

Korean Multinational Firms in Factory Asia and Home-Country Effects on Plant Turnover and Job Reallocation

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Abstract

During the last decade multinational firms originated from Asian emerging countries such as China and Korea have rapidly grown worldwide, but the effects of these multinational firms on their home countries have been rarely studied. Using Korean firm-plant matched dataset in 2008–2013, we examine the effects of the multinational firms on plant turnover and job reallocation at home. We find that Korean multinational firms are more likely not only to close down their domestic manufacturing plants but also to open new plants than non-multinationals. Along with the active plant turnover, Korean multinational firms have more active job reallocation across their domestic manufacturing plants within the firms, but which does not result in net job loss. After participating in Factory Asia, Korean multinational firms reorganize their manufacturing plants at home rather than hollow out home plants. This suggests that the home-country effect of Asian multinational firms' participation in global supply chains might be different from those of advanced countries' multinational firms.

JEL Classification: D22, F23

Keywords: Multinational Firm, Plant Death and Birth, Job Reallocation, Employment

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1. Introduction

Since the inception of 21st century, there has been a notable change in the regional composition of manufacturing production around the world - often called *Factory Asia* implying Asia as the global manufacturing base. Indeed, Asia's share of global manufacturing value-added increased from 26% in 2000 to 46% in 2014, according to the National Accounts Main Aggregate Database of *United Nation*. In the course of establishing Factory Asia, Asian countries themselves such as China, Hong Kong, Korea, Singapore and Taiwan were the major players through intra-regional foreign direct investments. As shown in Figure 1, while the share of the outward FDIs from Asia has risen from 10% in 2000 to 36% in 2013, main destinations of the FDIs are heavily concentrated within Asian countries. For instance, Korea invested 75% of its total FDIs in Asian region and China did 70%, according to UNCTAD's FDI database.

[Figure 1 about here]

According to Ramondo (2016), Asian multinational firms (MNEs) engage two-way trades in global value chains (GVC) formed in the Factory Asia: They import intermediate inputs from both foreign subsidiaries and independent suppliers, process them in domestic plants and export another intermediate components or final products abroad. For example, the share of Korean MNEs out of the total amount of export and import in Korea is approximately 85% in 2013, according to the Survey of Business Activities of Statistics Korea.¹ The FDIs entailing two-way trade might have quite different implication on home-country effects compared to the FDIs of advanced countries of which the purpose is mainly imports of intermediate inputs. A number of advanced countries have experienced that outward FDIs of their MNEs cause plant shutdown and job loss in the manufacturing sectors at home. Disney *et al.* (2003), Bernard and Jensen (2007), and Muendler and Becker (2010) show that job loss due to plant death has been

¹ This is different from China case. The export processing of Chinese firms are mostly conducted by foreign-owned enterprises, according to Fernandes and Tang (2012). Most Korean MNEs are Korean-majority owned.

commonly observed in many advanced countries such as UK, US, and Germany. Their findings of plant death and job loss driven by MNEs imply that the advanced MNEs relocated their manufacturing plants to foreign countries, resulting domestic job loss. Contrary to the FDIs of the advanced countries, the outward FDIs of Asian countries such as China and Korea reorganized domestic plants to be vertically related to foreign subsidiaries, according to Chun *et al* (2017). They showed that Korean manufacturing firms own both domestic affiliates and foreign affiliates that are forwardly or backwardly related in a vertical production line. The vertical line-up in manufacturing process across countries enables the Korean MNEs to participate actively in two-way input trade within Asia.

Despite of the apparently different features of the two types of MNEs, there have been few empirical studies focusing on the latter and examining the home-country effects of the multinational firms originated from Factory Asia on plant turnover and job reallocation. In this paper, we attempt to fill the gap by focusing on Korean MNEs. Korea case is a better case for this study than China to see the effect of outward FDIs on domestic manufacturing sectors since inward FDIs into Korea has rarely contributed to domestic manufacturing sectors while the inward FDIs in China as well as outward FDIs have played a major role in developing the manufacturing bases.²

Using firm-plant matched dataset of Korean firms in the period of 2008–2013, we examine the choice of the multinational firms on both death and birth of their domestic manufacturing plants; and the resulting employment dynamics such as job creation, destruction, and reallocation. Our main findings are as follows. First, the Korean multinational firms are more likely not only to shut down plants but also to open up new plants than non-multinational firms. Second, there is no statistical ground to say that the net employment growth of the multinational firms is higher than that of non-multinational firms. Third, the multinational firms have had more active job reallocation – job destruction and job creation – than non-multinational firms. Fourth, the above results are quite evident for the multinational firms invested in

² For example, see Davies (2013) and Zhang (2005) about the role of inward of FDIs in the history of Chinese strategies for developing manufacturing sectors.

Asian countries than in advanced countries. These findings are quite robust to a wide range of considerations such as alternative definitions of multinational firms and emerging countries; alternative periods with 3-year interval from 2008 to 2011; and exclusion of foreign owned firms. We also check out a potential endogeneity problem using the propensity score matching method; and possible joint decision of plant shutdown and startup of multinational firms.

