

Intangible Capital Transfer Within Multinationals: Evidence from Korean MNCs*

Jaehan Cho

Arizona State University

February 12, 2013

Abstract

In this paper, I use a unique data set for South Korean multinational affiliates to provide evidence of the benefit of being an MNC, especially regarding intangible capital. First, My data indicate that at the aggregate-level, physical trades are more prevalent than employee transfers. On the extensive margin, however, most Korean affiliates have at least one or more Korean management-level employees whereas almost half of them have absolutely zero intermediate purchases from the parent. Furthermore, Korean management-level employees from the parent are positively associated with labor productivity while physical trades within MNCs are not. Second, with a huge heterogeneity in the share of Korean management-level employees, I find that a number of Korean management-level employees are necessary for a newly starting firm, but as its size becomes larger it adds natives in management positions instead of Koreans. Also, Koreans in management positions become less important for an affiliate that is motivated to serve the domestic market. My findings provide strong evidence that transferring Korean management-level employees is a key factor for successful FDI and that they transfer firm-specific technology capital.

*Email: jaehan.cho@asu.edu. Thanks to Seung Ahn, Alexander Bick, David Lagakos, Jose Mendez, Edward Prescott, Natalia Ramondo, Todd Schoellman, Dan Silverman and audiences at the ASU Macroeconomics Workshop.

1 Introduction

Multinational corporations' (MNCs) activities have become larger and grown quickly in terms of shares of GDP and trade. In 2010, MNCs' production worldwide generated value-added of approximately \$16 trillion, which is about a quarter of global GDP. The Foreign affiliates of MNCs accounted for more than 10 percent of global GDP and one-third of world exports.¹ The sales through MNCs have remarkably increased over the last decades. In 2010, the total sales through the MNCs abroad were approximately \$33 trillion which exceeded total world exports of about \$19 trillion. Nonetheless an MNC's affiliate abroad is inevitably confronted with difficulties from the hosting countries because they are neither used to being with nor have enough information about the domestic situations. In spite of these disadvantages, however, why have MNCs' activities been prevalent abroad? More specifically, what is the benefit of being in an MNC?

An MNC can transfer its firm specific technology to its affiliates to overcome inherent difficulties; secret technology, superior marketing or management techniques.² At the aggregate level, previous quantitative studies emphasized that such intangible transfers from the parent to the affiliates are an important source for welfare gain through foreign direct investment (FDI).³ However, there is little work empirically to show or provide any evidence as to how an MNC transfers its specific advantages to its affiliate. In this paper, therefore, I provide evidence for the benefit of being an MNC, especially regarding intangible capital transfers and physical trades. For this, I will use the unique data set for South Korean multinational affiliates abroad.

For the last 30 years, Korean MNCs have increased FDI and held numerous foreign affiliates abroad. During the same period, Korean total FDI has increased two times faster than total trade.⁴ In 2010, Korea was the 16th country in terms of outward FDI flows and it invested \$23.1 billion over the world.⁵ In 2010, Korean multinational affiliates' worldwide sales, \$478.8

¹World Investment Report 2011, UNCTAD

²Various literatures refer to these by different terminologies such as knowledge capital (Markusen (1984), managerial ability (Garicano and Rossi-Hansberg (2006) and technology capital (McGrattan and Prescott (2010)

³See Burstein and Monge-Naranjo (2009), McGrattan and Prescott (2010), Ramondo and Rodriguez-Clare (2012)

⁴Korean FDI abroad has increased by 20.7 percent compared to its trade volume which increased by 10.1 percent from 1981 to 2010. See the Korea Export-Import Bank (EXIM) and the Korea International Trade Association (KITA)

⁵It was slightly higher than Norway but lower than Italy. UNCTAD

billion, exceeded total exports from Korea of \$466.5 billion.⁶ Also, shipments between parents and affiliates of Korean MNCs, which are called intra-firm trade, accounted for 28.9 percent of total Korean exports and 16.6 percent of total imports in Korea.⁷

In this paper, using the Korean MNCs data, 'Benchmark Survey of South Korean Multinational Affiliates Abroad', collected by the Korean Export-Import Bank (EXIM), I provide evidence that Korean MNCs share their intangible capital and I investigate its characteristics. The data cover Korean affiliates abroad as local legal entities and include detail information about the number of employees and transactions with other firms. The details regarding employees and transactions allow us to document several interesting facts as to how an MNC interacts or shares its intangible or physical trades within parents and affiliates.

On the employment side, at the aggregate level, my data show that Korean multinational affiliates hire employees mostly from the hosting country. In 2010, 97.7 percent of total employees in Korean affiliates abroad in my sample are native employees from the hosting country. I document that, among the Korean employees working for the Korean affiliate abroad and accredited from the parent in Korea, Korean employees fill management-level positions relatively more than production-level positions. Furthermore, on the extensive margin, most Korean affiliates abroad hold at least one Korean management-level employee. Specifically, in 2010, 81.4 percent of Korean affiliates had some Korean management-level employees while only 29.9 percent of Korean affiliates had some Korean production-level employees in my sample. Interestingly these Korean management-level employees are positively associated with the measure of labor productivity.

On the other side, at the aggregate-level, intra-firm imports from the parent seem to be prevalent. In 2010, Korean multinational affiliates imported 35.4 percent of their total purchases from the parent in Korea, called intra-firm imports, and 59.2 percent from both the parent in Korea and those related affiliates abroad who share the same parent, called intra-family imports. However, for each individual affiliate, 43.9 percent of Korean multinational affiliates had absolutely no purchases from the parent. Even if I consider intra-family imports, still 34.5

⁶I calculate Korean multinational affiliates' sales from the original sample data that I use for this paper as I discuss later, not population, so the true amount of affiliates' total sales worldwide might be larger.

⁷Bernard et al. (2011) reports that intra-firm trades were 25 percent of the total U.S. exports and 15 percent of total U.S. imports respectively. However, they calculated these using all U.S. MNCs registered, so intra-firm trade of Korean MNCs accounted for more trades in Korea

percent of Korean multinational affiliates had any purchases from neither the parent nor the related affiliates. In fact, these kinds of intra-family trades happen only in some large MNCs, especially in the developing countries.⁸ Moreover, these intra-family imports are not associated with the measure of labor productivity as Korean management-level employees are.

Most Korean affiliates abroad have at least one or more Korean management-level employees and they are relevant to labor productivity. The composition of management-level employees between Koreans and natives, however, has a huge heterogeneity across affiliates. Therefore, I provide which variables can predict the share of Korean management-level employees over total management-level employees and document the characteristics of Korean management-level employees.

First, my empirical work confirms that an affiliate needs only a few Korean management-level employees and that they are important for relatively new firms. My estimation results indicate that as an affiliate's size increases requiring more general management practices as in Burstein and Monge-Naranjo (2009), it keeps hiring natives in management positions instead of Koreans, so a larger firm has a lower share of Korean management employees. This implies that for an affiliate a few Korean management employees are sufficient to transfer an MNC's specific technology because they are not transferring general management practices. Even after I control firm characteristics and firm size, I show that the number of Korean management-level employees declines over time, showing that Korean management-level employees are more important for new firms.

Second, if an affiliate is motivated to serve the domestic market, it is likely to hire more native employees in management-level positions instead of Koreans. Oldenski (2012) emphasizes the importance of the cost for transmitting information related to decisions regarding FDI and argues that as an affiliate serves the domestic market more, communication to domestic consumers would be more important than the communication within production processes. So based on my finding, I can conclude that Korean management-level employees are more associated with the MNCs' specific technology or knowledge than information about domestic situations.

⁸I define as developing countries if its PPP GDP per capital from Penn World Table 7.0 was lower than that of Korea, \$25,029, and as developed countries if not. Even if I consider the breakpoint as \$20,000, the result is not different

Based on my empirical results, transferring management-level employees from the parent is important for establishing or initiating an affiliate. And their characteristics tell us that they are associated with firm specific technology or knowledge rather than general management skills. Because one crucial gain from FDI is transferring technology or intangible capitals, I conjecture that transferring management-level employees is one of the most important strategies for not only an MNC but also a key factor for the hosting country

My findings are in company with the importance of transferring intangible capital within MNCs or firms who share the same ownership proposed by Atalay et al. (2012) and Ramondo et al (2012). Atalay et al. (2012) document that even if a U.S. firm owns its affiliate within its production chain, it is hard to see physical transactions. As an alternative explanation, they suggest that vertical ownership promotes efficient intra-firm transfers of intangible inputs. Using U.S. multinationals Ramondo et al (2012) also show that U.S. affiliates abroad are isolated from the parents in terms of physical trades, and input-output links between the affiliates and the parent are not associated with intra-firm flows of physical goods. They suggest that the comparative advantage of MNCs comes from transferring intangible assets not physical trade. Neither of them, however, provides direct evidence of an intangible capital transfer. I show a direct evidence of intangible capital transfer using Korean management-level employees.

