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Hollowing Out or Filling In?
Impacts of Multinational Enterprises on Domestic Plant Turnover and Job Growth in Factory Asia

Hyunbae Chun[*], Jung Hur[*§], and Nyeong Seon Son[*]

Abstract

Recently multinational enterprises (MNEs) originating from Asian countries such as China and Korea have rapidly expanded their global operations, but the employment effect of these MNEs in their home countries has rarely been studied. Using Korean firm–plant matched data over 2008–2013, we examine the effects of MNEs on domestic plant turnover and job growth. We find that Korean MNEs are more likely than non–MNEs to not only close down their domestic manufacturing plants but also open new plants. Along with active plant turnover, Korean MNEs exhibit greater active job reallocation across their domestic manufacturing plants within firms; however, this does not result in net job loss. This suggests that Korean MNEs participating in Factory Asia restructured their domestic manufacturing bases rather than hollowing them out.

JEL Classification: F23, F66, L23
Keywords: Employment, Job Reallocation, Multinational Enterprise, Plant Birth, Plant Death

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1. Introduction

Multinational enterprises (MNEs)[1] organize their production at home and abroad, creating and destroying jobs across locations. Most advanced countries have experienced hollowing–out of domestic manufacturing jobs due to MNEs' plant shutdown at home and relocation to foreign countries (Disney *et al*., 2003; Görg and Strobl, 2003; Bernard and Jensen, 2007; Van Beveren, 2007). In contrast, restructuring global production networks between domestic and foreign plants may fill in manufacturing jobs at home through complementing rather than substituting domestic production. There is abundant evidence in the literature that supports the hollowing–out effect, whereas evidence for the filling–in effect, particularly job creation at the extensive margin (plant entry), is rare (Brainard and Riker, 1997; Becker *et al*., 2005; Konings and Murphy, 2006; Muendler and Becker, 2010).

To investigate the filling–in outcome, we focus on the massive rise in the outward foreign direct investment (FDI) of MNEs originating from Asian countries (specifically Korea in this study) during the last decade (Figure 1).[2] Asian MNEs have built production–supply networks, the so–called *Factory Asia*, within the continent.[3] MNEs in most advanced countries relocate their plants to foreign countries to take advantage of cheap labor, and instead, specialize headquarter services at home, destroying domestic manufacturing jobs.[4] In contrast, Asian MNEs shut down high–cost assembly lines and establish new plants producing intermediate goods at home, and then re–link the domestic plants to their low–cost assembly lines in foreign countries. In this case, manufacturing jobs at home can be created through

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[1] We narrowly define the term of MNEs in this paper as *manufacturing firms with plants both in domestic and*

[2] Asia's share of global outward FDI increased from 10% in 2000 to 36% in 2013.

[3] Destinations of Asian MNEs are also heavily concentrated in Asian countries. For instance, Korea and China invested 75% and 70% of total FDI in Asian countries, respectively, according to UNCTAD's FDI database. Thus, Asia countries became not only host countries of inward FDI but also home countries of outward FDI. To distinguish the home-country effect of outward FDI on domestic manufacturing from the inward FDI effect, it is necessary to choose an Asian country with massive outward FDI and relatively little inward FDI. In this respect, Korea is a better case study than China.

[4] Hansson (2005) and Head and Rise (2002) showed that MNEs that have foreign affiliates in low-wage countries raise the skill intensity of employment. In addition, Bernard *et al*. (2017) showed that offshoring makes firms reallocate labor away from production toward technology-related occupations.

building new domestic plants (e.g., Samsung Electronics).[5]

In this study, we focus on Korean MNEs that showcase the Factory Asia concept. Since the mid–2000s, massive increases in outward FDI of Korean MNEs have made substantial contributions to establishing the Asian production–supply network. Consequently, Korean manufacturing has experienced massive restructuring, but the share of employment in manufacturing has changed little over the last decade. Using a unique Korean firm–plant matched database for the period 2008–2013, we examine the impact of MNEs' foreign operations on both the death and birth of their domestic manufacturing plants and the resulting employment dynamics in terms of job creation, destruction, and reallocation.

Our main findings are as follows. First, Korean MNEs are more likely to not only shut down domestic manufacturing plants but also open up new plants, compared to non–MNEs. This simultaneous plant death and birth at home is evident for the MNEs that have invested in Asian countries, particularly China, but not in advanced countries. Asian countries are often interpreted as destinations of *vertical* FDI in the literature (Hanson *et al*., 2005; Debaere *et al*., 2010). Production can be more efficient if MNEs cut off domestic value chains and relocate plants to low–wage countries in Asia. Our findings imply that vertical FDI does not necessarily preclude the possibility of creating new plants at home. Active plant turnover (death and birth) can be viewed as a strategy of Korean MNEs' for growth in Factory Asia. Second, along with plant turnover, Korean MNEs have also reallocated domestic manufacturing jobs through not only destroying but also creating jobs. Despite no statistically significant net employment growth effect, MNEs have filled in domestic jobs at the extensive margin by establishing new manufacturing plants at home.

These findings are reasonably robust to a wide range of considerations such as alternative definitions of MNEs and emerging countries, alternative periods with a three–year interval from 2008 to 2011, and exclusion of foreign–owned firms. We also check for the presence of endogeneity using the propensity score matching method and possible joint decisions vis–a–vis plant shutdown and startup of MNEs.

[5] While Samsung Electronics relocated domestic assembly lines for televisions, cellphones, and refrigerators to foreign countries, they constructed huge production sites for high-end semiconductors and displays in Korea.

The findings herein provide important insights into the role of MNEs in domestic plant turnover and employment dynamics. First, Korean MNEs' foreign activities in Asian countries such as China have induced active reallocation in domestic manufacturing industries, establishing new plants along with shutting down existing plants. This restructuring process accompanied by domestic plant entry represents novel evidence in the MNE literature, contrasting with most previous findings which suggest that domestic plant closures occur without new entry caused by the expansion of foreign operations in (or offshoring toward) low–wage countries (Gibson and Harris, 1996; Bernard and Jensen, 2007; Bandick, 2010). Second, the job reallocation process in Korean MNEs also contrasts with that observed in advanced countries' MNEs. Korean MNEs actively reallocate domestic manufacturing jobs through filling in jobs at new plants, whereas other countries' MNEs mainly shut down plants and hollow–out jobs.[6] There have been some studies suggesting that foreign and domestic production or employment are complementary.[7] For instance, Muendler and Becker (2010) offered the first evidence to suggest that the domestic employment of (German) MNEs can expand at the intensive margin but not at the extensive margin.[8]

Furthermore, evidence on Korean MNEs sheds light on understandings of Asian MNEs in the context of Factory Asia. Starting in the early 1990s, outward FDI from Korean MNEs was characterized by relocation of manufacturing plants to low–cost countries such as China, resulting in hollowing–out of domestic jobs (Debaere *et al*., 2010). However, after the mid–2000s, Korean MNEs established global value chains (GVCs) in Asia so that trade in intermediate inputs between foreign and domestic plants

[6] The MNE–driven reallocation process may also affect overall manufacturing productivity at home. In this respect, Alfaro and Chen (2016) showed that most productivity gains from MNEs are attributable to the selection and reallocation mechanism. However, analyses of reallocation–driven productivity impacts of Korean MNEs are beyond the scope of this paper and can be explored in future work.

[7] Desai *et al.* (2009) also revealed a positive association between foreign and domestic activities (investments and employment growths) of U.S. MNEs, but did not distinguish extensive margins from complementary effects.

