Foreign Ownership and Employment Volatility*

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Abstract

In light of the expansion of foreign direct investment (FDI), this paper examines the relationship between foreign ownership and employment volatility at the firm level. We utilize unique South Korean firm-level data on foreign ownership for the period from 2006 to 2015. We find that the employment volatility of foreign-owned firms is *lower* than that of local firms. This result stands up to several robustness checks. We also find that foreign-owned firms are more likely to pay higher wages, to have lower employment volatility among skilled workers, to be more productive, and to be based in more advanced countries. The results together suggest that foreign-owned firms tend to have superior technology and thus are more likely to keep skilled workers by paying higher wages, which results in their low employment volatility.

Key words: Foreign ownership, Foreign-owned Firm, Employment Volatility, Foreign Direct Investment

JEL classification code: F1; F23

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1 Introduction

With the expansion of foreign direct investment (FDI), the effect of foreign ownership on the domestic labor market is an important concern for policy makers as well as academic researchers. Among labor market outcomes, one important aspect is whether domestic employment becomes more or less volatile as a consequence of foreign ownership. This is because higher employment volatility implies higher job insecurity. Moreover, labor adjustments usually require some adjustment costs (Hamermesh, 1989). If employment volatility increases, adjustment costs also increase, which in turn leads to a decline in the gains from inward FDI.

The effect of foreign ownership on domestic employment volatility is theoretically ambiguous, though. On the one hand, employment volatility could increase owing to increases in labor demand elasticity (i.e., flattening of the labor demand curve). For example, the entry of foreign-owned firms could lead to more product market competition, which may result in greater labor demand elasticity. Rodrik (1997) argued that the greater the elasticity, the larger the impacts of a shift in the labor supply function (e.g., by raising labor standards) on employment. As a result, "[t]he flattening of labor demand curves as a consequence of globalization results in greater instability in labor market outcomes" (Rodrik, 1997, p.19).

On the other hand, foreign ownership could decrease employment volatility. For example, if multinational firms have technology that is superior to that of local firms, they are more likely to keep skilled workers by paying higher wages. This in turn reduces job turnover in foreign-owned firms. Such a mechanism is formalized theoretically by Glass and Saggi (2002).[1] The effect of FDI on domestic employment volatility is therefore an empirical issue. Nevertheless, the study of this issue is still limited.

Based on this background, this paper empirically examines the relationship between foreign ownership and employment volatility. Our study is closely related to three strands of research. The first strand of research is the effects of trade and FDI on employment volatility at the firm level. Using US firm- and transaction-level data for the period 1991–2005, Kurz and Senses (2016) found that employ-

[1]The analysis by Glass and Saggi (2002) is not limited to manufacturing industries. Advanced technologies are also used in services activities such as management and marketing. Section 4.1 discusses their model in more detail.

ment volatility among exporters was less pronounced among local firms. They also found a non-monotonic relationship between export intensity and employment volatility, such that the effects of exports could be more or less volatile, depending on the share of exports in total sales. Kiyota, Matsuura, and Higuchi (2019) addressed the same issue for Japan, extending the analysis to FDI and intrafirm trade. Using Japanese firm-level data, they found that employment volatility in manufacturing firms increased as the share of intrafirm exports in total sales increased, while in wholesale trade firms volatility declined as the share of intrafirm imports in total imports increased.[2]

The second strand of research is the estimation of the labor demand function for multinational firms. Barba Navaretti, Turrini, and Checchi (2003) examined the difference in labor demand between multinationals and domestic firms, using firm-level data in 11 European countries. They found that employment adjustment was significantly faster in multinational firms than in domestic firms. In contrast, using German firm-level data, Buch and Lipponer (2010) did not find significant differences in employment adjustment between multinational firms and domestic firms.[3]

The third strand of research is related to offshoring and employment volatility. Bergin, Feenstra, and Hanson (2009, 2011) examined the effects of US offshoring on Mexican employment volatility relative to US employment volatility. Using industry-level data for the period between 1996 and 2005, they found that fluctuations in employment in Mexico were twice as volatile as in the corresponding industries in the United States, a result that stems from adjustment at the extensive margin, as products enter and exit trade between the two countries.