Moreover, my results from the characteristics of Korean management-level employees provide important information as to how an MNC organizes its labor resources in the same vein as Garicano and Rossi-Hansberg (2006), Garicano and Hubbard (2007) and Caliendo et al. (2012). My finding suggests that an MNC shares its unique knowledge with its affiliates through management-level employees from the parent and then it expands through hiring native workers from the hosting country. Also, my result suggests that the knowledge augmented to Korean management-level employees can be diffused to the native management-level employees. This can imply that the MNC may have a comparative advantage through transferring management-level employees.

The remainder of the paper is organized as follows. Section 2 describes the Korean MNCs' affiliates data. Section 3 describes the importance of Korean management-level employees for Korean foreign affiliates relative to intra-firm imports. Section 4 presents the correlation of Korean management-level employees share. Section 5 discusses the results from the estimations and section 6 is the conclusion.

2 Data

My firm level data set is from the 'Benchmark Survey of South Korean Multinational Affiliates Abroad' collected by the EXIM owned by the Korean government. Since 1999, by request of the Korea Ministry of Knowledge Economy, the EXIM has conducted this yearly survey using a questionnaire based on survey forms. In 2010, 35,950 Korean foreign affiliates operating abroad reported to the EXIM. Among them, the EXIM tried collecting 7,332 affiliates that had total accumulated investment of more than \$1 million. My original sample set has details of 3,893 affiliates who responded to the survey. It covers only about 10 percent of the total number of Korean affiliates abroad but about 65 percent of the total accumulated investments of Korean MNCs. I can say, therefore, that the samples can well represent Korean MNCs activities abroad.

The data includes detail information about employees and trades of Korean MNCs abroad from 2005 to 2010. It has 3,583 parents investing in 5,970 affiliates abroad.⁹ For unknown reasons, some affiliates did not report their trade information for either exports or imports, so I exclude these from my analysis. I note that the exclusion does not change my main results. In 2010, 1,579 firms failed to report trade information, but even after excluding them, my sample represents more than 85 percent of the original samples in terms of number of employees, so I can drop firms who did not report their trade information.¹⁰ Finally, my final sample has 2,349 parents investing in 3,908 affiliates. On average, a parent has 1.9 affiliates and the median parent has only one affiliate in 2010. A parent had at most 55 affiliates over the world. The variables were basically collected from the perspective of the affiliates not the parents. I can

⁹Not all affiliates reported for the entire 6 years

¹⁰As I reported, my original sample covers about 65 percent of the total accumulated investments of the Korean MNCs world population. By excluding firms which have missing variables in trades, I do not know how much the total investment in my final sample covers. However, they are a small fraction in terms of number of employees so I can say that the final sample can still well represent Korean MNCs activities abroad. I note that, however, it can be biased toward having only large affiliates

figure out in which country and in which industry an affiliate is.¹¹

The unique value of this data set is that I have extensive details of employee information. I have the number of employees of the affiliates categorized by whether the employees are native or Korean and which one of four positions they hold in the affiliate. The four positions are Executive, Manager, Sales worker and Production worker. Henceforth, I consider employees in Executive and Manager as management-level employees and employees in Sales and Production as production-level employees, following Lorenzo et al (2012)¹². And further, I presume that all Korean employees are accredited from the parent in Korea¹³. From this assumption, I can distinguish two types of management-level employees by origin.

Also, one of advantages of this data set is that I have relatively detailed information of sales and purchases in the affiliates. I have export and import information of the affiliates with other partners around the world.¹⁴ A partner can be identified whether it is one of the related affiliates that is invested in by the same parent in Korea, or the unrelated, and whether it is in the same hosting country, Korea, or the other country. So I have a total of 12 trade variables such as sales and purchases directly with the parent, the related affiliates in the hosting country or another country, as well as sales and purchases by unrelated affiliates in Korea, the hosting country or another country. Henceforth, I define sales and purchases directly with the parent as intra-firm exports and imports respectively and with the parent and the related as intra-family exports and imports respectively. Using this information, I can figure out the motivation of FDI, such as servicing the domestic market, or how an affiliate procures its intermediates, domestically or abroad or from the related or unrelated.

Being from an upper-middle income country, Korean MNCs operate actively in both the developing and the developed world. Table 1A shows the list of the top 20 countries hosting Korean MNCs operating in terms of number of affiliates. In my sample, China hosted the most

¹¹The industry is classified by 2-digit Korean standard industrial classification (KSIC) is broken down by 65 industries

¹²Lorenzo et al. (2012) documents that there are different layers in French firms and workers in different layers perform different tasks and receive a different payoff. Based on wage and task information from the French firms, they classify sales and production positions in the same layer. Unfortunately, I do not have wage information for each position so I follow their classification for production-level employees

¹³In view of the fact that Korea allowed people to hold only one citizenship before 2011, and a Korean means that he or she is a Korean resident, my assumption is valid

¹⁴These are dollar values

Korean MNCs, 1.033, both in terms of number of affiliates and employees, with total sales and number of employees, \$ 124,485 million and 465,936 employees respectively. The U.S. hosted the second most Korean MNCs in terms of number of affiliates, 244, with total sales of \$69,912 million and 30,553 employees. Vietnam hosted the second most Korean MNCs in terms of number of employees, 223,323 and it hosted 193 affiliates and sold \$5,597 million. As shown in Table 1A, Korean MNCs' affiliates operate in various countries that are quite different by market size or endowments.

[Table 1A]

Across industries, Korean MNCs found their affiliates abroad mainly in manufacturing. Table 1B shows that in 2010, 69 percent Korean affiliates abroad were in manufacturing. They hired more than 90 percent of total employees and sold more than 55 percent of total sales of the Korean affiliates. Wholesale and retail trade industry hosted the second most Korean affiliates abroad. They hired relatively fewer employees but they sold, on average, more than manufacturing. Although other sectors are not as prevalent as manufacturing or wholesale and retail trade, Korean MNCs invest in various kinds of industries.

[Table 1B]

In what follows, using the data I analyze the composition of employees and pattern of trade for the affiliates. Especially, I document which one, either accrediting employees or physical trade, is the more prevalent interaction between a parent and its affiliates. Moreover, I show how they are correlated with productivity of the affiliates.

3 The Composition of Employees and Pattern of Trade within Korean MNCs

At the aggregate level, Korean employees are a very small portion of the total employees whereas intra-firm or family trades are a prominent portion of total sales and total purchases in Korean foreign affiliates abroad. They hire employees mostly from the domestic market instead of accrediting from the parent in Korea. In 2010, Korean MNCs affiliates in my sample hired 1,109,991 total employees but only 2.3 percent of total employees, 26,029, are Korean. On the

other hand, they bought 35.5 percent and 59.2 percent of the total purchases and sold 15.9 percent and 33.7 percent of the total sales through intra-firm and family trade respectively. Viewing the aggregate statistics, it indicates that Korean MNCs depend more on physical trade, especially imports, than employee transfers within themselves.

[Table 2A]

However, interestingly, I can see a different pattern of the composition of employees across the different positions. Even though the share of Korean employees in Korean MNCs' affiliates is very small, the share of Korean management-level employees over total management-level employees is relatively high. In 2010, the share of Korean management-level employees over total management-level employees is 10.1 percent while the share of Korean production-level employees over total production-level employees is 1.3 percent. As seen in Table 2B, Korean employees are a small portion of production-level employees but relatively more Koreans fill management-level positions.

[Table 2B]

At the firm level data, more interestingly, even though Korean MNCs have a few Korean employees, on the extensive margin, most Korean affiliates have at least one or more Korean management-level employee. In 2010, among 2,314 affiliates, 81.3 percent of Korean MNCs affiliates, 1,883, had at least one or more Korean management-level employees while only 29.9 percent of Korean affiliates, 421, did for production-level employees.¹⁵ As I can see in Table 3A, even in the developed countries that might have a higher management skill, 71.9 percent of Korean affiliates still had some Korean management-level employees.