Unlike the previous literature on the advanced MNEs, our findings from Korean MNEs suggest somewhat different views on the multinational firms' plant turnover and the impacts on employment dynamics at home. First, for the first time in the literature, we could observe that the active manufacturing plant *entry* by multinational firms is as much influential to domestic industries. Second, implied by the plant turnover–exit *and* entry both, the negative effect on employment growth at the firm level is not found in our empirical results. In the previous literature on advanced countries, a consistent evidence has been put forwarded that plants owned by the multinational firms are more likely to exit than plants owned by non-multinational firms (Disney *et al.*, 2003; Bernard and Jensen, 2007; Muendler and Becker, 2010). In particular, Muendler and Becker (2010) distinguished the extensive margin as when MNEs enter foreign locations and the intensive margin as when MNEs operate existing plants. They found that domestic employment decreases due to the extensive margin but increases due to the intensive margin. In addition, Simpson (2012) reported a similar result from UK. The UK MNEs entering low-wage countries shut down their domestic plants in low-wage industries of UK but increased the numbers of workers of existing plants in high-wage industries.³ Unlike their results, we report a new case that both job losses and gains occurred only at the extensive margin of Korean MNEs entering Asian emerging countries, while the intensive margins do not play any role in affecting employment. This finding is consistent to country-level evidence in Korea; maintaining a high employment share of the manufacturing sector around at 17% for the last decade. Our paper does not simply suggest non hollowing-out effect of Korean

³ Similar to Simpson (2012), Harrison and McMillan (2011) argued that the employment effect of foreign offshoring of US firms might be ambiguous due to the two opposing effects: while the foreign production may substitute employments, it may as well save production costs and stimulate domestic employments.

MNEs' FDIs, but the main results imply that the Korean MNEs have brought about a new mechanism (i.e., plant entry) of restructuring plants in domestic manufacturing sectors and contributed to a steady level of employment over the period of rising outward FDIs. This is new evidence on the role of MNEs that has never been reported in the previous literature.

2. Factory Asia and Korean Multinational Firms

Since the mid-2000s, the majority of the outward foreign direct investments (OFDI) of Korean MNEs have been concentrated in Asian countries, in particular, China. Through establishing manufacturing subsidiaries in China, Korean MNEs participated in building up their manufacturing networks in China, a center of production-supply networks in Factory Asia. Yet, Korean MNEs themselves have maintained their traditional status as a manufacturer within Korea without transforming into factory-less headquarters.

Figure 2 shows the annual amounts of OFDI of multinational firms in the Korean manufacturing sector for the period of 1990 to 2013. One noticeable fact is that OFDI is rapidly increasing after 2005 and concentrated in Asia, in particular, China. The rising period coincides with the following two events. First, in 2004 and 2005 Korean government removed the overseas investment limits imposed on corporate and private investors.⁴ Second, in the mid-2000s Chinese government began implementing the WTO's obligation of removing restrictions on investment that create trade distortions after its accession to the WTO in 2002.⁵ That is, the internal and external conditions in the 2000s were quite favorable to outward FDIs of Korean firms toward China, a center of Factory Asia.

[Figure 2 about here]

⁴ See Nicolas *et al.* (2013) for more details on the history of the investment liberalization policy reform of Korean government.

⁵ See Bransetter and Lardy (2006) for the commitment of Chinese investment liberalization to the WTO after 2002. They also summarize the developments of Chinese globalization in 1990s.

According to the FDI database of Export-Import Bank of Korea in 2010, China was the top destination country of Korea's OFDI, followed by Vietnam, India, and Indonesia for the period of 1996-2009. Since the early 2000s, China has enormously absorbed global FDI not only from advanced countries but also from emerging economies. According to the OECD report by Davies (2013), the inward FDIs of China surged from 40 billion USD in 2000 to around 120 billion USD in 2011. The two thirds of the inward FDIs are from 10 Asian countries in 2010. Among them Korea is the third, following Singapore and Japan and followed by Taiwan.⁶

Korea is a key country to understand home-country impact of the formation of production-supply networks in China. First, compared to Taiwan, Korea has only recently become a major foreign investor in China and established relatively new production-supply networks since the mid-2000s, while Taiwan had already moved their production lines to China from the beginning of 1990s, more than a decade ahead of Korea, according to Zhang (2005). Taiwan together with Hong Kong were actually an insider of China that contributed to transforming Chinese economy to industrialized one from the inception of economic development of China since the early 1990s. Next, in terms of the total amounts of FDIs, Korea is not the only major foreign investor in China in recent years. According to Davies (2013), the amount of FDIs by Korea into China in 2010 was 2.7 billion USD, following U.S with 3.0 billion USD and Japan with 4.1 billion USD. The total amount of FDIs from E.U. was 5.4 billion USD, but no single nation in Europe invested more than Korea. More importantly, they have belonged to a traditional group of advanced countries within OECD nations for long time, while Korea is a relatively newcomer to the OECD group and a relatively new investor in the global market as well. Furthermore, the common characteristic of the advanced MNEs is that they are highly specialized headquarters in business services such as R&D, product design, and scientific and professional services, while the headquarters of Korean MNEs are still taking hold of significant scale of manufacturing facilities within domestic markets.

In fact, unlike other advanced countries, Korea did not suffer a contraction of the domestic

⁶ Although Hong Kong is the largest investing country into main China, it is now a part of China.

manufacturing sector during the recent period of the increased outward FDIs of Korea into China and Asia, Figure 3 shows some macroeconomic facts to see the status of Korean manufacturing sector. First, the manufacturing sector's share of value-added has been quite stable and not fallen below 28% since 2000. According to the Mining and Manufacturing Survey of Statistics Korea,⁷ it was 30% as of 2013. Second, the manufacturing sector's share of employment has remained at a high level as well. The Survey of Economically Active Population of Statistics Korea shows that the share has been slightly decreasing from 20% in 2000 to 17% in 2007, but continued to be stable at 17% so far. Third, the total annual number of manufacturing plants show upward-trends over years. According to the Survey of Mining and Manufacturing, the numbers 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 trend of outward FDIs, the domestic manufacturing sector continued to maintain the relatively high shares in employment, value-added, and the number of production plants.

[Figure 3 about here]

Given the importance of manufacturing in Korea, notably the Korean MNEs account for 48% of sales and value-added and 25% of employments in the manufacturing sector as of 2013, according to the Survey of Business Activities by Statistics Korea.⁸ So, our paper examines the home-country effect of the Korean MNEs in domestic manufacturing sectors. However, we need to be careful in interpreting the above macroeconomic statistics. This is because the aggregate levels of value-added, employment and numbers of manufacturing plants do not tell us exactly what has happened inside the manufacturing sector at all. For example, the above aggregate statistics on stable employment share of manufacturing sectors

⁷ The Survey of Mining and Manufacturing was done for manufacturing plants with more than 5 employees until 2007. After 2008, it excluded the plants with less than 9 employees.