While these strands of study made significant contributions to the literature, there is room to expand on them. The first strand of research did not examine the effects of foreign ownership explicitly. Note that multinational firms include both domestic firms that conduct FDI abroad and foreign-owned firms.[4] For countries

[2]In this connection, Karabay and McLaren (2010) theoretically examined the effects of offshoring on wage volatility rather than employment volatility.

[3]Using industry-level data, Hijzen and Swaim (2010) examined the effects of offshoring on labor demand elasticity for OECD countries. They found a significantly positive relationship between average offshoring and labor demand elasticity.

[4]Although Kiyota, Matsuura, and Higuchi (2019) examined the effects of multinational status on employment volatility, they did not distinguish between domestic firms that conduct FDI abroad and foreign-owned firms. This is because the share of foreign-owned firms is very small (i.e., only

where the share of foreign-owned firms is not small, this distinction is important.

The results of the second strand of research may imply that employment volatility is higher for foreign-owned firms than for local firms because of elastic demand. However, it should be noted that increases in labor demand elasticity are not necessarily sufficient to explain increases in employment volatility. This is because high volatility in output (for instance, through productivity shocks) could also lead to high employment volatility. Moreover, noting that Rodrik's (1997) argument is based on a partial equilibrium framework, Panagariya (1999) showed theoretically that trade openness did not necessarily result in more elastic labor demand in a general equilibrium context.

The third strand of research cannot capture gross job flows in one industry because the data cover all industries. As was pointed out by Davis, Haltiwanger, and Schuh (1996), small net job flows in one industry do not necessarily mean small job flows within an industry. If labor adjustment is occurring within one industry across firms, that adjustment is not captured by the industry-level data. In addition, the effect of foreign ownership is beyond the scope of these studies.

Building on these three strands of research, we examine the relationship between foreign ownership and employment volatility at the firm level using unique South Korean firm-level data for the period from 2006 to 2015.[5] There are at least two advantages to utilizing Korean firm-level data. First, detailed information on foreign ownership, such as foreign capital share and source country, is available at the firm level. This enables us to investigate the relationship between foreign ownership and employment volatility at the firm level precisely. Second, because the firm-level data are collected in on-site interviews, the response rate is quite high. For example, of 12,471 interviewed firms in 2016, only 28 firms (0.22 percent) did not respond. This high response rate reduces the extent or possibility of non-respondent bias and concerns about sample selection.

Our estimation results indicate that the employment volatility of foreign-owned firms is *lower* than that of local firms. This result stands up to several robustness checks. We also find that foreign-owned firms are more likely to pay higher wages, to have lower employment volatility among skilled workers, to be more produc-

2 percent) in Japan.

[5]For ease of exposition, hereafter South Korea is referred to as Korea. The next section explains the Korean firm-level data in more detail.

tive, and to be based in more advanced countries. The results together suggest that, as was hypothesized by Glass and Saggi (2002), foreign ownership could decrease employment volatility because foreign-owned firms tend to have superior technology and thus are more likely to keep skilled workers by paying higher wages.

The rest of the paper proceeds as follows. The next section explains the methodology and data used in this analysis. Section 3 presents the empirical results and discusses the robustness of our results. Section 4 investigates potential mechanisms. A summary of our findings and their implications is presented in the final section.

2 Methodology and Data

2.1 Methodology

For the measurement of employment volatility, we employ a "residual" approach, following Kurz and Senses (2016).[6] Let i, j, and t denote the firm, industry, and year, respectively. Let γ_{ijt} denote the growth of employment E_{it}. We define γ_{ijt} as the conditional (residual) growth rate of employment estimated from the following specification:

$$\gamma_{ijt} = \ln(E_{it}) - \ln(E_{it-1}) = \phi_i + \mu_{jt} + \upsilon_{ijt}, \tag{1}$$

where ϕ_i are the firm fixed effects, which capture the firm-specific characteristics to control for unobserved firm heterogeneity; μ_{jt} are the industry-year fixed effects, which capture unobserved industry-year-specific shocks such as shocks to factor prices, demand, or technology that are common to all firms within given a industry and year; and υ_{ijt} is the deviation of employment from the firm average and from the industry average in year t. The employment volatility σ is defined as the