[8] They defined the extensive margin where MNEs enter foreign locations and the intensive margin where MNEs operate existing affiliates.

dramatically increased (Ramondo, 2016).[9] This incurs domestic manufacturing restructuring accompanied by shutting down domestic plants substitutable for foreign inputs, and simultaneously establishing domestic plants complementary to foreign plants. This is consistent with the findings of Harrison and McMillan (2011), who noted that domestic and foreign employment can be complements if MNEs undertake significantly different tasks at home and abroad. The findings of our study contribute to improving on the existing knowledge of Asian MNEs' filling–in processes driven by plant entry at home. However, the international division of labor within Asian MNEs remains an issue for future work.[10]

The remainder of this paper is organized as follows. Section 2 reviews patterns of outward FDI and employment in the Korean manufacturing sector over time. Section 3 describes the firm–plant matched data applied herein and the construction of plant turnover, employment growth, and job reallocation variables. Sections 4 and 5 present empirical results and robustness checks, respectively. Finally, Section 6 offers conclusions.

2. Outward FDI and Manufacturing of Korea

Since the mid–2000s, most outward FDI of Korean MNEs has been concentrated in Asian countries. In the literature (Hanson *et al*., 2005; Debaere *et al*., 2010), MNEs' investments in Asia are often referred to as *vertical* FDI since Asian countries have cost advantages in manufacturing compared to developed countries.[11] Through establishing vertical manufacturing plants in low–cost Asian countries, Korean MNEs can build their manufacturing networks efficiently. Yet Korean MNEs have maintained their traditional status as manufacturers within Korea without downsizing jobs. In this section, we briefly address the regional distribution of Korea's outward FDI and the current status of domestic manufacturing.

[9] Ramondo (2016) showed that MNEs in Asia have strong input–output linkages between domestic and foreign plants.
[10] To identify the nature of international division in Asian MNEs, it is necessary to investigate the characteristics of, and intrafirm trade between, domestic and foreign plants. Such work also requires more detailed datasets.
[11] According to the World Integrated Trade Solution (WITS) trade database, almost 80% of the products imported to Korea from China are intermediate goods as of 2013. Similarly, most exported products from Korea to China are also intermediate goods.

Outward FDI from Korea

Figure 2 shows the annual amounts of outward FDI of MNEs in the Korean manufacturing sector for the period 1990–2013. One noteworthy observation is that outward FDI rapidly increased after 2005 and became more concentrated in Asia. This period coincides with the following two events. First, in 2004 and 2005, the Korean government removed the overseas investment limits imposed on corporate and private investors.[12] Second, in the mid–2000s the Chinese government began implementing the WTO's requirement to remove restrictions on investment that create trade distortions, following China's accession to the WTO in 2002.[13] That is, internal and external conditions in the 2000s were quite favorable to outward FDI from Korean firms.

[Figure 2 about here]

According to the FDI database of the Export–Import Bank of Korea in 2010, China was the top destination country for Korea's outward FDI, followed by Vietnam, India, and Indonesia for the period 1996–2009. Since the early 2000s, China has absorbed considerable global FDI from not only advanced countries but also emerging economies. According to the OECD report by Davies (2013), inward FDI into China surged from 40 billion USD in 2000 to around 120 billion USD in 2011. Two thirds of this inward FDI was from 10 Asian countries in 2010. Among them, Korea is the third largest contributor, followed by Singapore and Japan, and subsequently, Taiwan.[14] According to Zhang (2005), compared to other Asian economies, Korea has only recently become a major foreign investor and established relatively new production–supply networks since the mid–2000s. In this sense, Korea is probably the key

[12] See Nicolas *et al*. (2013) for more detail on the history of investment liberalization policy reform in Korea.
[13] See Bransetter and Lardy (2006) for details concerning Chinese investment liberalization and the WTO after 2002. These authors also summarized developments vis–a–vis Chinese globalization in the 1990s.
[14] Although Hong Kong is the largest investing country into Mainland China, it is now a part of China.

country to understand home–country impacts of the formation of global production–supply networks, particularly Factory Asia.

Manufacturing in Korea

Note that the increased outward FDI from Korea is not associated with a contraction of domestic manufacturing since 2007. Figure 3 shows macro–level stylized facts about the Korean manufacturing sector. First, the manufacturing sector's share of value–added has been reasonably stable and not fallen below 28% since 2000; according to the Mining and Manufacturing Survey of Statistics Korea, it was 30% as of 2013. Second, the manufacturing sector's share of employment has remained at a high level; the Survey of Economically Active Population of Statistics Korea shows that this proportion decreased slightly from 20% in 2000 to 17% in 2007, but has since remained stable at 17%. Third, the total annual number of manufacturing plants exhibits an upward trend over time. According to the Mining and Manufacturing Survey, the number of plants with more than 10 employees was 51,418 in 2000, 61,785 in 2007, and 65,389 in 2013. In summary, even during the period of rising outward FDI, the domestic manufacturing sector continued to maintain relatively high shares in employment and value–added, and to increase the numbers of production plants.

[Figure 3 about here]

Related to the entire manufacturing sector in Korea, one notable observation about Korean MNEs is that they account for 48% of sales and value–added and 25% of employment in the manufacturing sector as of 2013, according to the Survey of Business Activities by Statistics Korea. Although the macroeconomic data do not provide information on exactly what has happened inside the manufacturing sector, we can conjecture that the stable employment share of manufacturing sectors on the aggregate has resulted from Korean MNEs reallocating their plants by simultaneously closing down some while

opening up others. Although these two opposing dynamics cancel each other out, plant turnover of Korean MNEs can result in active job reallocation (both job creation and destruction) rather than job growth. This is what we attempt to test in this study using a unique firm–plant matched data.

3. Data

Firm–Plant Matched Data

To construct a firm–plant matched dataset, we combine two datasets of the Survey of Business Activities (SBA) and the Mining and Manufacturing Survey (MMS), conducted annually by Statistics Korea. SBA is a *firm–level* survey that covers all firms located in Korea with 50 or more employees and with 300 million KRW or more capital in all business sectors. SBA includes not only firm characteristics but also various business strategies and activities. In particular, regarding firms' foreign activities, SBA collects country location and two–digit industry information about each foreign plant, of which a Korean parent firm holds at least 20% equity. MMS is a *plant–level* survey that covers all mining and manufacturing plants with 10 or more employees located in Korea. MMS collects detailed information on plant characteristics such as employment, age, and tangible assets.

We use the firm identifier of a plant in MMS to match a firm in SBA. The sample of matched manufacturing firms with their domestic manufacturing plants covered 5,399 manufacturing firms with 7,367 manufacturing plants in 2008. Because SBA covers firms with 50 or more employees, some small plants in MMS are omitted in the matched sample. However, the matched dataset accounts for approximately 75% of sales and 50% of employment of all plants in the 2008 MMS. In addition, given our interest in MNE behavior, the exclusion of small plants might not generate a bias in the construction of a control group of non–MNEs.[15] This implies that our matched dataset is representative for analyzing the effect of MNEs on the domestic manufacturing sector.

[15] When we used the Census on Establishments to include these small plants that are omitted in MMS, our main results were qualitatively identical.

Following the massive expansion of manufacturing outward FDI across Asian countries after the mid–2000s, Korea's domestic manufacturing industries experienced massive reallocation and restructuring. To examine the consequence of MNE expansion on domestic manufacturing after the mid–2000s, we chose 2008–2013 as the sample period. In this five–year period, domestic manufacturing expanded with active reallocation along with not only 1,628 manufacturing plant deaths but also 1,815 plant births.

MNEs and Firm Characteristics

Using data from SBA, we construct variables related to MNEs and firm characteristics. First, we construct a measure of MNE status using information about the ownership of foreign plants.[16] A dummy variable of MNE takes the value 1 if a Korean manufacturing firm own at least one *foreign* manufacturing plant in 2008, and 0 otherwise. As noted in previous studies (Braconier and Ekholm, 2000; Debaere *et al*., 2010; Harrison and McMillan, 2011), the effect of MNEs on the domestic economy may differ according to the location of foreign activity. To address this, we classify MNEs according to country location of their manufacturing plants. The destinations are divided into two groups: advanced and emerging countries. Advanced countries include countries in North America, Europe, Oceania, and Japan, while emerging countries include all Asian and developing countries except for Japan.