[Table 3A]

However, regarding physical trade, almost half of Korean MNCs' affiliates have absolutely zero purchases from the parent. In table 3A, 43.8 percent of the affiliates have no purchases through intra-firm imports and this pattern is not different across the developing and the developed. In 2010, 31.6 percent of the parents, 384 of the total 1,217 parents, have more than a single affiliate

¹⁵Excepting for 14 affiliates, 417 Korean affiliates had both a Korean production and management-level employee. So there are only a few affiliates that have Korean production-level employees without Korean management-level employees

abroad. Therefore, I should consider the possibility of a physical trade from the parent to an affiliate through the other affiliates, which is captured by a part of intra-family trade. Even after considering this kind of physical trade from not only the parent directly but also from the related affiliates indirectly, at least 34.5 percent of total affiliates still had absolutely zero intra-family trade in 2010.¹⁶

[Table 3B]

I discussed two mechanisms to interact between a parent and its affiliates, physical trade and management-level employees. At the firm level, most Korean MNCs' affiliates have at least one or more Korean management-level employees even though they have a very small number of Korean employees. Regarding the physical trade, almost half of the affiliates have no intra-firm imports and at least 1/3 or possibly more of the affiliates have no intra-family imports.¹⁷ Overall, the data suggest that employee transfers are more common than intra-firm or intra-family imports on the extensive margin. Next I raise the question, what motivates Korean management-level employee transfers within Korean MNCs and whether management-level employee transfer is a main mechanism to transfer firm advantages to affiliates rather than physical trade in practice. To answer these questions, I test a correlation between these two variables and the affiliates' productivity. I estimate a following equation,

$$V_{acit} = \beta_o + \beta_1 \cdot S1_{acit} + \beta_2 \cdot S2_{acit} + \beta_3 \cdot S3_{acit} + \beta_4 \cdot X_a + \beta_5 \cdot X_c + \beta_6 \cdot X_i + \beta_7 \cdot X_t + \epsilon_{acit} \quad (1)$$

In equation (1), the dependant variable (V_{acit}) is the labor productivity for the affiliate a in country c , industry i and time t . I measure the labor productivity as valued-added divided by total employees.¹⁸ $S1_{acit}$ is the share of Korean management-level employees over management-level employees and $S2_{acit}$ is the share of total management-level employees over

¹⁶As I refer, trades from the other related affiliates can not only be a part of indirect trade originally from the parent but also purely independent from the parent. Therefore, 34.5 percent must be the lower boundary of the share of Korean affiliates who are involved with the parent through the physical trade

¹⁷Again, all intra-family imports may not come originally from the parent so 34.5 percent is the lowest boundary

¹⁸The value-added is calculated by total sales minus total purchases. In my data set, total purchases includes any costs to buy inputs from outside of the firm

total employees.¹⁹ $S3_{acit}$ is the share of intra-family imports over total purchases.

There are unobservable characteristics from different countries or industries that can increase labor productivity, for example, infrastructures or factor intensity. Moreover, Korean affiliates abroad sold a significant portion of their total sales to other countries abroad so their total sales can fluctuate depending on global economic conditions.²⁰ Therefore, I control country, industry (2-digit) and year effects through dummy variables. Moreover, there are unobservable characteristics that can lead to high labor productivity, for example, as each affiliate faces a different product market. So to control an individual characteristic of the affiliates, I do the panel analysis with the affiliate fixed-effect.

From the column (1)-(4) in Table 4A, I can see that a one point increase in the share of Korean management-level employees over total management-level employees is positively associated with a 0.6 to 0.7 increase in labor productivity.²¹ Also, my regression result indicates that a one point increase in the share of manager-level employees is positively associated with a 0.6 to 0.8 increase in labor productivity. So given the same management skill, Korean management-level employees are positively associated with labor productivity. On the other hand, intra-family imports are not associated with labor productivity. The share of intra-family imports over total purchases is statistically insignificant within 10 percent confidence interval. One question that I can ask is whether physical imports might be used for production with a time lag. Due to the fact that the value-added of some samples were negative, it might be possible that an affiliate bought intermediate goods from the parent to use for the next year.²² So considering this case, I use a time lag for each variable and report the results in Table 4A, columns (5). However, my result is not different and all lag variables are statistically insignificant. As I showed before, almost 40% of the affiliates have zero intra-family imports. So I consider the effect of intra-family imports on labor productivity on both extensive and intensive margins. In column (6), I consider dummy variable for whether an affiliate has intra-family imports or not. In equation

¹⁹I put this variable for two reasons. First, I want to control the effect of the share of management-level employees over total employees from the change of Korean management-level employees. Second, I want to double check if my measure of the labor productivity is valid. Previous literatures document that management skills are positively associated with a firm's productivity, see Bloom and Reenen (2007), so if my labor productivity is measured well, the sign of the coefficient for $S2_{acit}$ can be expected to be significantly positive

²⁰The sample includes the great recession period, 2009

²¹The average of labor productivity is 0.26 with standard deviation, 2.8. Maximum is 142.8 and minimum is -23.3

²²1,237 samples among 11,254 have negative value-added

(7), I consider samples only that have positive intra-family imports. The results show that intra-family imports are associated with labor productivity on neither extensive nor intensive margins.²³

[Table 4A]

Although It can be difficult to define intra-firm or family trade in the non-manufacturing sector, i.e. hotels and restaurants, my result is consistent with affiliates in the manufacturing sector. Table 4B shows that coefficients of the share of Korean management-level employees are a little smaller with only manufacturing affiliates than those with all affiliates but still positive and statistically significant. On the other hand, the share of intra-family imports over total purchases is not statistically associated with the total labor productivity of the firm. Therefore, in the manufacturing sector also transferring Korean management-level employees is more relevant for the affiliate's labor productivity than physical intra-family imports.

[Table 4B]

Not only are intra-family imports relatively less associated with labor productivity as I showed in Table 4A and Table 4B, but it also happens in some large affiliates, especially in the developing. Figure 1A shows the distribution of the share of intra-family imports over total purchases in 2010. As I documented before, almost 40 percent of affiliates had less than 10 percent of intra-family imports, actually most of them had zero. Figure 1B shows the same distribution in Figure 1A but it weights each firm using number of total employees. By comparing the two figures, I can see that the fraction of affiliates between 0-10 percent decreases in the developing while it increases in the developed. Therefore, I imply that intra-family imports mostly happen in some large affiliates not in the developed but in the developing.²⁴ In section 2, I discussed that my sample of the Korean affiliates abroad can be biased to some larger affiliates. In this sense, intra-family imports are much less relevant for the affiliates in the total population.

²³I consider only intra-family imports but an affiliate still can interact with its parent or the related affiliates through intra-family exports. And also, it can be possible that only direct trade from or to the parent matters for the affiliate i.e intra-firm import or export. Considering that, I estimate the correlations between various type intra-trades and labor productivity then I report the result in Table.A3 in appendix

²⁴Ramondo et al. (2012) also document that intra-firm trade happens only in some large U.S. affiliates. Atalay et al. (2012) also document that intra-firm trade between firms who share vertical ownership only happens to some large U.S. firms. Baldwin and Okubo (2012) also show that Japanese affiliates abroad buy and sell mostly to or from abroad and they operate independently from the related in terms of physical trade. They called these networked affiliates. My data, as well as theirs, also suggests that both intra-firm and family imports and exports are likely to happen only in some large Korean affiliates but especially in the developing

In this section, I showed that employee transfers, especially management-level employees, are more relevant than intra-family trade on the extensive margin. And also, Korean management-level employees are more importantly related with labor productivity than intra-family imports. In the next section, I investigate more about patterns of Korean management-level employee transfers and characteristics.

4 Patterns of Korean Management-Level Employee Transfers

In the previous chapter, I showed that transferring Korean management-level employees is important for a Korean affiliate, especially in the fact that it is positively associated with its labor productivity. And also, I can see that more than 80 percent of Korean affiliates in my sample had at least one Korean manager-level employee in 2010. The average affiliate, in the same year, has 27.8 percent of total management-level employees as Korean and the median firm has 15.4 percent. Therefore, some affiliates have a relatively high share of Korean management-level employees. Across countries, the average affiliate in the developing has 26.4 percent of total management-level employees as Korean, a little lower than that in the developed, 33.4 percent. Across industries, the average affiliate in manufacturing has 26.5 percent of total management-level employees as Korean, a little lower than that in non-manufacturing, 32.2 percent.