⁸ The Survey of Business Activities survey all firms located in Korea who hired more than 50 employees or 300 million Korean Won worth of equity capital. The firms cover about 70% of total value-added of the Korean economy.

might be resulted in if the Korean MNEs manage to reallocate their plants by closing down and starting up them at the same time. If so, the plant turnover of Korean MNEs might well affect job reallocation - job creation and destruction both – rather than job growth.

Our approach in this paper is quite different from the following earlier work on impact of Korean outward FDI on firm-level employments at home. Debaere *et al.* (2010) showed a fact that there was a negative effect on domestic manufacturing employment due to the outward FDI of Korea into non-advanced countries including China in early 1990s. Indeed, Figure 3 shows that since 1990 the employment share of manufacturing sector was continuously declining to 21% in 1997. But, for the periods of decreasing the employments, Figure 2 casts us a doubt that the amounts of Korean outward FDI in the manufacturing sector into Asian countries were too small to transform the whole domestic manufacturing sector. Accordingly, in this paper, we focus the periods from 2008 to 2013 that we can observe substantially large amounts of outward FDI of Korean MNEs. In particular, for the first time in the literature on the Korean economy we use firm-plant matched dataset and study the dynamic effect of Korean MNEs on domestic plants and employments in the domestic market.

3. Data

Firm-Plant Matched Data

To construct a firm-plant matched dataset, we combine two data sets of the Survey of Business Activities (firm) and the Mining and Manufacturing Survey (plant), annually conducted by Statistics Korea. The Survey of Business Activities (SBA) is a *firm-level* survey that covers all firms with 50 or more employees and with 300 million KRW or more capital in all business sectors. The SBA includes not only firm characteristics but also various business strategies and activities. In particular, regarding firms' foreign activities, the SBA collects country location and 2-digit industry information about each foreign affiliate of which a Korean parent firm holds at least 20% of equity. The Mining and Manufacturing Survey (MMS) is a plant-level survey that covers all mining and manufacturing plants with 10 or more employees located in

Korea. The MMS collect detailed information on plant characteristics such as employment, age, and tangible assets.

We use the firm identifier of a plant in the MMS to match a firm in the SBA. A sample of matched manufacturing firms with their domestic manufacturing plants covers 5,399 manufacturing firms with 7,367 manufacturing plants in 2008. Because the SBA covers firms with 50 or more employees, some small plants in the MMS are omitted in the matched sample. However, the matched dataset accounts for approximately 75% of sales and 50% of employment of all plants the 2008 MMS. In addition, given our interest in the behavior of multinational firms, the exclusion of small plants might not generate a bias in construction of a control group of non-multinational firms.⁹ This implies that our matched dataset is representative for analyzing the effect of multinationals on the domestic manufacturing sector.

Since a massive expansion of manufacturing outward FDI across (East) Asian countries after the mid-2000s, Korea's domestic manufacturing industries experienced massive reallocation and restructuring. To examine the consequence of this expanded multinationals on the domestic manufacturing during the mid-2000s, we chose the sample period of 2008–2013 period. In this 5-year period, the domestic manufacturing expanded with active reallocation along with not only 1,628 manufacturing plant deaths but also 1,815 plant births.

Multinational and Firm Characteristics

Using data from the SBA, we construct the variables related to multinational and firm characteristics. We construct a measure of multinational status using information about the ownership of foreign affiliates. A dummy variable of multinational takes one if a Korean manufacturing firm has at least one foreign manufacturing affiliate in 2008; zero otherwise.¹⁰ As noted in the previous studies of Braconier and

⁹ When we use the Census on Establishments to include these small plants that are omitted in the MMS, the results are qualitatively same.

¹⁰ The results are qualitatively the same when we consider the majority-owned (over 50% of equity) foreign affiliates because most foreign affiliates are majority-owned.

Ekholm (2000), Debaere *et al.* (2010), and Harrison and McMillan (2011), the effect of multinationals on the domestic economy may differ according to the location of foreign activity. To address the different effect, we classify multinationals according to country location of their affiliates. The destinations are divided into two groups: advanced countries and emerging countries. Advanced countries include countries in North-America, Europe, and Oceania, and Japan. Emerging countries include all Asian and developing countries excluding Japan.

We construct measures of firm size, age, capital intensity, productivity, and dummies for multiplant and multiproduct to control for firm heterogeneity. Firm size is the log of the sum of employees in all domestic manufacturing plants owned by a firm. Firm age is the log of years of operation of the firm. Firm-level capital intensity is the log of the ratio of the sum of plant-level tangible assets to the total manufacturing employment. Firm productivity is defined as the log of the total manufacturing sales over the total manufacturing employment. Multi-plant is a dummy variable that takes one if a firm has at least two manufacturing plants. Multiproduct is a dummy variable that takes one if a firm has 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 2008 is absent from the MMS in 2013. A plant is defined as a birth one if it were absent in 2008 but present in 2013. Both the plant birth and death are defined over the 5-year span of the sample period. We measure a dummy variable for plant death *at the firm-level* that takes one if the firm has at least one plant death in 2008–2013. A dummy for plant birth at the firm-level is similarly defined. If a firm consists of a plant (a single-plant firm), the plant death is the firm death. However, the plant death does not necessarily implies the firm death if a firm owns multiple plants (a multi-plant firm). Because the MMS includes plants with 10 or more employees, the plant is recorded as death if the level of employment of the plant fell below 10 in the sample period. Using data on the Census on Establishments that covers all establishments with at least one worker, we identify whether the plant

death represents either plant closure or omission due to being below the minimum 10-worker requirement. However, the results remain unchanged if the sample is adjusted for true deaths and births of plants.