Next, we construct measures of firm size, firm age, firm capital intensity, firm productivity, and multi–plant and multi–product dummies to control for firm heterogeneity. Firm size is the natural log of the sum of employees in all domestic manufacturing plants owned by a firm. Firm age is the natural log of years of operation of the firm. Firm–level capital intensity is the natural log of the ratio of the sum of plant–level tangible assets to total manufacturing employment. Firm productivity is defined as the log of total manufacturing sales over total manufacturing employment. Multi–plant is a dummy variable that takes the value 1 if a firm has at least two domestic manufacturing plants, while multi–product is a dummy variable

[16] We follow SBA's definition on the ownership, which is at least 20% capital equity of the foreign plants. However, our results are qualitatively identical when we consider majority–owned (over 50% of equity) foreign plants because most foreign plants are majority-owned.

that takes the value 1 if a firm has a record of sales that belong to at least two 3–digit KSIC manufacturing industries.

Plant Deaths and Births

We define a plant death if a plant in MMS 2008 is absent from MMS 2013. A plant birth is defined where a plant is absent in MMS 2008 but present in MMS 2013. Both plant birth and death are defined over the five–year span of the sample period. We construct a dummy variable for plant death *at the firm level* that takes the value 1 if a firm has at least one plant death in 2008–2013 and 0 otherwise. A dummy for a plant birth at the firm level is similarly defined. If a firm consists of a single plant (a single–plant firm) in MMS, plant death also indicates firm death. Plant death does not necessarily imply firm death if a firm owns multiple plants (a multi–plant firm). Because MMS includes plants with 10 or more employees, a plant death is recorded if the number of people employed at the plant fall below 10 in the sample period. Using data on the Census on Establishments (CE) that covers all domestic establishments with at least one employed worker, we identified whether plant death represents either plant closure or omission due to being below the minimum 10–worker requirement. However, our main results remained unchanged if the sample was adjusted for true deaths and births of plants.[17]

Employment Growth and Reallocation

Following Davis *et al*. (1998), we construct two measures of employment growth and reallocation at the firm level. First, we define the net employment growth rate of firm i as the weighted sum of plant–level employment growth rates:

[17] Although CE is comprehensive to include all plants in Korea, it has information on employment of plants only. So, we still need the MMS for other information such as capital and sales for this extra exercise.

$$NET_{i,t} = \sum_{j \in i} w_{j,t} EG_{j,t}$$

where $E_{j,t}$ is the number of workers at plant j in year t, $EG_{j,t} = (E_{j,t} - E_{j,t-1})/\bar{E}_{j,t}$ is the employment growth rate of plant j, $\bar{E}_{j,t} = 0.5(E_{j,t} + E_{j,t-1})$, and $w_{j,t} = \bar{E}_{j,t} / \sum_{j \in i} \bar{E}_{j,t}$ is the employment weight of plant j in the firm. This growth measure integrates employment growths at continuing (surviving) plants and death and birth plants. The growth rate lies in the interval [–2, 2] with plant death and birth corresponding to left and right endpoints, respectively.

We also construct an excess job reallocation measure calculated by the sum of job creation and destruction minus the absolute value of net employment growth as

$$EXR_{i,t} = \ JC_{i,t} + JD_{i,t} - |NET_{i,t}|$$

where $JC_{i,t} = \sum_{\substack{j \in i \\ EG_{j,t} > 0}} w_{j,t} EG_{j,t}$ is the (gross) job creation rate calculated by the weighted sum of employment growth at continuing plants with positive employment changes and birth plants; and $JD_{i,t} = \sum_{\substack{j \in i \\ EG_{j,t} < 0}} w_{j,t} |EG_{j,t}|$ is the (gross) job destruction rate similarly defined for continuing plants with negative employment changes and death plants. The reallocation measure captures gross job flows between expanding and shrinking plants including birth and death plants that underlie the net employment change. Note that net employment growth is simply the difference between job creation and destruction. Thus, even where a firm's plants exhibit active job flows within the firm through plant expansion, contraction, births, and death, firm–level employment may remain unchanged if the magnitudes of job creation and destruction are the same. In this respect, the reallocation measure captures the heterogeneity of employment changes across plants, which enables us to identify whether MNEs reorganize their plants at home.

[Table 1 about here]

Summary Statistics

Table 1 reports summary statistics for Korean manufacturing firms used in our analysis. The first column shows that 25.6% of 5,399 manufacturing firms closed at least one domestic plant during 2008–2013, whereas 15.7% of the firms opened new domestic plants during the same period. In the case of employment–weighted means, the probabilities of both plant closure and opening at the firm level increased by 29.7% and 27.3%, respectively, which indicates that large firms would have higher probabilities of plant birth and death. However, the findings do not necessarily indicate a positive association between firm size and plant death and birth because large firms are more likely to have multiple plants and multi–plant firms have a high plant turnover rate (Dunne *et al*., 1989; Bernard and Jensen, 2007; Kneller *et al*., 2012). Table 1 shows that a quarter of firms in the sample are multi–plant firms, accounting for more than 50% of the total employment in the sample. This suggests that it is crucial to control for firm characteristics that may affect plant turnover. Overall, the findings confirm that Korean manufacturing firms actively pursued reallocation and restructuring through closing and opening domestic plants during 2008–2013.

Employment growth over the five–year period is on average -0.394 (-0.243 for employment–weighted mean) and has a large standard deviation of 0.966. Large negative values of mean employment growth with a substantial standard derivation are a function of our employment growth measure that integrates employment changes of not only continuing plants but also plant (and firm) death and birth. For example, firms that have only exiting plants have an extreme value of -2. To compare employment growth between MNEs and non–MNEs, however, it is necessary to employ this integrated measure because the exit rates of MNEs and non–MNEs are substantially different. Consistent with high plant birth and death, mean excess job reallocation (0.112 and 0.177 for unweighted and weighted means, respectively) indicates

substantial job creation and destruction (that cancel each other out and do not change the employment level).

[Table 2 about here]

Table 2 reports the weighted mean of each variable for MNEs (1,382) and non–MNEs (4,017). On average, MNEs exhibit higher probabilities of both plant death and birth than non–MNEs. In the third column, the differences in death and birth probabilities in the two groups are statistically significant at the 1% level. Employment growth and reallocation are also higher for MNEs than non–MNEs. However, it is difficult to conclude that MNEs have more active reallocation and higher employment growth than non–MNEs, because MNEs also have different firm attributes that may affect plant turnover. As expected, Table 2 shows that MNEs are larger, older, more capital–intensive, and more productive than non–MNEs. MNEs are also more likely to be multi–plant and multi–product firms than non–MNEs. Therefore, it is crucial to control firm characteristics when identifying the impacts of MNEs on employment growth and reallocation. Accordingly, we carry out multiple regression analyses in the next section.

4. Empirical Results

Empirical Specification

In this section, we examine the effect of MNEs not only on plant death and birth but also on employment growth and reallocation at the firm level. To relate firm characteristics including MNEs in year t to the four firm–level outcomes between year t and $t+5$, we estimate regressions of the form

$$y_i = \alpha + \beta MNE_i + \gamma' X_i + \mu_k + \varepsilon_i.$$

The dependent variables are plant death and birth, net employment growth, and excess job reallocation of firm i between years t (2008) and $t+5$ (2013). Plant death and birth at the firm level are dummy variables that take the value 1 if firm i closes or opens a plant during 2008–2013, respectively. The net employment growth rate at the firm level is measured by the weighted average of plant–level employment growth rates and the excess job reallocation rate at the firm level is calculated by the sum of job creation and destruction rates minus the net employment growth rate. MNE_i is a dummy variable indicating whether firm i is an MNE in year t; X_i is a vector of firm–level characteristics in year t that includes firm size, firm age, firm capital intensity, firm productivity, and multi–plant and multi–product dummies. The model also includes 61 three–digit industry dummies (μ_k) to control for unobserved factors affecting firm–level outcomes.[18] ε_i is an error term allowing clustering at the industry level. We employ probit models where plant death and birth (both dichotomous) are dependent variables, and ordinary least squares estimation to model employment growth and job reallocation. To examine the economic significance of MNE operations, we estimate employment–weighted regressions for all four outcomes in this section.[19]