At the firm level, each firm has heterogeneity in terms of the shares of Korean management-level employees. Figure 2A shows the distribution of Korean management-level employees in Korean affiliates abroad in 2010 by the developing and the developed. As the figure shows, different Korean affiliates have a quite different share of Korean management-level employees without a definite pattern. Furthermore, there is no striking difference in the pattern between the developing and the developed. Even if I see the distribution by manufacturing and non-manufacturing in Figure 2B, I cannot see any distinction across the industries.²⁵ Then, what characteristics of country, industry or firm can explain the share of Korean management-level employees over total management-level employees? To figure out which predictors can explain heterogeneity of the share of management-level employees, I regress estimate them using equation (2).

²⁵1,597 of 2,314 affiliates are in manufacturing in 2010

$$KS_{acit} = \beta_0 + \beta_1 \cdot Size_{acit} + \beta_2 \cdot Horizontal_{acit} + \beta_3 \cdot Distance_c + \\ + \beta_4 \cdot Living\ cost_c + \beta_5 \cdot X_p + \beta_6 \cdot X_{ct} + \beta_7 \cdot X_i + \beta_8 \cdot X_t + \epsilon_{acit} \quad (2)$$

In equation (2), the dependent variable (KS_{acit}) is the share of Korean management-level employees over total management-level employees including Korean and native manager-level employees. For explanatory variables, firstly, I measure the size of the affiliates, $Size_{acit}$, by either their total sales or total number of employees. $Horizontal_{acit}$ is the share of sales to the unrelated in the hosting country, which means how much an affiliate serves for the domestic market, over total sales.

I put variables to control the parent (X_p), country (X_{ct}) and industry (X_i) effects. To control the parent effect, I regress total sales of the parent in Korea ²⁶. For variables to see country effects (X_{ct}), I consider GDP, GDP per capita and investment share of GDP per capita from the Penn World Table 7.0 from Aten, Heston and Summers (2011). I also determine the distance to Korea from CEPII, as documented in Mayer and Zignago (2011). To consider education level in the hosting country, I determine the average years of schooling attainment from Barro and Lee (2010). Finally, besides the distance, to determine an accurate cost to accredit a Korean manager from Korea to the hosting country, I use Rules of Overseas Service Allowance of the Ministry of Foreign Affairs and Trade in Korea ²⁷. To control the industry effect, I use the share of R&D expenditures over total sales from The Survey of Research and Development in Korea and I also include time-dummy variables to control the time fixed effects. My dependent variable is the share so it is censored below zero and above one. Considering that, I use the Tobit model to estimate coefficients. Because not many observations turn out to be censored, I also use OLS for a robust check.²⁸ Table 5 reports the estimation result.

²⁶I cannot identify the parent but can only recognize whether affiliates share the same parent. So total sales of the parent in Korea is the sum of total sales of the Korean affiliates in my sample which share the same parent only

²⁷Actually, many Korean firms refer to the rules to decide expatriate compensation. One advantage from using these, I can get the cost for most countries. These rules are constructed based on UN Living Costs and ECA (Employment Condition Abroad)

²⁸Among 10,170 observations, 868 are censored below zero and 1,115 are censored above one. I also report the marginal effects on the share of Korean management-level employees on the effect on the expected value of the dependent variable conditional being between zero and one and on the probability of being between zero and one in Table.A4 in appendix

[Table 5]

In Table 5, the first and second columns show the result that is estimated by the Tobit model using different measure of the size of the firms. The third and fourth columns show the same result that is estimated by the OLS model for the robust check. In all columns, my dependent variable is share of Korean management-level employees over total management-level employees. As shown in Table 5, all columns' results are very similar and robust. The result implies some interesting characteristics of accrediting Korean management-level employees to the affiliates.

First, the result shows that the share of Korean management-level employees over the total management-level employees is negatively associated with the size of the firm. It means that as a firm's size becomes larger and larger and it needs more management skilled workers, it keeps hiring a native rather than having a Korean from the parent.²⁹ Because the dependent variable is the share of Korean management-level employees over total management-level employees, of course I cannot really determine whether one increases or not but at least I can see that it hires native managers rather than Korean.³⁰ Furthermore, I can claim that transferring a Korean manager is not solely because general manager skills are required more as a firm become larger and larger, but is a firm specific intangible capital.³¹

Another interesting finding from the results in Table 5 is that the share of sales to the unrelated in the hosting country over total sales, which measures how much the firm serves its domestic market, is negatively associated with the share of Korean management-level employees over total management-level employees. If an affiliate is to target the domestic market, understanding the circumstances of the domestic market must be more important than other knowledge to maximize its profit. Using U.S. MNCs, empirically, Oldenski (2012) shows that products requiring direct communication with domestic consumers are likely to be produced in the destination market through FDI instead of arm-length export. My result shows that even

²⁹Lucas (1978) and Burstein and Monge-Naranjo (2009) extend a standard neoclassical model by adding management know-how as a production factor. In their model, a firm requires more management skills as it becomes larger

³⁰I will discuss whether Korean and native management-level employees increase or decrease separately in the next chapter

³¹Burstein and Monge-Naranjo (2009) uses the model transferring management know-how from the developed to developing to show that the elimination of barriers to foreign control of domestic factors of production gives a welfare gain to a developing which has a relative scarcity of management know-how. One of their important assumptions is that management know-how flows from the developed to the developing

after FDI decisions, an affiliate still adjusts its management-level positions to fill the requisition of the communication. In line with her result, I can claim that a Korean management-level employee sent from the parent is relatively augmented with the firm-specific skill or technology but a native management-level employee hired from the domestic market is relatively augmented with country-specific skill or knowledge.

The results can also show that a parent, who has more multinational activities measured as total sales of the all affiliates, is likely to have a relatively smaller share of Korean management-level employees over total management-level employees. However, as an affiliate operates in a country that is farther away from Korea, the affiliate holds a relatively higher share of Korean management-level employees. These two results can be interpreted that as an MNC is more active, it can transfer its own skill or technology through the manager-level worker easier because it has the know-how to operate the other affiliates. And also, as the distance is farther from the parent, it is harder to transfer its own skill or technology through management-level employees, and it needs to send relatively more Korean management-level employees to transfer its own skill or technology.³².

I also see that an affiliate in an R&D intense industry has less Korean management-level employees. The result is consist to Keller and Yeaple (2009) who show that if inputs that an affiliate uses most are highly dependent on non-codified knowledge, called knowledge intensive, it depends relatively on physical trade and is sensitive to trade cost. Because not all knowledge can be codified, the affiliate faces a high cost to communicate between parent and affiliate managers while trade cost is invariant. With their result, I can interpret that affiliates in an R&D intense industry are likely to have intra-imports rather than transfer Korean management-level employees because it might be hard for them to communicate between Korean and native employees.

³²This interpretation can be in a line with Ramondo and Rodriguez-Clare (2009) and Irzabal et al. (2010). They calibrate the transportability of intangible assets and productivity within an MNC as a function of the distance between the parent and the affiliates

5 Pattern of Korean and Native Management-Level Employees

In the previous chapter, an important result is that the share of Korean management-level employees over total management-level employees decreases as the affiliate's size becomes larger. To see the pattern of how the share changes associated with the size, I will look at the pattern of Korean and native management-level employees separately.

Figure 3 shows the cumulative distribution of Korean affiliates by number of management-level employees. The cumulative distribution tells us that 90 percent of Korean affiliates have ten or less Korean management-employees while they have relatively monotonous increase in the numbers of native management-level employees as its size become larger. 21.5 percent of the Korean affiliates have zero native management-level employees and 20.6 percent of the Korean affiliates have more than 100 native management-level employees.³³ Interestingly, even though most Korean affiliates have Korean management-level employees but they have only a few of them. So I can say that Korean management-level employees transfer a firm specific skill, which does not depend on the relative size rather than a skill augmented to native management-level employees. And also, I argue that because the skill augmented by Korean management-level employees can diffuse to native management-level employees or other level workers, then the parent can send only a few Korean management-level employees to the affiliates. In this case, I also expect that the number of Korean management-level employees will decrease over time.