[6] As a robustness check, we measure employment volatility in different ways; the results are in Section 3.2.

standard deviation of the residual growth rates for a window of length w:[7]

$$\sigma_{ij}^{w} = \sqrt{\frac{1}{w-1}\sum_{t} v_{ijt}^{2}}, \tag{2}$$

To formally test the linkage between a firm's foreign-ownership status and its employment volatility, we begin by estimating the following specification:

$$\ln \sigma_{ij}^{w} = \alpha + \beta \text{Foreign ownership status}_{i}^{w} + \gamma Z_{i}^{w} + \zeta Y_{j}^{w} + \text{FEs} + \varepsilon_{ij}^{w}, \tag{3}$$

where i indexes the firm, j indexes the industry, and w indexes the window over which the volatility measure and the explanatory variables are calculated. The control variables are calculated as the average over w. Foreign ownership status$_{i}^{w}$ is a foreign ownership dummy in which foreign firms own equity of 50 percent or more averaged over the window w; Z_{i}^{w} is a list of firm-level control variables averaged over the window w; Y_{j}^{w} is a list of industry-level control variables averaged over the window w; FEs include industry and/or region fixed effects;[8] and ε_{ij}^{w} is an error term.

The parameter of interest is β. If foreign ownership increases (decreases) employment volatility, the parameter β will be significantly positive (negative). The next section explains the data used in this regression.

2.2 Data

2.2.1 Overall description

The primary dataset is the Survey of Business Activities (SBA) from Statistics Korea. The purpose of the survey is to gather basic data required for making various

[7] Our measure of employment volatility is based on employment growth at the firm level. Employment volatility caused by the entry and exit of firms is beyond the scope of our analysis, although this could be an important aspect of employment volatility at the aggregate level. See, for example, Andrews, Bellmann, Schank, and Upward (2012) for the relationship between the exit of foreign-owned firms and their employment.

[8] Because the employment volatility is defined as the standard deviation for w and the control variables are averaged over w for each firm, the regression equation (3) is at the firm level, not at the firm-year level. Hence, we can include industry and/or region fixed effects, but cannot include firm fixed effects or year fixed effects. redNote also that firm and industry-year fixed effects have already been taken into account in equation (1).

economic policies and for studying management strategies and changes in industrial structures by understanding the kinds of activities that businesses engage in. It is an annual survey which was first carried out in 2006. The data are collected through on-site interviews (self-interviews by respondents).[9]

We utilize 10-year horizon data for the period 2006 to 2015. The dataset covers all industries and includes firms that are conducting business activities in Korea as of the survey reference date, firms with at least 50 full-time employees, and firms with a capital stock of 300 million Korean won or more.[10] All firms that satisfy the above conditions are included in the sample. The target sample size in each year is approximately 13,000 firms in Korea, which represent 80 percent of the total output of Korea in the year 2008.

From the dataset, we can identify the region and industry for each firm.[11] The regions match the administrative divisions of Korea. The country is made up of 17 first-tier administrative divisions: one special city, six metropolitan cities, one metropolitan autonomous city, eight provinces, and one special autonomous province.[12] The industries are identified by 76 two-digit divisions based on the Korean Standard Industrial Classification.[13] If a firm produces multiple products (across different industries), the survey identifies the industry of a firm as the one with the highest sales value. If a firm has multiple plants, the survey identifies the region of a firm as the one in which the headquarter is located.

2.2.2 Variable description

The data include firm-level variables such as the number of employees, foreign-ownership share, assets, outsourcing cost, R&D expenditure, revenue, purchases, exporting status, importing status, and many others. In the baseline analysis, we define employment as the number of permanent workers. Permanent workers are workers whose contract period is one year or more or for whom the contract

[9] In some cases, an internet survey is used as well.

[10] The reference date of the survey carried out in 2006 is December 31, 2005. For enterprises in "Wholesale and Retail Trade" and "Service" industries, enterprises with capital stock of 1 billion Korean won or more are included in the target population even if they have fewer than 40 full-time employees.