[Table 3 about here]

Plant Death and Birth

Table 3 reports the marginal effects of MNEs on the probability of plant death and birth at the firm level. Column (1) of Table 3 shows that MNEs have an approximately 13% higher probability of plant shutdown than non–MNEs. This finding is consistent with the effects of MNEs in advanced countries on their plants at home (Bernard and Jensen, 2007). Outward FDI induces plant closing in the home country, which hollows out domestic industries. However, column (2) shows that Korean MNEs also have a higher

[18] Some three–digit industries in which the dependent variable for all firms in an industry has the same value are merged into the closest industries, which reduces the number of industries from 82 to 61.
[19] Nonetheless, unweighted regressions generate qualitatively similar results (reported in Table A1 in the Appendix).

probability of opening a new plant at home than non–MNEs. Together, the results in columns (1) and (2) suggest that Korean MNEs shut down their manufacturing plants at home while opening new plants at home.[20] The magnitude of MNEs' effects on the probabilities of domestic plant death and birth also indicates that the difference in plant birth probability between MNEs and non–MNEs is even larger than that for plant death probability. Thus, Korean MNEs are characterized by active plant opening at home, distinguishing them from MNEs in advanced countries. This suggests that plant closures in Korea driven by MNEs imply the reorganization of domestic manufacturing industries (and result in net job growth at home) rather than their hollowing out.[21]

In addition to MNEs, columns (1) and (2) show that some firm characteristics are related to plant shutdown and opening. Old firms are less likely to close their plants than young firms and multi–plant firms are more likely to close their plants than single–plant firms (Dunne *et al*., 1989; Bernard and Jensen, 2007; Kneller *et al*., 2012). Firm productivity is positively related to the probability of plant birth, although this is significant only at the 10% level. Firm size and productivity do not affect the probability of plant death. Our findings at the firm level are not directly comparable to those in previous plant–level studies where the probability of plant survival is positively related to *plant* size, age, productivity, and capital intensity. When we related plant size and productivity to plant exit decision, we also found a negative relation.[22]

Columns (3) and (4) distinguish MNEs according to their destinations: emerging and advanced countries. A firms' ownership of manufacturing plants in emerging countries have both positive effects on the probabilities of plant death and birth at home, while the ownership of plants in advanced countries have a significant positive effect on plant birth but not plant death. As for the former result on emerging

[20] Closing and opening of plants may not be carried out by the same firms. To address this issue, we employ a bivariate probit model to estimate the association between plant closing and opening decisions. The estimation results suggest a positive association between the two decisions. See Table A3 in the Appendix.
[21] However, herein, we do not investigate other economic aspects of this reorganization of manufacturing, such as changes in productivity and production structure.
[22] The results are available upon request.

countries, the existing literature (Hanson *et al*., 2005; Debaere *et al*., 2010; Harrison and McMillan, 2011) describes that FDI to developing countries is often defined as *vertical* FDI mainly because of the regional advantage of labor costs. Such MNEs downsize their domestic production scale and relocate labor–intensive plants to developing countries. However, our empirical findings suggest us more than this story; vertical FDI does not simply preclude the possibility of establishing new plants at home. Plant death and birth can be viewed as MNEs' strategy of vertically linking domestic plants and foreign plants. As for the latter result on advanced countries, the traditional theory of proximity–concentration tradeoff (Markusen, 1984) hints us that FDI to developed countries could be regarded as *horizontal* FDI because of the market size and purchasing powers. Such MNEs directly producing in developed countries can save trade costs and be closer to consumer markets with a large purchasing power. This theory implies that horizontal FDI may not be related to a plant or job creation at home. However, our second finding in column (4) reveals a possibility that horizontal FDI can stimulate domestic investments through establishing new plants. For instance, the new manufacturing plants at home country can export and serve foreign consumer markets with new products, together with the manufacturing plants located in developed countries. Although these two mechanisms about vertical and horizontal FDIs need to be analyzed empirically, micro–level information on foreign plants and products of MNEs is not available. We leave this to the future research agenda.

[Table 4 about here]

Employment and Reallocation

Table 4 presents results on net employment growth and job reallocation within firm over the five–year sample period. Column (1) of Table 4 shows that net employment growth in MNEs relative to non–MNEs is positive but statistically insignificant. Column (2) reports that MNEs have more active job reallocation relative to non–MNEs, which is statistically significant at the 1% level. Consistent with the results for

plant death and birth in Table 3, Table 4 shows that MNEs reorganize their domestic manufacturing activities through closing and opening plants, inducing active job reallocation but not net job growth at home.

Columns (3) and (4) of Table 4 present the differential effects of MNEs on employment and reallocation according to the destinations of outward FDI. MNEs with plants in emerging countries exhibit active job reallocation but insignificant net employment growth at home. In contrast, MNEs with plants in advanced countries exhibit both active job reallocation and positive net employment growth. Again, consistent with the findings for plant death and birth in columns (3) and (4) of Table 3, these results suggest that the effects on net employment growth and job reallocation vary according to the destination of FDI from Korean MNEs.

5. Robustness

To assess the robustness of our findings, we examine various issues related to the main results. First, we examine whether or not our results are robust to alternative definitions of MNEs (majority–owned foreign plants) and emerging countries (further disaggregating them to Asian or East Asian countries). Second, we examine alternative sample periods (sub–periods of 2008–2011 for shorter time and another sub–period of 2009–2013 for excluding the global crisis years) and alternative sample firms (excluding firms owned by foreign parent firms). Third, we address possible endogeneity concerns by using propensity score matching methods. Fourth, we will check if plant entry and exit decisions are related within an MNE by using bivariate probit models. This wide range of robustness tests produces qualitatively similar results to those shown in Tables 3 and 4.

Alternative Definitions: MNEs and Emerging Countries

We define an MNE as of 2008, i.e., the beginning of the five–year sample period, so that we can link the

expansion of outward FDI starting in the mid–2000s to the plant turnover effect at home in the late–2000s. However, some firms might have exhibited outward FDI activities before the mid–2000s, and thus, completed reorganizing their manufacturing plants at home before the start of our sample period.[23] If the share of these MNEs is non–negligible, our definition of MNEs might not correctly estimate the impact on domestic plant turnover. To address this issue, we define here MNEs as firms that undertook outward FDI only during 2006–2008. So, we redefine the MNEs as those who increased the amount of FDIs for existing foreign manufacturing plants or those who set up new plants in foreign countries between 2006 and 2008. This alternative definition covers approximately 86% of MNEs based on the ownership of foreign affiliates as of 2008, showing a strong association between the ownership of foreign manufacturing plants in 2008 and outward FDI in the mid–2000s.

To examine whether the reallocation effects of MNEs are related to more narrowly defined emerging countries in Asia, we use two alternative definitions of emerging countries: Asian countries or East Asian countries. Because emerging countries are more diversely located in several continents (Asia, the Americas, etc.) compared to advanced countries, it is important to examine whether our findings of MNEs to emerging countries are related to global production chains built by Korean MNEs in East Asian countries.

[Table 5 about here]

Panels A1 and B1 in Table 5 show results for plant turnover and employment dynamics when the alternative definition of MNEs is used. In the case of advanced countries, MNEs are also more likely to close their domestic plants, and thus, the positive net employment growth effect found from Table 4 disappears. Overall, the results are qualitatively identical to those found in Tables 3 and 4. Alternative

[23] Some large Korean firms began to transform to MNEs in the 1990s, but undertook massive outward FDI after the mid-2000s.

definitions of emerging countries are used in Panels A2 and B2 of Table 5: East Asian countries in columns (1) and (2) and Asian countries in columns (3) and (4). Results for East Asian countries are qualitatively identical to those pertaining to all emerging countries, which suggests that active plant turnover and job reallocation in domestic manufacturing are related to the rapid expansion of outward FDI toward East Asian countries, particularly China, during the mid–2000s.