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 mean of plant-level employment growth rates:

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

where $E_{j,t}$ is the number of workers of 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 the 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 of both continuing (surviving) plants and death and birth plants. The growth rate lies in the interval of $[-2, 2]$ with plant death and birth of plant corresponding to the left and right endpoint, 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 growths of 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. This reallocation measure gross job flows between expanding and shrinking plants including birth and death plants that underlie the net employment change. We note that net employment growth is simply the difference between job creation and destruction. Thus, even though plants of a firm have active job flows within the firm through plant expansion, contraction, births, and death, the firm-level employment may remain unchanged if the magnitude of job creation and destruction is the same. In this respect, the reallocation measure that captures the heterogeneity of employment changes across plants, which enables us to identify whether or not multinational firms reorganize their plants at home.

[Table 1 about here]

Summary Statistics

Table 1 reports summary statistics for Korean manufacturing firms in the BSA. The first column shows that 25.6% of 5,399 manufacturing firms close at least one domestic plants during the 2008–2013 period, whereas 15.7% of the firms open new domestic plants in the same period. In the case of employment-weighted mean, the probabilities of both plant closure and opening at the firm-level increased 29.7% and 27.3%, respectively, which indicates that large firms may have higher probabilities of plant birth and death. However, the findings do not necessarily indicate a positive association between the firm size and the 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 that account 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 had actively reallocation and restructuring through closing and opening their domestic plants in the 2008–2013 period.

The employment growth over the 5-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 is associated with the property 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 which have only exiting plants have an extreme values of -2. To compare employment growths between multinationals and non-multinationals, however, it is necessary to employ this integrated measure because the exit rates of multinational and non-multinationals are substantially different. Consistent with high plant birth and deaths, figures of excess job reallocation means (0.112 and 0.177 for unweighted and weighted means, respectively) indicate that there were a substantial job creation and destruction (that cancel out each other and do not change employment level).

[Table 2 about here]

Table 2 reports the unweighted mean of each variable for multinationals (1,382) and non-multinationals (4,017). Multinationals have on average higher probabilities of both plant death and birth than non-multinationals. In the third column, *t*-test statistics show that the differences of the death and birth probabilities in the two groups are statistically significant at the 1% level. Employment growth and reallocation are also higher for multinational than non-multinationals. However, it is difficult to conclude that multinationals have more active reallocation and higher employment growth than non-multinationals because multinationals also have different firm attributes that may affect plant turnover. As expected, Table 2 shows that multinational firms are larger, older, more capital intensive, more productive than non-multinationals. Multinational firms are also more likely to be multi-plant and multi-product firms than non-multinationals. Therefore, it is crucial to control firm characteristics when we identify the impacts of multinationals on employment growth and reallocation. To do this, we perform multiple regressions in the next section.

4. Empirical Results

Empirical Specification

In this section, we examine the effect of multinationals not only on the plant death and birth but also on employment growth and reallocation at the firm level. To relate firm characteristics including multinationals in year t to the four firm-level outcomes across 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 year t (2008) and $t + 5$ (2013). Both the plant death and birth at the firm level are dummy variables that take one if firm i close and open a plant over the 2008–2013 period, respectively. The net employment growth rate at the firm-level are measured by the weighted mean 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 or not firm i is a multinational firm in year t ; X_i is a vector of firm-level characteristics in year t that include firm size, age, capital intensity, productivity, and dummies for multi-plant and multiproduct. The model also includes 61 3-digit-level industry dummies (μ_k) to control for unobserved factors affecting firm-level outcomes.¹¹ ε_i is error terms allowing clustering at the industry-level. We employ probit models for the death and birth variables that are dichotomous, while we use least square estimation for employment growth and job reallocation variables. To examine economic significance of multinationals' effects, we estimate employment-weighted regressions for all the four

¹¹ Some 3-digit industries in which the dependent variable for all firm in an industry has the same value are merged into the closest industries, which reduces the number of industries from 82 to 61.

outcomes in this section.¹²

[Table 3 about here]

Results on Plant Deaths and Birth

Table 3 reports the marginal effects of multinationals on the probability of plant death and birth at the firm-level. Column (1) of Table 3 shows that multinational firms have an approximately 13% higher probability of plant shutdown than non-multinationals. This finding on plant shutdown is consistent with the effects of advanced multinational on their plants at home (Bernard and Jensen, 2007; and others): Outward FDI induces plant closing in the home country, which hollows out domestic industries. However, column (2) shows that Korean multinationals also have a higher probability of opening a new plant at home than non-multinationals. Combining findings of columns (1) and (2) suggest that Korean multinational firms shut down their manufacturing plants at home, but at the same time open new plants at home.¹³ Magnitude of multinationals' effects on the probabilities of domestic plant death and birth also indicates that the difference in the plant birth probability between multinationals and non-multinationals is even larger than that in the plant death probability. Thus, Korean multinationals are characterized by active plant opening at home, distinguishing from the impact of advanced multinationals on home-country plants. Our finding suggests that plant closing in Korea driven by multinationals implies reorganizing domestic manufacturing industries (and resulting in net job growth at home) rather than hollowing out them.¹⁴

¹² Nonetheless, unweighted regressions generate qualitatively similar results that are reported in Table A1 in Appendix.

¹³ The closing and opening of plants may not be done by the same firms. To address this issue, we employ a bivariate probit model that enables us to estimate the correlation coefficient for two decisions of plant closing and opening. The estimation results show a positive association of the two decisions. Refer to Table A3 in Appendix for more details and estimation results for the bivariate models.

¹⁴ However, in the paper, we do not investigate the other economic contents of this reorganization of manufacturing such as productivity and production structure changes.

In addition to multinationals, columns (1) and (2) show 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 effect on the probability of plant birth is positive, but 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 is not directly comparable to findings in the previous studies at the plant-level, in which a probability of plant survival is positively related to *plant* size, age, productivity and capital intensity. When we relate plant size and productivity to plant exit, we also find a negative relationship.

