized Korean firms may be a bit surprising. Indeed, recently, a large number of small sized Korean firms have withdrawn from Shandong province due to the loss of their competitiveness. One possible reason for this result is that our dataset includes relatively successful firms in terms of sales (more than 50 million RMB) even if their employees are small.¹²⁾ That is, small sized Korean firms with large total sales may succeed in keeping their competitiveness.

Finally, differences in corporate performance among Korean firms and the other firms are examined by sector. Table 9 presents the results. The coefficient for Japan dummy in sector 5 (machinery), the coefficients for USA and Germany dummy in sector 3 (petroleum industrial chemicals), and the coefficient for France dummy in sector 4 are estimated to be significantly positive. On the other hand, the coefficients for Korea dummy in both equations are significantly positive in sector 4 (formed and fabricated materials) and sector 5 (machinery). Since transportation costs and close coordination play an important role in those sectors, the proximity of Korean firms to the home country may lead to such significantly higher productivity in Korean firms in those sectors.

¹²⁾ Another possible reason would be that our dataset might not well reflect the very recent situation of Korean firms in Shandong Province.

Table 8 Corporate Performance by Firm Nationality and by Scale

# of Employees	0-499	500-999	1000-1499	1500-2499	2500-4999	5000-
Productivity						
Japan	0.401* (0.158)	0.303 (0.198)	0.106 (0.297)	-0.129 (0.353)	-2.467** (0.896)	-2.240** (0.332)
Korea	0.379* (0.175)	0.282 (0.147)	-0.273 (0.323)	-0.296 (0.333)	-0.237 (0.900)	-0.543 (0.434)
HMT	-0.011 (0.121)	0.183 (0.130)	-0.216 (0.245)	-0.258 (0.237)	-0.409 (0.361)	
USA	0.456* (0.201)	0.032 (0.210)	0.041 (0.577)	1.340 (0.788)	-0.739 (0.952)	-3.094** (0.557)
UK	0.144 (0.437)	0.079 (0.464)				
France	0.451 (0.539)	1.168* (0.486)				
Germany	0.610* (0.257)	-0.019 (0.563)				
Other	0.487** (0.186)	0.010 (0.237)		1.175** (0.390)		
Constant	2.796** (0.118)	2.382** (0.132)	2.105** (0.185)	2.087** (0.227)	2.085** (0.343)	2.572** (0.434)
Scale	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Sector	No	No	No	No	No	No
City	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	770	1,094	488	466	273	123
R-square	0.1909	0.1720	0.2879	0.3876	0.3764	0.7617
Sales						
Japan	0.402** (0.133)	0.442* (0.171)	0.173 (0.237)	-0.360 (0.332)	-2.115** (0.723)	-2.435** (0.362)
Korea	0.316* (0.147)	0.357** (0.126)	0.112 (0.258)	-0.286 (0.313)	-0.307 (0.726)	-0.442 (0.472)
HMT	-0.130 (0.102)	0.163 (0.112)	-0.229 (0.196)	-0.274 (0.223)	-0.468 (0.292)	
USA	0.391* (0.169)	0.234 (0.181)	0.141 (0.462)	0.784 (0.741)	-0.996 (0.768)	-3.725** (0.606)
UK	0.260 (0.367)	0.018 (0.400)				
France	0.903* (0.453)	1.126** (0.419)				
Germany	0.390 (0.216)	-0.198 (0.484)				
Other	0.559** (0.156)	0.262 (0.204)		1.157** (0.367)		
Constant	4.169** (0.099)	3.609** (0.114)	3.339** (0.148)	3.223** (0.213)	3.342** (0.277)	3.723** (0.472)
Scale	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes
Sector	No	No	No	No	No	No
City	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	770	1,094	488	466	273	123
R-square	0.2380	0.1904	0.3564	0.3547	0.4270	0.7415

Note: Heteroskedasticity-consistent standard errors (White) are in parentheses. ** and * show 1% and 5% significance, respectively.