Alternative Samples: Period and Coverage

In our main analysis, we use a five–year sample period spanning 2008–2013 to investigate the impacts of outward FDI on domestic plant turnover and employment dynamics. To examine whether or our results are robust to a shorter timespan, we use two alternative sample periods. First, we use a three–year period spanning 2008–2011, which requires MNEs' impacts on reallocation to be realized more quickly than the five–year period. Second, our five–year sample period includes the global financial crisis of 2007–2008, which might affect our results. To address this issue, we use a sample period spanning 2009–2013. Table 6 indicates that different sample periods do not alter the main results on plant turnover and employment dynamics reported in Tables 3 and 4.

[Table 6 about here]

Firms owned by foreign parent firms are included in the current analysis. In such a case, because the foreign parent firms are also MNEs, the outward FDI decisions of firms in our sample may be dependent upon global production strategies of the foreign MNEs. So, here we exclude such firms owned by foreign parent firms with more than 50% of capital equity. This results in a minor exclusion of 343 firms owned by foreign parent firms; this does not alter the previously reported results.[24]

[24] Results pertaining to the sample where foreign-owned firms are omitted are reported in Table A2 of the Appendix.

Endogeneity

Endogeneity may arise in estimating the effects on outcomes: the probability of plant death or birth, employment growth, and reallocation. To address this issue, we use the MNE variable in year t prior to the outcome variables in years t and $t+5$. We also control for various firm–level characteristics in the study. If there are unobserved positive shocks, such as rising labor costs at home, that may induce firms to increase outward FDI and shut down plants at home, our estimate of MNEs' effect on the probability of plant death might be biased. Most previous studies focusing on plant death can be sensitive to these unobserved shocks, but our results may circumvent this issue because we examine not only plant death but also plant birth, i.e., reallocation. Nonetheless, to address possible endogeneity, we employ propensity score matching methods to estimate the impacts of MNEs. Propensity score matching methods have hitherto been widely used to reduce endogeneity problems. Propensity scores are fitted by the predicted values of the probit specification, which includes firm size, firm age, firm capital intensity, firm productivity, and multi–plant and multi–product variables. After calculating propensity scores, we pair each MNE with a non–MNE that has a similar propensity score. We impose the requirement that the match must emanate from the same industry and adopt five nearest neighbor non–MNEs.[25] These non–MNEs are assigned equal weight to calculate the treatment effects. We use a bootstrap method for standard errors with 300 replications.

[Table 7 about here]

Table 7 reports matching results. The coefficients are the average treatment effect of MNEs. The impacts of MNEs remain unchanged. Overall, the matching results confirm that the main results in Tables 3 and 4 are not biased by endogeneity issues.

[25] When we use 10 and 20 nearest-neighbor variants, the results are qualitatively similar.

Finally, our results concerning MNE effects on plant turnover do not necessarily imply that both plant deaths and births occur in the same firm, because we estimate birth and death regressions separately. We thus estimate bivariate probit models to explore whether plant deaths and births are positively related within an MNE. Results suggest that the two decisions concerning plant death and birth within an MNE are positively correlated and the correlation coefficient (Rho) is statistically significant at the 1% level.[26] This finding confirms that a Korean MNE not only closes domestic manufacturing plants but also opens new plants.

6. Conclusion

In this study, we examine the impacts of outward FDI of Korean firms on their choices of domestic plant birth and death using firm–plant matched data. Our empirical results show that Korean MNEs, especially those owning manufacturing plants in Asian countries, are more likely to not only shut down but also open up domestic manufacturing plants as compared to non–MNEs. Additionally, Korean MNEs exhibit more active job reallocation than non–MNEs. However, the net job growth effect of MNEs is insignificant.

Our findings suggest that while building Asian supply chains during the 2000s, Korean MNEs reorganized domestic manufacturing rather than hollowing out. This may further imply that the impacts of Asian MNEs on their domestic plant turnover and employment dynamics are different from those of advanced countries' MNEs. The existing literature suggests that the reduction in domestic employment is due to the extensive margin of plant exit while the MNEs increase employment at existing plants at home. However, we found a new pattern here whereby Korean MNEs exhibit job losses and gains only at extensive margins of plant entry and exit, without any influence from intensive margin. We may interpret this as an Asian case of the filling–in effect at the extensive margin.

[26] Results for the bivariate models are reported in Table A3 of the Appendix.

More importantly, we emphasize that Korean MNEs' investment mechanism is distinctive compared to that of advanced countries' MNEs because the former restructured their manufacturing plants through both closing down existing plants and opening up new plants. This calls for further study into what types of plants have been closed and opened within MNEs during the period of building Asian supply chains through outward FDI. One potential avenue in this respect is a vertical linkage or technology–driven hypothesis. While Korean MNEs may remove domestic assembly lines of final products, they construct vertical chains of inputs both domestically and globally. The removal of assembly lines may help mitigate cost pressures on domestic manufacturing, and at the same time, the vertical linkage of capital–intensive or high–tech input producing plants in domestic to labor–intensive or low–tech input producing plants in foreign may elevate their position in global value chains. Alternatively, another possible mechanism for the filling–in phenomenon is a horizontal investment or a market expansion hypothesis. Since the mid–2000s, Korean MNEs have had the opportunity to enter huge Chinese markets. As these markets increasingly open up to foreign manufacturers, Korean MNEs may invest in both domestic and foreign countries to meet increased demand from the global market engagement of China. As the production of Korean MNEs increases, economies of scale would eventually benefit the firms selling products in China. Understanding these reallocation mechanisms led by Korean MNEs would provide new insights into the home–county effects of MNEs not only in terms of production structure but also employment and productivity growth; we leave this for future study.

References

Alfaro, Laura, and Maggie X. Chen, "Selection and Market Reallocation: Productivity Gains from Multinational Production," *American Economic Journal: Economic Policy* (forthcoming), 2016.

Bandick, Roger, "Multinationals and Plant Survival," *Review of World Economics*, 146(4), 2010, 609–634.

Bernard, Andrew B., and J. Bradford Jensen, "Firm Structure, Multinationals, and Manufacturing Plant Deaths," *Review of Economics and Statistics,* 89(2), 2007, 193–204.

Bernard, Andrew B., Teresa Fort, Valerie Smeets, and Frederic Warzynski, "Offshoring and Reorganization," Technical Report, Tuck School of Business, 2017.

Becker, Sascha O., Karolina Ekholm, Robert Jäckle, and Marc-Andreas Muendler, "Location Choice and Employment Decisions: A Comparison of German and Swedish Multinationals," *Review of World Economics*, 141(4), 2005, 693–731.

Braconier, Henrik, and Karolina Ekholm, "Swedish Multinationals and Competition from High-and Low-Wage Locations," *Review of International Economics*, 8(3), 2000, 448–461.

Brainard, S. Lael, and David A. Riker, "Are US Multinationals Exporting US Jobs?" NBER Working Papers No. 5958, 1997.

Bransetter, Lee, and Nicholas Lardy, "China's Embrace of Globalization," National Bureau of Economic Research Working Papers No. 12373, 2006.

Chun, Hyunbae, Jung Hur, Doyoung Kim, and Nyeong Seon Son, "Cross-Border Vertical Integration in Factory Asia: Evidence for Property Rights Theory," Working Paper, 2017.

Davies, Ken, "China Investment Policy: An Update," OECD Working Papers on International Investment, 2013/01, 2013.

Davis, Steven J., John C. Haltiwanger, and Scott Schuh, *Job Creation and Destruction*, Cambridge, MA: MIT Press, 1998.

Debaere, Peter, Hongshik Lee, and Joonhyung Lee, "It Matters Where You Go: Outward Foreign Direct Investment and Multinational Employment Growth at Home," *Journal of Development Economics*, 91(2), 2010, 301–309.

Desai, Mihir A., C. Fritz Foley, and James R. Hines, Jr., "Domestic Effects of the Foreign Activities of US Multinationals," *American Economic Journal: Economic Policy*, 1(1), 2009, 181–203.