Columns (3) and (4) distinguish multinationals according to their destinations: emerging and advanced countries. As in Debaere *et al.* (2010) and Harrison and McMillan (2011), the locations of multinational and offshoring activities that represent motives for the activities do have significant effects on domestic industries. Consistently, multinationals to emerging countries have both positive effects on the probabilities of plant death and birth at home, while multinationals to advanced countries have a significant positive effect on the plan birth, not on the death. The findings suggest that the rapid expansion of outward FDI toward emerging economies, in particular, China, in the 2000s is a key source of active plant death and birth in the domestic manufacturing sector. However, outward FDI toward advanced countries has a positive effect on domestic plant birth, but does not induce plant closure.¹⁵ The findings confirm that South-South and South-North relationship of emerging multinationals might have different effect on manufacturing industries at home.

[Table 4 about here]

¹⁵ It may be referred as a market-oriented FDI. That is, in entering the advanced countries, the MNEs build up their production plants to meet the market demand for more varieties in goods. In this case, the MNEs may be not necessarily close down their plants upon the entry.

Results on Employment and Reallocation

Table 4 presents firm-level results for the effects of multinationals on employment growth and job reallocation within the firm over the 5-year period. Column (1) of Table 4 shows the employment growth of multinationals relative to non-multinational is positive but statistically insignificant. Column (2) reports that multinationals have more active job reallocation relative to non-multinationals, which is statistically significant at the 1% level. Consistent to results of plant death and birth in Table 3, Table 4 shows that multinationals reorganize their domestic manufacturing activities through closing and opening plants, inducing active job reallocation, but not adding manufacturing jobs at home.¹⁶

Columns (3) and (4) of Table 4 present the difference in effects of multinationals on employment and reallocation according to the destinations of outward FDI. Multinationals toward emerging countries exhibit active job reallocation, but insignificant employment effect at home. In contrast, multinational toward advance countries exhibit both active job reallocation and positive employment growth. Again, consistent with the findings in plant death and births in columns (3) and (4) of Table 3, the findings suggest that employment growth and job reallocation effects are also different between South-South and South-North relationships for emerging multinationals originated from Korea.

5. Robustness

To assess the robustness of our findings, we examine various issues related to main results. First, we examine whether our results are robust to alternative definitions of multinationals and emerging countries (focusing on Asian or East Asian countries). We also examine alternative sample periods (3-year over 2008–2011 or period excluding the global crisis year) and sample firms excluding firms owned by another foreign parent firms. Third, we address a possible endogeneity in multinationals using propensity

¹⁶ In addition, we further decompose firm-level employment growth into the contributions of job creation (plant birth and expansion) and destruction (plant death and contraction). Results show that multinationals create more jobs at new plants and shed more jobs at continuing plants than non-multinationals. The decomposition results are not reported in the paper, but are available upon request.

matching methods and check if the choices of plant entry and exit are related within a multinational firm by using bivariate probit models. The wide range of robustness tests produces qualitatively similar results to those shown in Tables 3 and 4.

Alternative Definitions: Multinationals and Emerging Countries

We have defined multinationals whether a firm has at least one foreign manufacturing affiliate as of 2008, i.e., the beginning year of 5-year sample period. We use this definition of multinationals in order to link the expansion of outward FDI in the mid-2000 to its impact on manufacturing plants at home in the late-2000s. However, some firms might have their outward FDI activities before the mid-2000 and might completed reorganizing their manufacturing plants at home before our sample period began.¹⁷ If the share of these multinationals is non-negligible, our definition of multinationals might not correctly estimate the relocation impact on domestic manufacturing. To address this issue, we define multinationals as firms that performed outward FDI during 2006–2008 period. This alternative definition covers approximately 86% of multinationals that are defined based on the ownership of foreign affiliate as of 2008, showing a strong correlation between the ownership of foreign affiliates in 2008 and outward FDI in the mid-2000s.

To examine whether the reallocation effects of multinationals is 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 of Asia, Americas, and etc, compared to advanced countries, it is important to examine whether our findings of multinationals to emerging countries is related to global production chains built by Korean multinationals in East Asian countries.

[Table 5 about here]

¹⁷ Large Korean firms transformed into multinationals in the 1990s, but their massive outward FDI have done after the mid-2000s.

Panels A1 and B1 in Table 5 show results for plant turnover and employment dynamics when the alternative definition of multinationals is used. In the case of advanced countries, multinationals are also more likely to close their domestic plants and thus the positive net employment growth effect disappears that was found in Table 4. The results are overall qualitatively the same as those found in Tables 3 and 4. Alternative definitions of emerging countries are used in Panel 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 the same as those in all emerging countries, which suggests that active plant turnovers and job reallocation at home manufacturing is related to the rapidly increased expansion of outward FDI toward East Asian countries, in particular, China during the mid-2000s.

Alternative Samples: Period and Coverage

In our main analysis, we use the 5-year sample period of 2008–2013 to investigate the impacts of outward FDI on domestic manufacturing. To examine whether our results are robust to the choice of sample periods, we use two alternative sample periods. First, we use a 3-year period of 2008–2011 that allows multinationals' impacts on reallocation to be done more quickly than the 5-year period. Second, our 5-year sample period includes the global financial crisis in 2007-2008, which might affect our results. To address this issue, we exclude the Global Financial Crisis and estimate by using the sample period of 2009-2013. Table 6 indicates that different sample periods do not alter main results on plant turnover and employment dynamics reported in Tables 3 and 4.