[Figure 3]

Table 6 shows the correlations of the number of Korean management-level employees and native management-level employees with an affiliate's size, measured as the affiliate's total sales and total employees, and time.³⁴ By column (1) and (3), which use different measure for size of firms, in Table 6, the panel regression using individual affiliate's fixed effect shows that the number of Korean management-level employees decreases over time. On the other hand, in column (2), the coefficient is statistically insignificant which means that the number of native management-level employees does not change over time. Column (4) shows that the number of

³³On average, a Korean affiliate has 5 Korean and 52 native management-level employees

³⁴I do not have information about the year when an affiliate started so I just use 6 years from 2005-2010, which are available in my sample, as one to six as the affiliates' age but I control each affiliate individual effect using fixed effect so I can see the effect of age independently

native management-level employees even increases over time when I use total employees as the measure of firms' size.

[Table 6]

I also reconfirm the result in the previous chapter about how an affiliate fills in the management-level positions as its size become larger. Although as the affiliate become larger, it hires both Korean and native employees in management level positions, but comparing column (1) and (3) or (2) and (4), I see that it hires native employees two times more than Korean. This consistent in the negative correlates between affiliates' size and the share of Korean management-level employees over total management-level employees in the previous chapter.

My result shows Korean management-level employees are important for a new affiliate. After it becomes established, it keeps hiring natives for management-level employees rather than accrediting Koreans. Moreover, as time passes, it sends Korean management-level employees back. From this fact, I conjecture that they transfer a firm specific technology or knowledge and it becomes transferred or diffused to native management-level employees. My result supports one of important results in Atalay et al. (2012) who shows that an affiliate tends to resemble its parent. Atalay et al. (2012) shows that an affiliate of a U.S. MNC is likely to produce the same product that the parent produces and sell it to the same destination that the parent does. Based on their finding, my result implies that management-level employees play an important role by transferring specific know-how or knowledge to the affiliate.

6 Conclusion

Using Korean MNCs' affiliate abroad data from the EXIM, this paper answers empirically what is the benefit to being in an MNC. I show that the relative importance of an MNCs transfer of Korean management-level employees from the parent and the affiliates over intra-firm or intra-family imports. Moreover, they are positively associated with an affiliate's productivity whereas the physical imports are not. This implies that transferring management-level employees is important for a successful FDI as well as FDI itself. This is why a MNC keep accrediting a management-level employee to its affiliates even with a high cost and risky.³⁵

³⁵Mervosh and McClenahan (1997) estimates the direct cost of a failed foreign assignment in U.S. multinationals ranges from \$250,000 to \$500,000. The survey (2005) from Mercer tells that various countries MNCs paid a

Although Korean management-level employee transfers are important within MNCs, there is a huge heterogeneity in the share of Korean management-level employees over total management-level employees. My estimation result indicates that a few Korean management-level employees are important for relatively new affiliates but as its size and need for management skills becomes larger, it hires natives from the hosting country to fill the position instead of accrediting Koreans from the parent. And also, if an affiliate is to serve the domestic market in the hosting country, which requires domestic information rather than a firm specific knowledge, native management-level employees are more important than Korean management-level employees. In addition, as parents become more experienced as multinationals, they transfer a relatively smaller number of Korean employees. This fact suggests that transferring Korean management-level employees can transfer a firm specific technology different from general management skills. I conjecture that successful accrediting management-level employees to affiliates is important for technology transfers through MNCs

management-level employee in Singapore more than double as when she were in the domestic because of housing, education and other costs

References

- Atalay, Englin, Ali Hortacsu and Chad Syverson (2012) 'Why Do Firms Own Production Chins?' *Unpublished Manuscript*
- Baldwin, Richard and Toshihiro Okubo (2012) 'Networked FDI: Sales and Sourcing Patterns of Japanese Foreign Affiliates' *NBER Working Paper* 18083
- Barro, Robert and Jong-Wha Lee (2010) 'New Data Set of Educational Attainment in the World, 1950-2010' *NBER Working Paper* 15902
- Bernoard, Andrew B., Stephen J. Redding, and Peter K. Schott (2011) 'Multi-Product Firms and Trade Liberalization' *The Quarterly Journal of Economics* 126(3), 1271-1318
- Burstein, Ariel T., and Monge-Naranjo Alexander (2009) 'Foreign Know-How, Firm Control, and the Income of Developing Countries' *The Quarterly Journal of Economics* 124(1), 149-195
- Caliendo, Lorenzo, Ferdinando Monte and Esteban Rossi-Hansberg (2012) 'The Anatomy of French Production Hierarchies' *NBER Working Paper* 18259
- Garicano, Luis, and Esteban Rossi-Hansberg (2006) 'Organization and Inequality in a Knowledge Economy' *The Quarterly Journal of Economics* 121(4), 1383-1435
- Heston, Alan, Robert Summers and Bettina Aten (2011) 'Penn World Table Version 7.0' *Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania*
- Keller, Wolfgang and Stephen R. Yeaple (2009) 'The Gravity of Knowledge' *NBER Working Paper* 15509
- Markusen, James R. (1984) 'Multinationals, Multi-plant Economies, and the Gains from Trade' *Journal of International Economics* 16(3-4), 205-226
- Mayer, Thierry and Soledad Zignago (2011) 'Notes on CEPII's distances measures (GeoDist)' *EPII Working Paper* 25
- McGrattan, Ellen, and Edward C. Prescott (2010) 'Technology Capital and the U.S. Current Account' *American Economic Review* 100(4), 1493-1522

- Mervosh, Edward M. and John S. McClenahan (1997) 'The Care and Feeding of Expats' *Industry Week* 246(22), 68-72
- Lucas, Robert E. Jr., (1978) 'On the Size Distribution of Business Firms' *Bell Journal of Economics* 9, 508-523
- Oldenski, Lindsay (2012) 'Export Versus FDI and the Communication of Complex Information' *Journal of International Economics* 87(2), 312-322
- Ramondo, Natalia, and Andres Rodriguez-Clare (2012) 'Trade, Multinational Production, and the Gains from Openness, *Unpublished Manuscript*
- Ramondo, Natalia, Veronica Rappoport and Kim J. Ruhl (2012) 'Horizontal vs. Vertical FDI: Revisiting Evidence from U.S. Multinationals. Unpublished Manuscript
- World Investment Report 2011, UNCTAD

Figures and Tables

Figure 1A: Distribution of affiliates by the share of intra-family purchases by countries

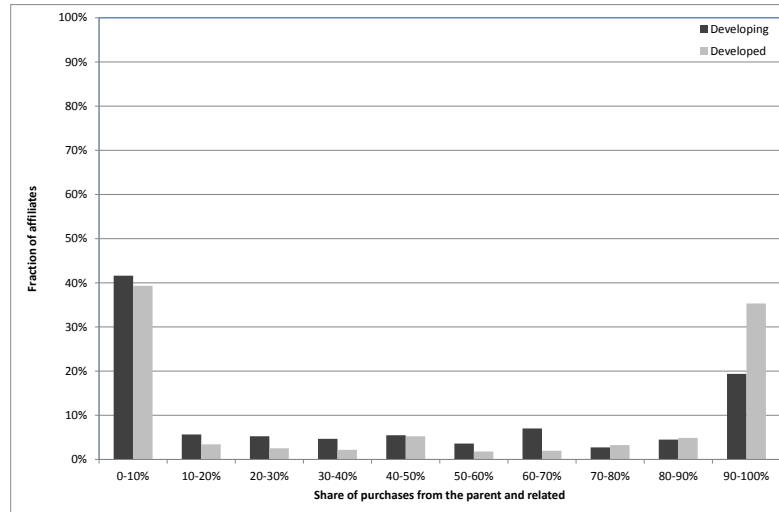


Figure 1B: Distribution of affiliates by the share of intra-family purchases by countries (weighted)