Disney, Richard, Jonathan Haskel, and Ylva Heden, "Entry, Exit and Establishment Survival in UK Manufacturing," *Journal of Industrial Economics*, 51(1), 2003, 91–112.

Dunne, Timothy, Mark J. Roberts, and Larry Samuelson, "The Growth and Failure of US Manufacturing Plants," *Quarterly Journal of Economics*, 104(4), 1989, 671–698.

Fernandes, Ana P., and Heiwai Tang, "Determinants of Vertical Integration in Export Processing: Theory and Evidence from China," *Journal of Development Economics*, 99(2), 2012, 396–414.

Gibson, John. K., and Richard ID Harris, "Trade Liberalization and Plant Exit in New Zealand Manufacturing," *Review of Economics and Statistics*, 78(3), 1996, 521–529.

Görg, Holger, and Eric Strobl, "Footloose' Multinationals?" *The Manchester School*, 71(1), 2003, 1–19.

Hanson, Gordon H., Raymond J. Mataloni, and Matthew J. Slaughter, "Vertical Production Networks in Multinational Firms," *Review of Economics and Statistics*, 87(4), 2005, 664–678.

Hansson, Pär, "Skill Upgrading and Production Transfer within Swedish Multinationals," *Scandinavian Journal of Economics*, 107(4), 2005, 673–692.

Harrison, Ann, and Margaret McMillan, "Offshoring Jobs? Multinationals and U.S. Manufacturing Employment," *Review of Economics and Statistics*, 93(3), 2011, 857–875.

Head, Keith, and John Ries, "Offshore Production and Skill Upgrading by Japanese Manufacturing Firms," *Journal of International Economics*, *58*(1), 2002, 81–105.

Kneller, Richard., Danny McGowan, Tomohiko Inui, and Toshiyuki Matsuura, "Closure within Multi-plant Firms: Evidence from Japan," *Review of World Economics,* 148(4), 2012, 647–668.

Konings, Jozef, and Alan Patrick Murphy, "Do Multinational Enterprises Relocate Employment to Low-Wage Regions? Evidence from European Multinationals," *Review of World Economics*, 142(2), 2006, 267–286.

Markusen, James R., "Multinationals, Multi-plant Economies, and the Gains from Trade," *Journal of International Economics*, 16(3–4), 1984, 205–226.

Lipsey, Robert E. and Fredrik Sjoholm, "South-South FDI and Development in East Asia," *Asian Development Review*, 28(2), 2011, 11–31.

Muendler, Marc-Andreas, and Sascha O. Becker, "Margins of Multinational Labor Substitution," *American Economic Review*, 100(5), 2010, 1999–2030.

Nicolas, Francoise, Stephen Thomsen, and Mi-Hyun Bang, "Lessons from Investment Policy Reform in Korea," OECD Working Papers on International Investment, 2013/02, 2013.

Ramondo, Natalia, "Factory Asia: The Determinants of Multinational Activity in the Context of Global Value Chains," Asia Development Bank Working Papers, 2016.

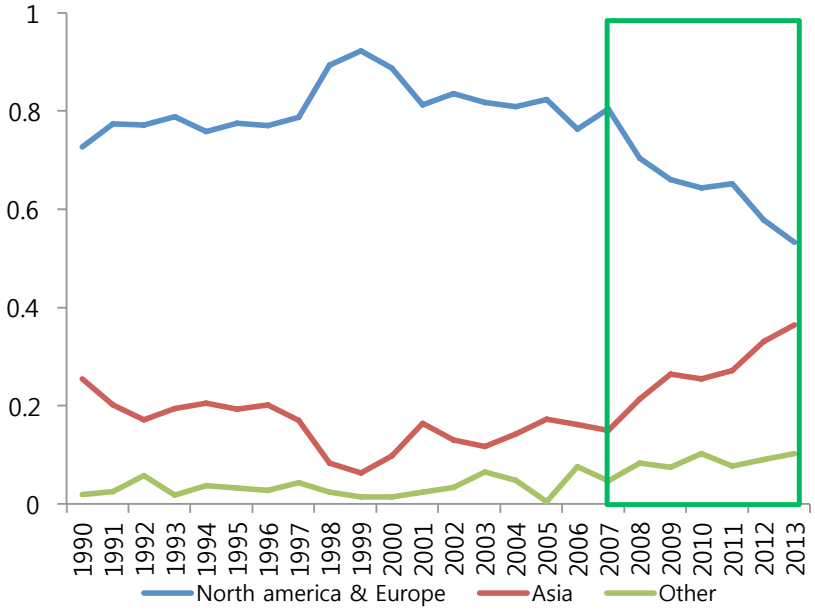
Simpson, Helen, "How Do firms' Outward FDI Strategies Relate to Their Activity at Home? Empirical Evidence for the UK," *World Economy*, 359(3), 2012, 243–272.

United Nation, National Accounts Main Aggregate Database.

Van Beveren, Ilke, "Footloose Multinationals in Belgium?" *Review of World Economics*, 143(3), 2007, 483–507.

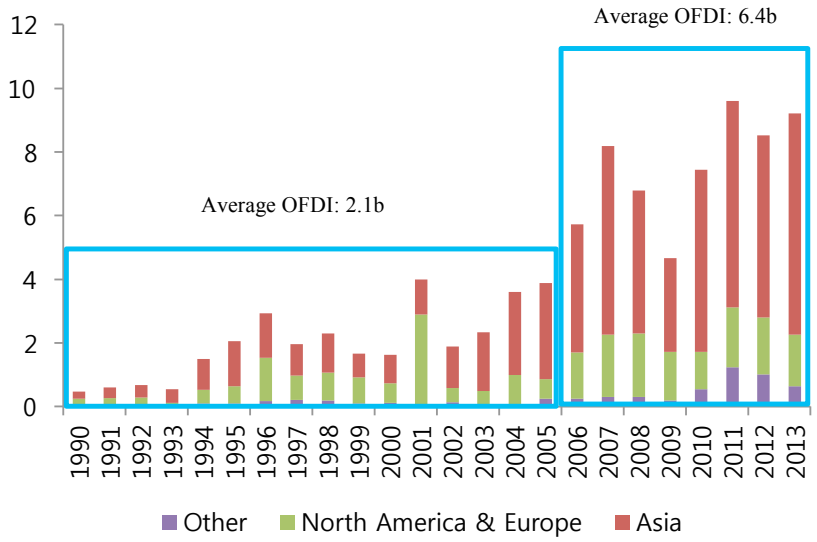
Zhang, Kevin Honglin, “Why Does So Much FDI from Hong Kong and Taiwan Go to Mainland China?” *China Economic Review*, 16(3), 2005, 293–307.

Figure 1: Regional Shares of Outward FDI (1990–2013)



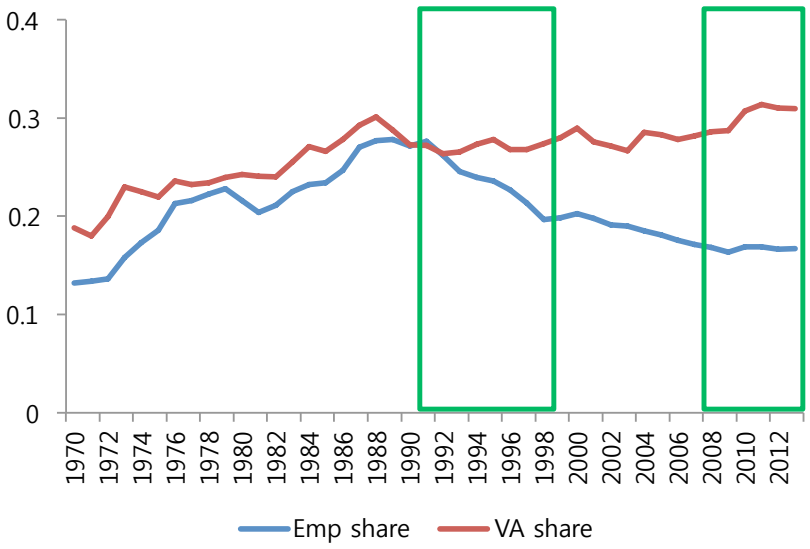
Source: UNCTAD FDI Statistics.