[Table 6 about here]

Firms in the sample can be owned by foreign parent firms. In such a case, the foreign parent firms that are advanced multinationals might influence the outward FDI decision of Korean firms. Because we focus

on emerging multinational originated from Korea, it is necessary to exclude the firms owned by foreign firms. We also exclude a firm if more than 50% of its capital equity is owned by foreign firms. However, the exclusion of 343 firms owned by foreign parent firms does not alter the results.¹⁸

Endogeneity

The potential endogeneity of multinationals 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 multinational variable in year t prior to outcome variables in year t and $t + 5$. We also control for various firm-level characteristics in the paper. If there were unobserved positive shocks such as the rise in labor cost at home that may induce firms to increase outward FDI and shut down plants at home, our estimate of multinationals' effect on the probability of plant death might be biased. Most previous studies focusing on the plant death might be sensitive to these unobserved shocks, but our studies might not be because we examine not only plant death but also birth, i.e. reallocation. Nonetheless, to address a possible endogeneity, we employ propensity score matching methods to estimate the impacts of multinationals. Propensity score matching methods has been widely used to reduce endogeneity problems. Propensity scores are fitted by the predicted values of probit specification that includes firm size, age, capital intensity, productivity, multiplant, and multiproduct variables. After calculating propensity scores, we pair each multinational with the non-multinational firms that have a similar propensity score. We impose the requirement that the match must come from the same industry and adopt 5-nearest neighbor non-multinationals.¹⁹ These non-multinationals are assigned equal weight to calculate treatment effects. We use bootstrap methods for standard errors with 300 replications.

[Table 7 about here]

¹⁸ Results for the sample that omits foreign-owned firms are reported in Table A2 of Appendix.

¹⁹ When we use 10-nearest and 20-nearest neighbor, the results are qualitatively similar.

Table 7 reports matching results. The coefficients are the average treatment effect of MNE on the treated. The impacts of multinationals remain unchanged. Overall, the matching results confirm that the main results in Tables 3 and 4 are robust to the endogeneity problem.

Finally, our finding on the multinationals effects on plant turnover does not necessarily imply that both plant deaths and births occur in the same firm because we estimate birth and death regression separately. We thus estimate bivariate probit models to check whether both plant deaths and births are positively related to each other within a multinational. Results from bivariate probit models show that the two decisions of plant death and birth within the multinational firm are positively correlated, and the correlation coefficient (ρ) are statistically significant at the 1 % level.²⁰ The finding confirms that a Korean multinational not only close domestic manufacturing plants but also open new ones.

6. Conclusion

In this paper, we examine the impacts of outward FDI of Korean firms on their domestic manufacturing in terms of plant birth and death using Korean matched firm-plant level data. Our empirical results show that Korean multinational firms, especially invested in Asian countries, are more likely to not only shut down but also open up domestic manufacturing plants than non-multinational firms. Additionally, Korean multinational firms have more active job reallocation than non-multinational firms. However, net job growth effect of multinational firms is insignificant.

Our findings suggest that while building Asian supply chains during the 2000s, Korean multinational firms reorganized domestic manufacturing rather than hollowed out. It implies that impacts of Asian multinational firms on domestic manufacturing might be different from those of advanced multinational firms. In the literature on advanced MNEs, the reduction of domestic employments are due to the

²⁰ Results for the bivariate models are reported in Table A3 of Appendix.

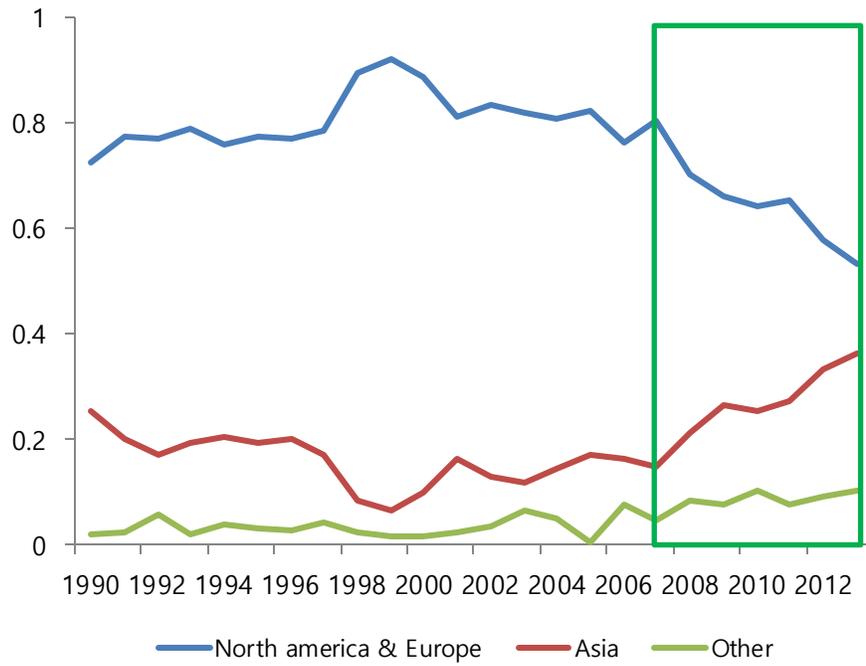
extensive margin of the plant exit while the MNEs increase employment at existing plants at home. However, we found a new case that Korean MNEs may differ in that both job losses and gains are only at extensive margins of plant entry and exit, without any influence from intensive margin. We may interpret it as an Asian case of non hollowing-out effect of MNEs. More importantly, we want to emphasize that the Korean MNEs' investment mechanism is distinctive to that of advanced MNEs in that Korean MNEs restructured their manufacturing plants through closing down some old plants and opening new ones. This calls for a further study on what kind of plants has been closed or opened within MNEs during the period of rising outward FDIs. This question is important because an answer may tell us a qualitative nature of the restructuring mechanism led by the Korean MNEs. We leave this for a future study.