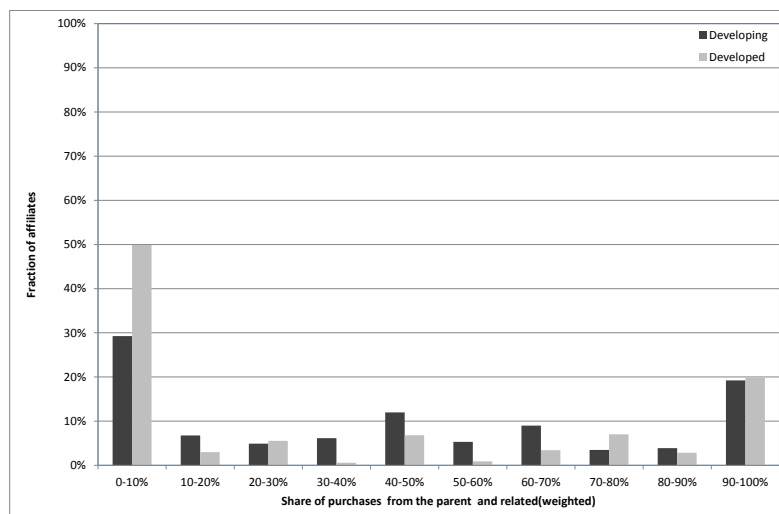


Figure 1C: Distribution of affiliates by the share of intra-family purchases by industries

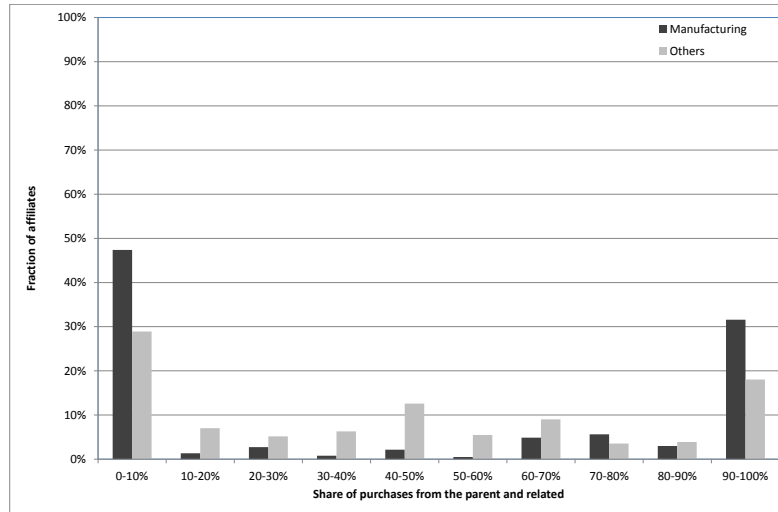


Figure 1D: Distribution of affiliates by the share of intra-family purchases by industries (weighted)

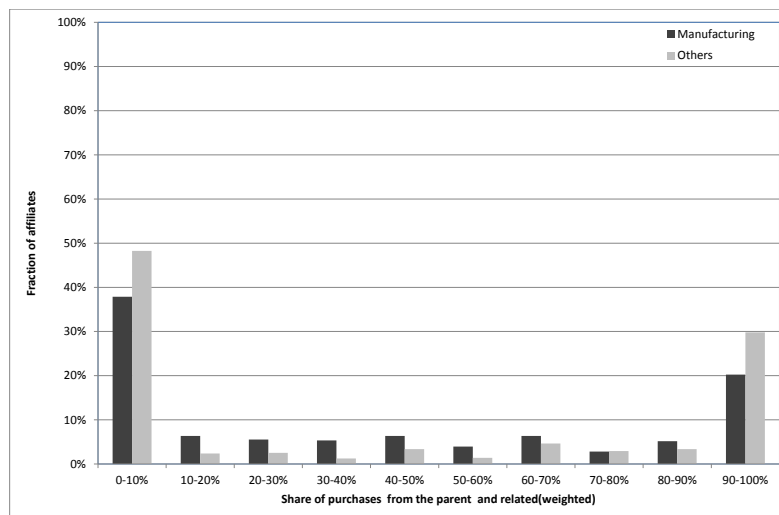


Figure 2A: Distribution of affiliates by the share of management-level employees by countries

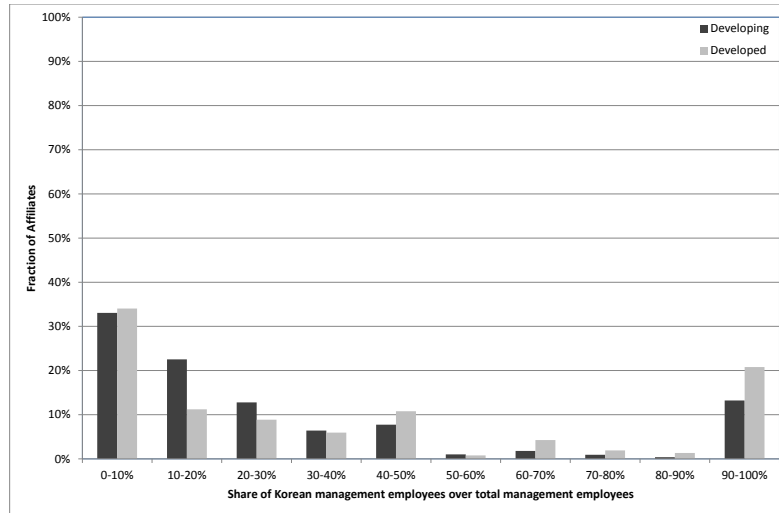


Figure 2B: Distribution of affiliates by the share of management-level employees by industries

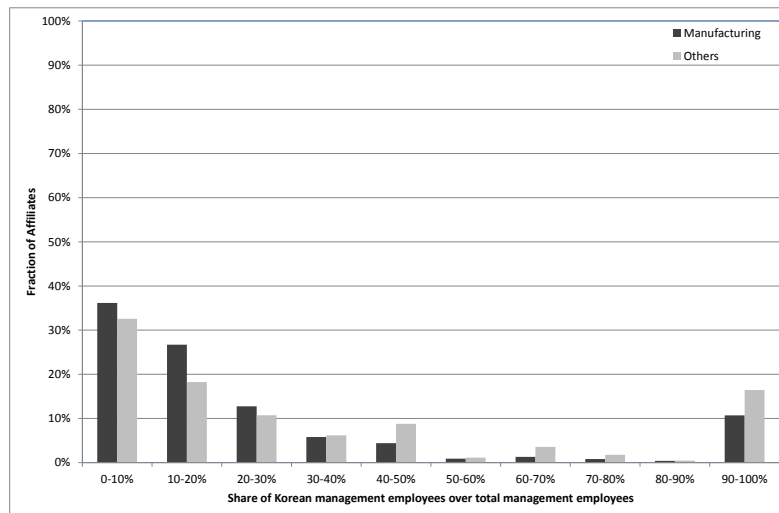


Figure 3: Cumulative Distribution of affiliates by number of management-level employees

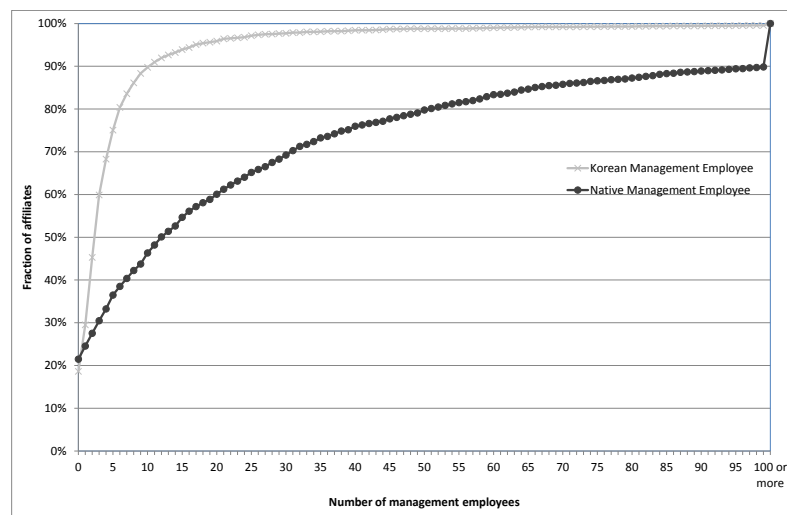


Table 1A: Korea Affiliates Abroad by Countries in 2010

Country	Number	Sale (\$millions)	Employee
China	1,033	124,485	465,936
US	244	66,912	30,553
Vietnam	193	5,597	223,323
Indonesia	89	11,270	114,601
Japan	77	15,073	3,701
Panama	54	1,412	1,600
Hong Kong	49	16,752	18,719
India	47	9,756	30,686
Thailand	42	6,041	16,810
Slovakia	31	10,992	12,629
Germany	31	23,632	2,113
Malaysia	24	5,935	2,771
Singapore	22	35,823	1,561
Taiwan	22	17,855	3,238
Poland	21	6,545	12,205
Russia	20	8,292	7,448
Philippine	19	2,594	16,150
Mexico	19	3,854	9,185
Turkey	17	2,378	4,496
Canada	17	5,928	1,143