Figure 2. Outward FDI of Korean Firms in the Manufacturing Sector: 1990–2013



Source: Export-Import Bank of Korea.
Note: Outward FDI measured in Billion USD

Figure 3. Value-added and Employment Shares of Manufacturing in Korea



Sources: National Accounts (Value-added), Bank of Korea
Economically Active Population Survey (Employment), Statistics Korea

Table 1. Summary Statistics: Korean Manufacturing Firms

	Mean	Mean (weighted)	Standard deviation	Minimum	Maximum
Plant turnover at the firm level					
Plant death	0.256	0.297	0.437	0	1
Plant birth	0.157	0.273	0.363	0	1
Employment dynamics					
Employment growth	-0.394	-0.243	0.966	-2	1.927
Excess job reallocation	0.112	0.177	0.329	0	2
Firm characteristics					
Firm size	4.682	6.790	0.856	0	11.237
Firm age	2.766	3.031	0.683	0	4.532
Firm capital intensity	4.448	4.984	1.092	-5.017	8.676
Firm productivity	5.626	6.077	0.854	-0.068	9.907
Multi-plant	0.236	0.545	0.424	0	1
Multi-product	0.172	0.277	0.377	0	1

Notes: Figures in the first and second columns are unweighted and weighted means of characteristics for 5,399 Korean manufacturing firms, respectively. Plant death and birth are dummy variables that take the value 1 if firms closed and opened domestic manufacturing plants during 2008–2013, respectively. Firm characteristics pertain to 2008. Firm size (employment), firm age, firm capital intensity, and firm productivity are logarithmic values.

Table 2. Means of Characteristics for MNEs and Non-MNEs

	MNE	Non-MNE	Difference
Plant turnover			
Plant death	0.366	0.223	0.143 (0.012)***
Plant birth	0.393	0.144	0.248 (0.011)***
Employment dynamics			
Employment growth	-0.167	-0.322	0.155 (0.020)***
Excess job reallocation	0.245	0.105	0.140 (0.009)***
Firm characteristics			
Firm size	7.847	5.667	2.180 (0.053)***
Firm age	3.222	2.827	0.395 (0.020)***
Firm capital intensity	5.242	4.709	0.533 (0.028)***
Firm productivity	6.368	5.767	0.601 (0.023)***
Multi-plant	0.700	0.380	0.320 (0.012)***
Multi-product	0.374	0.173	0.201 (0.012)***
Observations	1,382	4,017	
Employment weight	0.513	0.487	

Notes: Figures in the first and second columns are weighted means of characteristics for MNEs and non-MNEs, respectively. Plant death and birth are dummy variables that take the value 1 if firms closed and opened domestic manufacturing plants during 2008–2013, respectively. Firm characteristics and employment weights pertain to 2008. Firm size (employment), firm age, firm capital intensity, and firm productivity are logarithmic values. Numbers in parentheses are standard errors.
* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 3. Korean MNEs and Home-Country Effects on Manufacturing Plant Turnover

	(1)	(2)	(3)	(4)
	Plant death	Plant birth	Plant death	Plant birth
MNE	0.130***	0.153***		
	(0.043)	(0.034)		
MNE: Emerging countries			0.117***	0.103***
			(0.039)	(0.024)
MNE: Advanced countries			0.078	0.152**
			(0.059)	(0.059)
Firm size	-0.044	0.032	-0.052*	0.017
	(0.032)	(0.025)	(0.029)	(0.023)
Firm age	-0.072***	0.002	-0.072***	0.004
	(0.022)	(0.039)	(0.021)	(0.038)
Firm capital intensity	-0.008	-0.019	-0.007	-0.017
	(0.017)	(0.017)	(0.017)	(0.016)
Firm productivity	0.003	0.048*	$0.005 \text{x} 10^{-1}$	0.043*
	(0.024)	(0.025)	(0.025)	(0.024)
Multi-plant	0.366***	0.033	0.369***	0.043
	(0.031)	(0.034)	(0.029)	(0.031)
Multi-product	0.023	0.085	0.021	0.087
	(0.059)	(0.074)	(0.058)	(0.076)
Pseudo R^2	0.313	0.277	0.315	0.281
Sample size	5,399	5,399	5,399	5,399

Notes: The dependent variables in columns (1) and (3) are dummy variables that take the value 1 if firms closed domestic manufacturing plants during 2008–2013. Dependent variable in columns (2) and (4) are similarly defined for firms' plant births. The table reports marginal effects of probit estimates. The sample includes all Korean manufacturing firms with 50 or more employees in 2008 (that are linked to their manufacturing plants with 10 or more employees). All regressions include 61 three-digit industry dummies. All regressions are weighted by firm employment in 2008. Numbers in parentheses are industry-clustered standard errors.
* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 4. Korean MNEs and Home-Country Effects on Employment Dynamics

	(1) Employment growth	(2) Job reallocation	(3) Employment growth	(4) Job reallocation
MNE	0.024	0.064***		
	(0.048)	(0.018)		
MNE: Emerging countries			-0.027	0.044**
			(0.048)	(0.017)
MNE: Advanced countries			0.122**	0.074***
			(0.060)	(0.028)
Firm size	0.058***	0.002	0.047**	-0.005
	(0.019)	(0.017)	(0.022)	(0.015)
Firm age	0.039*	-0.001	0.037	-0.004
	(0.023)	(0.016)	(0.024)	(0.016)
Firm capital intensity	0.059***	-0.012	0.060***	-0.010
	(0.018)	(0.010)	(0.018)	(0.010)
Firm productivity	0.074**	0.010	0.071**	0.007
	(0.028)	(0.014)	(0.027)	(0.014)
Multi-plant	-0.092**	0.119***	-0.081**	0.123***
	(0.036)	(0.025)	(0.035)	(0.023)
Multi-product	-0.011	0.053	-0.005	0.055
	(0.041)	(0.041)	(0.040)	(0.041)
Adjusted R^2	0.110	0.285	0.112	0.289
Sample size	5,399	5,399	5,399	5,399

Notes: Employment growth is the net job creation rate defined as the job creation rate minus the job destruction rate. The excess job reallocation rate is defined as the sum of job creation and destruction rates minus employment growth (the net job creation rate).The sample includes all Korean manufacturing firms with 50 or more employees in 2008 (that are linked to their manufacturing plants with 10 or more employees). All regressions include 61 three-digit industry dummies. All regressions are weighted by firm employment in 2008. Numbers in parentheses are industry-clustered standard errors.
* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 5. Robustness Checks: Alternative Definitions of MNEs and Emerging Countries

A. Plant Turnover

	(1) Plant death	(2) Plant birth	(3) Plant death	(4) Plant birth
A1. Alternative definition of MNEs				
MNE	0.135***	0.154***		
	(0.049)	(0.038)		
MNE: Emerging countries			0.111***	0.084***
			(0.043)	(0.032)
MNE: Advanced countries			0.119*	0.253***
			(0.069)	(0.087)
A2. Alternative definition of emerging countries				
MNE: East Asian countries	0.115***	0.098***		
	(0.040)	(0.029)		
MNE: Asian countries			0.117***	0.103***
			(0.039)	(0.030)
MNE: Advanced countries	0.080	0.155***	0.076	0.148**
	(0.060)	(0.060)	(0.059)	(0.058)

B. Employment Dynamics

	(1) Employment growth	(2) Job reallocation	(3) Employment growth	(4) Job reallocation
B1. Alternative definition of MNEs				
MNE	0.032	0.073***		
	(0.049)	(0.020)		
MNE: Emerging countries			-0.003	0.051**
			(0.052)	(0.019)
MNE: Advanced countries			0.067	0.094**
			(0.065)	(0.040)
B2. Alternative definition of emerging countries				
MNE: East Asian countries	-0.030	0.042**		
	(0.049)	(0.019)		
MNE: Asian countries			-0.025	0.040**
			(0.046)	(0.018)
MNE: Advanced countries	0.123**	0.075***	0.122**	0.075***
	(0.060)	(0.028)	(0.061)	(0.028)