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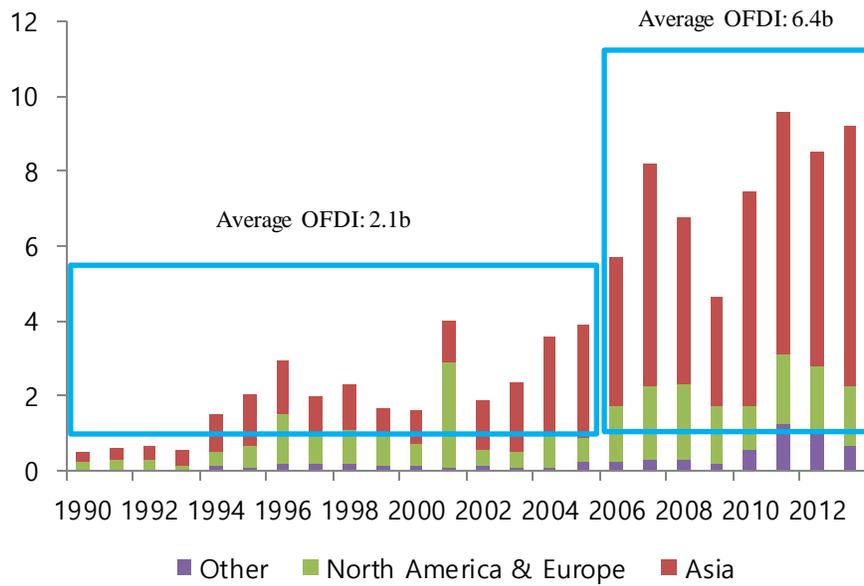
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Figure 1: Regional Shares of Outward FDIs in the World (1990-2013)



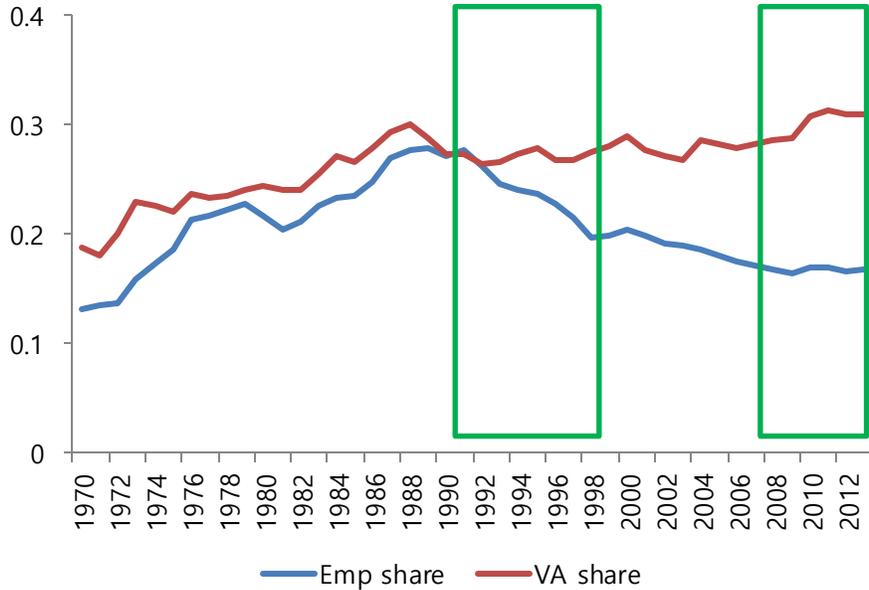
Source: UNCTAD FDI Statistics.

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



Source: Export-Import Bank of Korea.
 Note: Unit of the outward FDI - 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
Capital intensity	4.448	4.984	1.092	-5.017	8.676
Productivity	5.626	6.077	0.854	-0.068	9.907
Multipiant	0.236	0.545	0.424	0	1
Multiproduct	0.172	0.277	0.377	0	1

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

Table 2. Means of Characteristics for Multinational and Non-multinational Firms

	Multinationals	Non-multinationals	Difference
Plant turnover			
Plant death	0.292	0.244	0.048 (0.014)***
Plant birth	0.221	0.134	0.087 (0.011)***
Employment dynamics			
Employment growth	-0.280	-0.434	0.154 (0.030)***
Excess job reallocation	0.152	0.098	0.054 (0.010)***
Firm characteristics			
Firm size	5.078	4.545	0.533 (0.026)***
Firm age	2.924	2.711	0.213 (0.021)***
Capital intensity	4.563	4.408	0.155 (0.034)***
Productivity	5.786	5.571	0.215 (0.026)***
Multiplant	0.356	0.194	0.162 (0.013)***
Multiproduct	0.227	0.153	0.074 (0.012)***
Observations	1,382	4,017	
Employment-weight	0.513	0.487	

Notes: Figures in the first and second columns are unweighted means of characteristics for multinational and non-multinational firms, respectively. Plant death and birth are dummy variables that take one if firms closed and newly opened domestic manufacturing plants during 2008–2013, respectively. Firm characteristics and employment weights are in 2008. Firm size is logarithm of employment. Firm age, capital intensity, and productivity are logarithmic values. Numbers in parenthesis are standard errors.

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

Table 3. Korean Multinationals and Home-Country Effect on Manufacturing Plant Turnover

	(1)	(2)	(3)	(4)
	Plant death	Plant birth	Plant death	Plant birth
Multinational	0.130*** (0.043)	0.153*** (0.034)		
Multinational:			0.117***	0.103***
Emerging countries			(0.039)	(0.024)
Multinational:			0.078	0.152**
Advanced countries			(0.059)	(0.059)
Firm size	-0.044 (0.032)	0.032 (0.025)	-0.052* (0.029)	0.017 (0.023)
Firm age	-0.072*** (0.022)	0.002 (0.039)	-0.072*** (0.021)	0.004 (0.038)
Capital intensity	-0.008 (0.017)	-0.019 (0.017)	-0.007 (0.017)	-0.017 (0.016)
Productivity	0.003 (0.024)	0.048* (0.025)	0.000 (0.025)	0.043* (0.024)
Multiplant	0.366*** (0.031)	0.033 (0.034)	0.369*** (0.029)	0.043 (0.031)
Multiproduct	0.023 (0.059)	0.085 (0.074)	0.021 (0.058)	0.087 (0.076)
Pseudo R^2	0.313	0.277	0.315	0.281
Sample size	5,399	5,399	5,399	5,399