Table 9 Corporate Performance by Firm Nationality and by Sector

# of Employees	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6
Productivity						
Japan	-0.130 (0.226)	-0.272 (0.241)	0.754 (0.498)	0.172 (0.254)	0.555** (0.210)	-1.090* (0.516)
Korea	0.373 (0.514)	-0.186 (0.158)	0.521 (0.372)	1.712** (0.412)	0.516** (0.174)	-1.174** (0.275)
HMT	-0.112 (0.234)	-0.313* (0.150)	-0.061 (0.484)	-0.053 (0.130)	-0.017 (0.212)	0.238 (0.172)
USA	0.389 (0.444)	-0.198 (0.373)	0.980* (0.438)	0.407 (0.297)	0.071 (0.246)	-0.636 (0.375)
UK			-0.036 (0.478)		0.128 (0.527)	
France			0.337 (0.584)	1.652** (0.508)	0.999 (0.908)	
Germany			1.331** (0.483)	-0.360 (0.706)	0.385 (0.409)	-0.638 (0.590)
Other	0.672* (0.263)	-0.160 (0.440)	0.368 (0.341)	0.505 (0.318)	-0.227 (0.408)	1.026* (0.431)
Constant	2.541** (0.126)	2.509** (0.150)	2.375** (0.194)	2.709** (0.128)	2.386** (0.125)	2.162** (0.177)
Scale	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Sector	No	No	No	No	No	No
City	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	519	544	453	647	787	264
R-square	0.1141	0.2807	0.2877	0.2747	0.1721	0.2380
Sales						
Japan	-0.115 (0.195)	-0.125 (0.207)	0.695 (0.419)	0.082 (0.237)	0.566** (0.183)	-0.154 (0.403)
Korea	0.280 (0.445)	0.021 (0.135)	0.269 (0.313)	1.526** (0.385)	0.523** (0.151)	-0.714** (0.215)
HMT	-0.274 (0.203)	-0.377** (0.129)	0.023 (0.406)	-0.055 (0.121)	0.016 (0.185)	0.072 (0.134)
USA	0.307 (0.385)	-0.345 (0.319)	0.504 (0.368)	0.473 (0.278)	0.310 (0.214)	-0.289 (0.293)
UK			-0.091 (0.401)		0.139 (0.458)	
France			0.437 (0.491)	1.546** (0.474)	1.426 (0.790)	
Germany			0.942* (0.405)	-0.811 (0.659)	0.212 (0.356)	-0.577 (0.461)
Other	0.770** (0.228)	0.154 (0.377)	0.427 (0.287)	0.427 (0.297)	0.207 (0.355)	1.256** (0.336)
Constant	3.897** (0.109)	3.586** (0.129)	3.327** (0.163)	3.770** (0.120)	3.541** (0.108)	3.230** (0.138)
Scale	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Sector	No	No	No	No	No	No
City	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	519	544	453	647	787	264
R-square	0.1867	0.2910	0.2924	0.2662	0.1837	0.3096

Note: Heteroskedasticity-consistent standard errors (White) are in parentheses. ** and * show 1% and 5% significance, respectively. As for sectoral code (major classification), see Appendix.

6. CONCLUDING REMARKS

This paper constructed a firm-level dataset of manufacturing firms in Shandong Province and examined whether economic performance, e.g., labor productivity, of foreign-owned firms, particularly of Korean firms, was higher than that of domestically-owned firms. In the regression analysis, we found that foreign-owned firms overall achieved significantly higher corporate performance. In particular, relatively small sized Korean firms and Korean firms in formed and fabricated materials sector and machinery sector had relatively high performance among firms including foreign-owned firms.

Differences in corporate performance across firm nationalities are attributed to technological/managerial capability of firms and its compatibility with local production conditions. More formal analysis on the source of competitive performance is required in future research. Particularly in the case of Korean firms in Shandong Province, local production conditions in the context of new economic geography such as the geographical proximity to Korea and positive agglomeration effects may partially explain relatively high performance of Korean firms. Interactions with local firms in terms of competition and technology transfer/spillovers are another important issue to be further investigated.

APPENDIX

Table A1 Sectoral Codes

Major Classification		Minor Classification	
1	Foods, Beverages, and Tobacco	1	Foods from Agriculture Products
		2	Foods
		3	Beverages
		4	Tobacco
2	Textile, Wearing Apparel	5	Textile
		6	Textile Wearing Apparel
		7	Leather, Fur, Feather, and Related Products
3	Petroleum, Industrial Chemicals	13	Petroleum, Coking, Processing of Nuclear Fuel
		14	Raw Chemical Materials and Chemical Products
		15	Medicines
		16	Chemical Fibers
4	Formed and Fabricated Materials	17	Rubber
		18	Plastics
		19	Non-metallic Mineral Products
		20	Ferrous Metals
		21	Non-ferrous Metals
		22	Metal Products
5	Machinery	23	General Purpose Machinery
		24	Special Purpose Machinery
		25	Transport Equipment
		26	Electrical Machinery and Equipment
		27	Communication Equipment, Computers and
		28	Precision Machinery
6	Other Manufactured Products	8	Wood, Bamboo, Rattan, Palm, and Straw Products
		9	Furniture
		10	Paper and Paper Products
		11	Printing, Reproduction of Recording Media
		12	Articles for Culture, Education, and Sport Activity
		29	Other Manufacturing Industries
		30	Recycling

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