Table 1B: Korea Affiliates Abroad by Industries in 2010

Industry	Number	Employee	Sale (\$millions)
Manufacturing	1597	1008455	244429.1
Wholesale and Retail Trade	325	52863	166747.3
Real Estate and Renting	99	3923	1594.4
Transportation	59	11459	10182.8
Publishing and Communications	50	4587	925.2
Professional, Scientific and Technical Activities	35	2203	3452.1
Construction	33	6089	1121.6
Mining	31	12886	13775.3
Arts, Sports and Recreation Related Services	28	2157	119.2
Hotels and Restaurants	19	3417	384.4
Agriculture, Forestry And Fishery	16	972	53.3
Business Facilities Management and Support Services	6	498	849.3
Other Service	5	277	19.4
Education Service	4	84	3.9
Electricity, Sewerage and Waste management	3	21	46.3
Human Health and Social Work	3	60	2.7
Materials Recovery and Remediation	1	40	3.2

Table 2A:Composition of Sale and Purchase in Korean Affiliates in 2010

	Intra-family (Intra-firm)	Domestic others	Foreign others (including Korea)
Purchase	59.2% (35.5%)	29.5%	11.2%
Sale	33.7% (15.9%)	51.9%	14.5%

Table 2B: Composition of Employees in Korean Affiliates in 2010

Position	Korean	Native	Total
Executive	26.6%	73.4%	10326
Manager	8.7%	91.3%	123547
Sale	3.9%	96.1%	70646
Production	1.1%	98.9%	905472
Total	2.3%	97.7%	1109991

Table 3A: Fraction of Korean affiliates in 2010

	Total	Developing	Developed
Imports from parent (= 0)	43.9%	43.7%	44.2%
Exports to parent (= 0)	61.9%	58.2%	73.4%
Imports from the related (= 0)	34.5%	34.9%	33.3%
Exports to the related (= 0)	45.5%	42.5%	55.3%
Korean Management-level (> 0)	81.4%	84.4%	71.9%
Korean Production-level (> 0)	29.9%	30.8%	27.2%
# of Affiliates	2314	1749	552

Table 3B: Share of Internal Shipments and Workers in 2010

Share of.	Average	25 th	50 th	75 th	90 th	95 th
Imports from parent	27.4%	0.0%	5.0%	51.7%	92.0%	100.0%
Exports to parent	19.1%	0.0%	0.0%	16.0%	94.5%	100.0%
Imports from the related	40.6%	0.0%	28.0%	85.0%	100.0%	100.0%
Exports to the related	34.1%	0.0%	2.0%	88.0%	100.0%	100.0%
Korean Management-level	27.8%	6.3%	15.4%	33.3%	100.0%	100.0%
Korean Production-level	4.1%	0.0%	0.0%	1.2%	7.5%	21.9%

Table 4A: Correlations with the Total Labor Productivity (All Industries)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$(\frac{\# \text{ of Korean manager}}{\# \text{ of Total manager}})$	0.609*** [0.117]			0.734*** [0.119]	1.022*** [0.197]	0.738*** [0.119]	1.147*** [0.177]
$(\frac{\# \text{ of Total manager}}{\# \text{ of Total employee}})$		0.648*** [0.149]		0.844*** [0.153]	1.212*** [0.240]	0.846*** [0.153]	1.290*** [0.226]
$(\frac{\text{Intra-family import}}{\text{Total purchase}})$			0.104 [0.091]	0.100 [0.091]	0.108 [0.151]	0.049 [0.116]	0.090 [0.156]
$L.(\frac{\# \text{ of Korean manager}}{\# \text{ of Total manager}})$					-0.255 [0.191]		
$L.(\frac{\# \text{ of Total Manager}}{\# \text{ of Total employee}})$					-0.360 [0.239]		
$L.(\frac{\text{Intra-family import}}{\text{Total purchase}})$					-0.142 [0.138]		
<i>Dummy for intra – family import</i>						0.074 [0.105]	
<i>Constant</i>	0.229 [0.944]	-0.156 [0.875]	-0.068 [0.877]	0.000 [0.876]	-0.034 [0.180]	-0.021 [0.877]	-0.189 [1.025]
Affiliate Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,416	10,475	10,475	10,416	6,094	10,416	7,176
R-squared	0.018	0.017	0.014	0.023	0.015	0.023	0.015
Number of Affiliates	3,679	3,698	3,698	3,679	2,412	3,679	2,727

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Notes: I also control country, industry (2-digits) and year effects by dummy variables

Table 4B: Correlations with the Total Labor Productivity (Manufacturings)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$(\frac{\# \text{ of Korean manager}}{\# \text{ of Total manager}})$	0.150** [0.062]			0.223*** [0.063]	0.153* [0.083]	0.225*** [0.063]	0.293*** [0.091]
$(\frac{\# \text{ of Total manager}}{\# \text{ of Total employee}})$		0.561*** [0.094]		0.627*** [0.096]	0.876*** [0.121]	0.629*** [0.096]	0.851*** [0.141]
$(\frac{\text{Intra-family import}}{\text{Total purchase}})$			-0.014 [0.046]	-0.022 [0.046]	-0.037 [0.059]	-0.051 [0.057]	-0.060 [0.075]
$L.(\frac{\# \text{ of Korean manager}}{\# \text{ of Total manager}})$					-0.094 [0.078]		
$L.(\frac{\# \text{ of Total Manager}}{\# \text{ of Total employee}})$					-0.017 [0.126]		
$L.(\frac{\text{Intra-family import}}{\text{Total purchase}})$					-0.006 [0.055]		
<i>Dummy for intra – family import</i>						0.044 [0.052]	
<i>Constant</i>	-0.105 [0.446]	0.021 [0.443]	0.171 [0.445]	-0.252 [0.445]	-0.039 [0.064]	-0.284 [0.450]	-0.053 [0.521]
Affiliate Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,521	7,554	7,554	7,521	4,403	7,521	5,426
R-squared	0.086	0.091	0.085	0.094	0.024	0.094	0.015
Number of Affiliates	2,619	2,628	2,628	2,619	1,730	2,619	2,074

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Notes: I also control country, industry (2-digits) and year effects by dummy variables

Table 5: Determinant of the Share of Korean Manager

VARIABLES	(1)	(2)	(3)	(4)
$\log(\text{Total sale})$	-0.012*** [0.003]		-0.013*** [0.002]	
$\log(\text{Total employee})$		-0.045*** [0.003]		-0.042*** [0.002]
$\frac{\text{Sale to the domestic}}{\text{Total sale}}$	-0.047*** [0.008]	-0.071*** [0.008]	-0.038*** [0.007]	-0.059*** [0.007]
$\log(\text{Total sale of the parent})$	-0.017*** [0.002]	-0.014*** [0.001]	-0.015*** [0.001]	-0.013*** [0.001]
$\log(\text{Distance})$	0.032*** [0.009]	0.028*** [0.009]	0.030*** [0.007]	0.027*** [0.007]
$\log(\text{R\&D intensity})$	-0.020*** [0.004]	-0.009** [0.004]	-0.016*** [0.003]	-0.006* [0.003]
$\log(\text{GDP per capita})$	0.030** [0.012]	-0.017 [0.012]	0.032*** [0.010]	-0.012 [0.010]
$\log(\text{gdp})$	-0.006* [0.003]	-0.004 [0.003]	-0.005** [0.002]	-0.003 [0.002]
$\log(\text{Schooling})$	0.029 [0.040]	0.056 [0.039]	0.016 [0.033]	0.042 [0.032]
$\log(\text{Cost of dispatchment})$	-0.037 [0.032]	-0.059* [0.031]	-0.003 [0.026]	-0.021 [0.025]
$\log(\text{Capital Intensity})$	0.036 [0.022]	0.02 [0.022]	0.021 [0.018]	0.005 [0.018]
<i>Constant</i>	-0.169 [0.166]	0.519*** [0.168]	-0.184 [0.135]	0.463*** [0.136]
Observations	10,170	10,170	10,170	10,170
R-squared	N/A	N/A	0.07	0.11
Pseudo R2	0.05	0.07	N/A	N/A