Notes: Dependent variable of columns (1) and (3) is a dummy variable that takes one if firms closed domestic manufacturing plants during 2008–2013; otherwise zero. Dependent variable for columns (2) and (4) is similarly defined for plant births for the firms. 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 3-digit-level 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 Multinationals and Home-Country Effect on Employment Dynamics

	(1)	(2)	(3)	(4)
	Employment growth	Job reallocation	Employment growth	Job reallocation
Multinational	0.024 (0.048)	0.064*** (0.018)		
Multinational:			-0.027 (0.048)	0.044** (0.017)
Emerging countries				
Multinational:			0.122** (0.060)	0.074*** (0.028)
Advanced countries				
Firm size	0.058*** (0.019)	0.002 (0.017)	0.047** (0.022)	-0.005 (0.015)
Firm age	0.039* (0.023)	-0.001 (0.016)	0.037 (0.024)	-0.004 (0.016)
Capital intensity	0.059*** (0.018)	-0.012 (0.010)	0.060*** (0.018)	-0.010 (0.010)
Productivity	0.074** (0.028)	0.010 (0.014)	0.071** (0.027)	0.007 (0.014)
Multiplant	-0.092** (0.036)	0.119*** (0.025)	-0.081** (0.035)	0.123*** (0.023)
Multiproduct	-0.011 (0.041)	0.053 (0.041)	-0.005 (0.040)	0.055 (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 the 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 3-digit-level 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: Alternative Definitions of Multinationals and Emerging Countries**A. Plant Turnover**

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

B. Employment Dynamics

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

Notes: All regression specifications include firm size, age, capital intensity, productivity, multiplant, and multiproduct variables as controls. Panel A reports marginal effects of probit estimates. All regressions include 61 3-digit-level 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: Alternative Sample Periods**A. Plant Turnover**

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

B. Employment Dynamics

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

Notes: All regression specifications include firm size, age, capital intensity, productivity, multiplant, and multiproduct variables as controls. Panel A reports marginal effects of probit estimates. All regressions include 61 3-digit-level 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
Multinational	0.238** (0.100)	0.278*** (0.100)				
Multinational: Emerging countries			0.237** (0.093)	0.277*** (0.102)		
Multinational: Advanced countries					0.301* (0.168)	0.384** (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
Multinational	-0.032 (0.028)	0.179** (0.077)				
Multinational: Emerging countries			-0.046 (0.032)	0.176** (0.080)		
Multinational: Advanced countries					0.047 (0.033)	0.247* (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 the 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. Bootsrapped standard errors 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
Multinational	0.037** (0.016)	0.046*** (0.009)		
Multinational: Emerging countries			0.044** (0.017)	0.033*** (0.009)
Multinational: Advanced countries			-0.006 (0.029)	0.061** (0.024)
Firm size	-0.062*** (0.010)	0.034*** (0.006)	-0.062*** (0.010)	0.032*** (0.006)
Firm age	-0.067*** (0.012)	-0.012* (0.007)	-0.067*** (0.012)	-0.012* (0.007)
Firm capital intensity	-0.000 (0.008)	-0.005 (0.006)	-0.000 (0.008)	-0.005 (0.006)
Firm productivity	-0.015 (0.010)	0.019** (0.008)	-0.015 (0.010)	0.018** (0.008)
Multipiant	0.430*** (0.016)	0.059*** (0.011)	0.429*** (0.016)	0.059*** (0.011)
Firm multiproduct	-0.008 (0.016)	0.081*** (0.013)	-0.009 (0.016)	0.082*** (0.013)
Pseudo R^2	0.137	0.065	0.137	0.066
Sample size	5,399	5,399	5,399	5,399

Notes: Dependent variable of columns (1) and (3) is a dummy variable that takes one if firms closed domestic manufacturing plants during 2008–2013; otherwise zero. Dependent variable for columns (2) and (4) is similarly defined for plant births for the firms. 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 3-digit-level 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: Excluding Foreign-owned Firms**A. Plant Turnover**

	(1)	(2)	(3)	(4)
	Plant death	Plant birth	Plant death	Plant birth
Multinational	0.118*** (0.042)	0.157*** (0.038)		
Multinational:			0.108*** (0.040)	0.107*** (0.028)
Emerging countries				
Multinational:			0.065 (0.065)	0.165*** (0.058)
Advanced countries				
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
Multinational	0.035 (0.053)	0.062*** (0.019)		
Multinational:			-0.022 (0.052)	0.042** (0.019)
Emerging countries				
Multinational:			0.143* (0.074)	0.083*** (0.028)
Advanced countries				
Adjusted R^2	0.109	0.300	0.112	0.305
Sample size	5,056	5,056	5,056	5,056

Notes: All regression specifications include firm size, age, capital intensity, productivity, multiplant, and multiproduct variables as controls. Panel A reports marginal effects of probit estimates. All regressions include 61 3-digit-level 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 A3. Plant Turnover Results: Bivariate Probit Model

	(1)	(2)	(3)	(4)
	Plant death	Plant birth	Plant death	Plant birth
Multinational	0.100*** (0.033)	0.124*** (0.027)		
Multinational: Emerging countries			0.089*** (0.030)	0.084*** (0.019)
Multinational: Advanced countries			0.058 (0.043)	0.114*** (0.041)
Rho		0.375***		0.371***
Wald test for Rho = 0		36.00		39.54
Log likelihood		-978343		-973829
Sample size	5,399	5,399	5,399	5,399

Notes: Dependent variable of columns (1) and (3) is a dummy variable that takes one if firms closed domestic manufacturing plants during 2008–2013; otherwise zero. Dependent variable for columns (2) and (4) is similarly defined for plant births for the firms. 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, age, capital intensity, productivity, multiplant, and multiproduct variables as controls. All regressions include 61 3-digit-level 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.