Notes: All regressions include firm size, firm age, firm capital intensity, firm productivity, and multi-plant and multi-product variables as controls. Panel A reports marginal effects of probit estimates. All regressions include 61 three-digit industry dummies. All regressions are weighted by firm employment in 2008. Numbers in parentheses are industry-clustered standard errors.
* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 6. Robustness Checks: Alternative Sample Periods

A. Plant Turnover

	(1) Plant death	(2) Plant birth	(3) Plant death	(4) Plant birth
A1. 3-year period: 2008–2011				
MNE	0.067**	0.112***		
	(0.029)	(0.027)		
MNE: Emerging countries			0.059**	0.087***
			(0.026)	(0.020)
MNE: Advanced countries			0.038	0.066
			(0.046)	(0.051)
A2. Excluding the global financial crisis: 2009–2013				
MNE	0.139***	0.125***		
	(0.034)	(0.033)		
MNE: Emerging countries			0.130***	0.090***
			(0.030)	(0.023)
MNE: Advanced countries			0.067	0.095*
			(0.046)	(0.055)

B. Employment Dynamics

	(1) Employment growth	(2) Job reallocation	(3) Employment growth	(4) Job reallocation
B1. 3-year period: 2008–2011				
MNE	0.068	0.039***		
	(0.058)	(0.010)		
MNE: Emerging countries			0.036	0.024**
			(0.054)	(0.010)
MNE: Advanced countries			0.087*	0.055***
			(0.051)	(0.018)
B2. Excluding the global financial crisis: 2009–2013				
MNE	-0.053	0.044***		
	(0.065)	(0.015)		
MNE: Emerging countries			-0.104	0.039**
			(0.074)	(0.016)
MNE: Advanced countries			0.119*	0.003
			(0.064)	(0.016)

Notes: All regressions include firm size, firm age, firm capital intensity, firm productivity, and multi-plant and multi-product variables as controls. Panel A reports marginal effects of probit estimates. All regressions include 61 three-digit industry dummies. All regressions are weighted by firm employment in 2008. Numbers in parentheses are industry-clustered standard errors.
* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 7. Endogeneity: Propensity Score Matching

A. Plant Turnover

	(1)	(2)	(3)	(4)	(5)	(6)
	Plant death	Plant birth	Plant death	Plant birth	Plant death	Plant birth
MNE	0.238**	0.278***				
	(0.100)	(0.100)				
MNE:			0.237**	0.277***		
Emerging countries			(0.093)	(0.102)		
MNE:					0.301*	0.384**
Advanced countries					(0.168)	(0.154)
Sample size	1,382	1,382	1,279	1,279	306	306

B. Employment Dynamics

	(1)	(2)	(3)	(4)	(5)	(6)
	Employment growth	Job reallocation	Employment growth	Job reallocation	Employment growth	Job reallocation
MNE	-0.032	0.179**				
	(0.028)	(0.077)				
MNE:			-0.046	0.176**		
Emerging countries			(0.032)	(0.080)		
MNE:					0.047	0.247*
Advanced countries					(0.033)	(0.135)
Sample size	1,382	1,382	1,279	1,279	306	306

Notes: Dependent variables are plant death and birth dummies at the firm level for Panel A and employment growth and excess job reallocation rates for Panel B. Propensity scores are estimated by the weighted probit model. Matches are assigned within the same 3-digit industry. Bootstrapped standard errors are in parentheses.
* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Appendix

Table A1. Plant Turnover Results: Probit Model (Unweighted)

	(1)	(2)	(3)	(4)
	Plant death	Plant birth	Plant death	Plant birth
MNE	0.037**	0.046***		
	(0.016)	(0.009)		
MNE: Emerging countries			0.044**	0.033***
			(0.017)	(0.009)
MNE: Advanced countries			-0.006	0.061**
			(0.029)	(0.024)
Firm size	-0.062***	0.034***	-0.062***	0.032***
	(0.010)	(0.006)	(0.010)	(0.006)
Firm age	-0.067***	-0.012*	-0.067***	-0.012*
	(0.012)	(0.007)	(0.012)	(0.007)
Firm capital intensity	-0.001x10^{-1}	-0.005	-0.001x10^{-1}	-0.005
	(0.008)	(0.006)	(0.008)	(0.006)
Firm productivity	-0.015	0.019**	-0.015	0.018**
	(0.010)	(0.008)	(0.010)	(0.008)
Multi-plant	0.430***	0.059***	0.429***	0.059***
	(0.016)	(0.011)	(0.016)	(0.011)
Multi-product	-0.008	0.081***	-0.009	0.082***
	(0.016)	(0.013)	(0.016)	(0.013)
Pseudo R^2	0.137	0.065	0.137	0.066
Sample size	5,399	5,399	5,399	5,399

Notes: The dependent variables in columns (1) and (3) are dummy variables that take the value 1 if firms closed domestic manufacturing plants during 2008–2013. Dependent variables in columns (2) and (4) are similarly defined for firms' plant births. The table reports marginal effects of probit estimates. The sample includes all Korean manufacturing firms with 50 or more employees in 2008 (that are linked to their manufacturing plants with 10 or more employees). All regressions include 61 three-digit industry dummies. Numbers in parentheses are industry-clustered standard errors.
* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table A2. Robustness Checks: Excluding Foreign-owned Firms

A. Plant Turnover

	(1)	(2)	(3)	(4)
	Plant death	Plant birth	Plant death	Plant birth
MNE	0.118***	0.157***		
	(0.042)	(0.038)		
MNE: Emerging countries			0.108***	0.107***
			(0.040)	(0.028)
MNE: Advanced countries			0.065	0.165***
			(0.065)	(0.058)
Pseudo R^2	0.324	0.289	0.326	0.296
Sample size	5,056	5,056	5,056	5,056

B. Employment Dynamics

	(1)	(2)	(3)	(4)
	Employment growth	Job reallocation	Employment growth	Job reallocation
MNE	0.035	0.062***		
	(0.053)	(0.019)		
MNE: Emerging countries			-0.022	0.042**
			(0.052)	(0.019)
MNE: Advanced countries			0.143*	0.083***
			(0.074)	(0.028)
Adjusted R^2	0.109	0.300	0.112	0.305
Sample size	5,056	5,056	5,056	5,056

Notes: All regressions include firm size, firm age, firm capital intensity, firm productivity, and multi-plant and multi-product variables as controls. Panel A reports marginal effects of probit estimates. All regressions include 61 three-digit industry dummies. All regressions are weighted by firm employment in 2008. Numbers in parentheses indicate industry-clustered standard errors.
* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table A3. Plant Turnover Results: Bivariate Probit Model

	(1A)	(1B)	(2A)	(2B)
	Plant death	Plant birth	Plant death	Plant birth
MNE	0.100***	0.124***		
	(0.033)	(0.027)		
MNE: Emerging countries			0.089***	0.084***
			(0.030)	(0.019)
MNE: Advanced countries			0.058	0.114***
			(0.043)	(0.041)
Rho	0.375***		0.371***	
Wald test for Rho = 0	36.00		39.54	
Log likelihood	-978,343		-973,829	
Sample size	5,399	5,399	5,399	5,399

Notes: The dependent variables in columns (1A) and (2A) are dummy variables that take the value 1 if firms closed domestic manufacturing plants during 2008–2013. Dependent variables in columns (2A) and (2B) are similarly defined for firms' plant births. The table reports marginal effects of bivariate probit estimates. The sample includes all Korean manufacturing firms with 50 or more employees in 2008 (that are linked to their manufacturing plants with 10 or more employees). All regression specifications include firm size, firm age, firm capital intensity, firm productivity, and multi-plant and multi-product variables as controls. All regressions include 61 three-digit industry dummies. All regressions are weighted by firm employment in 2008. Numbers in parentheses are industry-clustered standard errors.

* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.