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Notes: I control year-fixed effect using dummy variable

Table 6: Pattern of Korean and Native Manager

VARIABLES	(1) Korean	(2) Native	(3) Korean	(4) Native
<i>Time</i>	-0.041*** [0.005]	-0.012 [0.010]	-0.011*** [0.004]	0.049*** [0.008]
<i>log(Total sale)</i>	0.124*** [0.011]	0.248*** [0.022]		
<i>log(Total employee)</i>			0.274*** [0.005]	0.546*** [0.009]
<i>Constant</i>	1.150*** [0.095]	1.621*** [0.184]	0.142 [0.339]	-0.289 [0.650]
Firm Fixed Effect	Yes	Yes	Yes	Yes
Observations	11,254	11,254	11,254	11,254
R-squared	0.023	0.019	0.310	0.324
Number of group	3,880	3,880	3,880	3,880

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Notes: I control country, industry and year effects using dummy variables

Appendix

Table.A1: Summary by Region

	Obs	Mean	Std	25pc	50pc	75pc
<u><i>Intra-familyimport</i></u> <u><i>Totalpurchase</i></u>						
All	2314	0.42	0.40	0.00	0.32	0.88
OECD	567	0.47	0.41	0.00	0.47	0.95
Non-OECD	1747	0.41	0.40	0.00	0.30	0.80
Asia	1682	0.41	0.39	0.00	0.30	0.80
North America (including Mexico)	280	0.45	0.43	0.00	0.38	0.99
Europe	231	0.48	0.39	0.06	0.50	0.90
Latin America (excluding Mexico)	94	0.47	0.46	0.00	0.40	1.00
Africa	8	0.45	0.40	0.00	0.60	0.72
Middle East	19	0.42	0.45	0.00	0.03	0.88
<u><i>Koreanmanagement-levelemployees</i></u> <u><i>Totalmanagement-levelemployees</i></u>						
All	2063	0.28	0.31	0.06	0.15	0.33
OECD	513	0.32	0.34	0.06	0.19	0.50
Non-OECD	1550	0.26	0.31	0.06	0.14	0.31
Asia	1514	0.26	0.29	0.06	0.14	0.30
North America (including Mexico)	253	0.37	0.36	0.07	0.25	0.63
Europe	210	0.24	0.29	0.05	0.14	0.27
Latin America (excluding Mexico)	66	0.54	0.44	0.08	0.51	1.00
Africa	5	0.26	0.42	0.06	0.11	0.13
Middle East	15	0.32	0.36	0.04	0.17	0.44

Table.A2: Summary by Industry

<i>Intra-family import</i> <i>Total purchase</i>	Obs	Mean	Std	25pc	50pc	75pc
Manufacturing	1597	0.40	0.39	0.00	0.30	0.80
Electronic components, computer, video, sound and communications equipment manufacturing	321	0.43	0.37	0.01	0.35	0.80
Motor vehicles, trailers and semitrailers	251	0.44	0.38	0.05	0.40	0.80
Chemicals and chemical products (except pharmaceuticals)	124	0.34	0.36	0.00	0.19	0.59
Wearing apparel, clothing accessories and fur articles	115	0.39	0.42	0.00	0.25	0.90
Basic metal products	114	0.45	0.42	0.00	0.38	0.90
Fabricated metal products, except machinery and furniture	100	0.38	0.37	0.01	0.30	0.70
Other machinery and equipment	87	0.36	0.40	0.00	0.20	0.75
Rubber and plastic products	66	0.45	0.37	0.07	0.43	0.76
Food products	64	0.26	0.40	0.00	0.00	0.60
Textiles, except apparel	60	0.39	0.43	0.00	0.12	0.98
Wholesale and retail trade	325	0.63	0.42	0.03	0.85	1.00
Others	392	0.24	0.38	0.00	0.00	0.50
<i>Korean management-level employees</i> <i>Total management-level employees</i>						
Manufacturing	1449	0.25	0.30	0.06	0.14	0.29
Electronic components, computer, video, sound and communications equipment manufacturing	297	0.21	0.26	0.05	0.11	0.23
Motor vehicles, trailers and semitrailers	224	0.24	0.27	0.09	0.14	0.23
Chemicals and chemical products (except pharmaceuticals)	114	0.26	0.29	0.08	0.16	0.31
Wearing apparel, clothing accessories and fur articles	97	0.25	0.30	0.08	0.13	0.27
Basic metal products	100	0.27	0.29	0.07	0.17	0.33
Fabricated metal products, except machinery and furniture	89	0.28	0.31	0.05	0.17	0.38
Other machinery and equipment	83	0.27	0.30	0.08	0.17	0.29
Rubber and plastic products	61	0.28	0.30	0.08	0.16	0.33
Food products	61	0.27	0.33	0.06	0.10	0.42
Textiles, except apparel	57	0.35	0.36	0.07	0.20	0.50
Wholesale and retail trade	297	0.31	0.33	0.05	0.18	0.50
Others	317	0.36	0.36	0.08	0.20	0.60

Notes: I report top 10 manufacturing sectors in terms of number of affiliates abroad in 2010

]

Table.A3: Correlations with the Total Labor Productivity

VARIABLES	(1)	(2)	(3)	(4)	(5)
$\frac{\# \text{ of Korean manager}}{\# \text{ of Total manager}}$	0.736*** [0.119]	0.737*** [0.119]	0.736*** [0.119]	0.735*** [0.119]	0.734*** [0.119]
$\frac{\# \text{ of Total Manager}}{\# \text{ of Total employee}}$	0.845*** [0.153]	0.846*** [0.153]	0.843*** [0.153]	0.845*** [0.153]	0.850*** [0.153]
$\frac{\text{Intra-family export}}{\text{Total sale}}$	-0.095 [0.095]				
$\frac{\text{Intra-family trade}}{\text{Total purchase+sale}}$		-0.118 [0.110]			
$\frac{\text{Intra-firm, import}}{\text{Total purchase}}$			0.071 [0.110]		
$\frac{\text{Intra-firm, export}}{\text{Total sale}}$				-0.095 [0.144]	
$\frac{\text{Intra-firm trade}}{\text{Total purchase+sale}}$					-0.273* [0.163]
<i>Constant</i>	0.087 [0.875]	0.112 [0.876]	0.023 [0.877]	0.022 [0.943]	0.072 [0.944]
Affiliate Fixed Effect	Yes	Yes	Yes	Yes	Yes
Observations	10,416	10,416	10,416	10,416	10,416
R-squared	0.023	0.023	0.023	0.023	0.023
Number of Firms	3,679	3,679	3,679	3,679	3,679

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Notes: I also control country, industry (2-digits) and year effects by dummy variables

Table.A4: Marginal Effects on the Share of Korean Management-Level Employees

VARIABLES	(1)	(2)	(3)	(4)	(5)
$\log(\text{Total sale})$	-0.012***	-0.005***	-0.008***	-0.010***	0.002***
$\frac{\text{Sale to the domestic}}{\text{Total sale}}$	-0.047***	-0.022***	-0.032***	-0.039***	0.007***
$\log(\text{Total sale of the parent})$	-0.017***	-0.008***	-0.012***	-0.014***	0.002***
$\log(\text{Distance})$	0.032***	0.015***	0.022***	0.026***	-0.005***
$\log(R\&D)$	-0.020***	-0.009***	-0.013***	-0.016***	0.003***
$\log(\text{GDP per capita})$	0.030**	0.014**	0.020**	0.024**	-0.004**
$\log(\text{GDP})$	-0.006*	-0.003*	-0.004*	-0.005*	0.001*
$\log(\text{Schooling})$	0.029	0.013	0.020	0.024	-0.004
$\log(\text{Cost of dispatchment})$	-0.037	-0.017	-0.025	-0.030	0.005
$\log(\text{Capital Intensity})$	0.036	0.016	0.024	0.029	-0.005

Note: This table shows that different marginal effects on the share of Korean management-level employees from the result of column (1) in Table 5. Column (1) reports the effect on the expected value of the latent variable as same as in Table 5. Column (2) reports the effect on the expected value of the dependent variable conditional on it being between zero and one. Column (3) reports the effect on the probability of being between zero and one. Column (4) reports the effect on the probability of being greater than zero. Column (5) reports the effect on the probability of being smaller than one