[11] In the empirical analysis, we use industry, region, or industry-region fixed effects to control for unobserved industry and region heterogeneity.

[12] The detailed region classification is presented in Table A1.

[13] The detailed industry classification is presented in Table A2.

period is not regulated. We calculate employment volatility based on the number of permanent workers at the firm-year level.[14]

Our key variable of interest is foreign ownership. Each firm must report foreigners' share in total equity. We define foreign-owned firms as firms in which 50 percent or more of equity (averaged over the window w) is owned by the foreign parent firm (Foreign-ownership status$_i^w$).[15] In addition to the information on foreign-ownership share, the data identify the country where the parent company is located if 50 percent or more of equity is owned by the parent firm. This is another advantage of using the Korean firm-level data.

For firm-level control variables (Z_i^w), we include trade status (Both, Export only, Export intensity, Import only, and Import intensity), the outward FDI status (Outward FDI), and the logarithm of size (Employment) over the window w.[16] Firms are regarded as exporters or importers if firms are engaged in exporting or importing for at least one year during the window w. For industry-level control variables (Y_j^w), we include export intensity, import intensity, and employment, all of which are defined as the average over the window w at the 76 two-digit industry-level j.

2.3 Descriptive statistics

We restrict our original raw sample to firms that report at least five consecutive years of positive permanent employees over the full 10-year window from 2006 to 2015. Table 1 provides descriptive statistics of the firm-level variables used in the regression analysis for the 10-year window from 2006 to 2015 with at least five years of positive employment. Columns (1) and (2) present means and standard deviations for the full sample. Columns (3) and (4) provide means and standard deviations for the foreign-owned firms. There is a sample of 11,048 firms in the full sample, among which 908 firms (8.2 percent) are defined as foreign-owned firms, of which 406 firms are in manufacturing (7.2 percent of total manufacturing firms)

[14] In our robustness checks, we include the number of temporary employees. Temporary workers are workers whose contract period is less than one year.

[15] Foreign-owned firms include firms that switch their ownership from local to foreign (or vice versa) during the window. In Section 3.2, we examine whether our results are robust to the different definition of foreign ownership.

[16] For trade status, Both, Export only, and Import only are firms that engage in exports and imports, exports only, and imports only, respectively. Export intensity and Import intensity are defined as the share of exports in revenues and the share of imports in purchases, respectively.

and 502 firms are in non-manufacturing (9.3 percent of total non-manufacturing firms).[17]

[Table 1 about here.]

The average number of permanent employees in the full sample is 304; the average number of employees in foreign-owned firms is 347. This indicates that foreign-owned firms are typically bigger than non-foreign-owned local firms (hereafter referred to as local firms). As for international activities, on average, 83 percent of foreign-owned firms participate in exporting and 82 percent of foreign-owned firms engage in importing, both of which are higher than their averages (65 percent and 60 percent, respectively). Export intensity and import intensity are larger for foreign-owned firms. In addition, 62 percent of foreign-owned firms are engaged in outward FDI, which is more than the average (48 percent).[18] In the last two rows, we present the employment volatility of growth rates, estimated using the residual method. On average, employment in foreign-owned firms is 13.3 percent less volatile than in the average firm.

In sum, foreign-owned firms are larger and more actively engaged in international activities than local firms.[19] Note, however, that these comparisons are based on simple averages. We now investigate the difference in employment volatility between foreign-owned firms and local firms more precisely, controlling for other firm, industry, and region characteristics.

3 Results

3.1 Baseline results

Table 2 reports the regression results of equation (3) for the full 10-year window for firms with at least five consecutive years of positive employment. We calculate the employment volatility using the residual approach. In column (1), we begin the analysis by including firm-level foreign-ownership status (Foreign-ownership status$_i^w$), along with firm-level control variables (Z_i^w). We highlight three findings. First, the

[17] Of the 908 firms, 459 are 100 percent foreign owned.

[18] In addition to the size and international activities, foreign-owned firms differ in terms of the location and industry dimensions. See Tables A1 and A2 for more details.

[19] Similar findings are found for foreign-owned firms in Japan (Kimura and Kiyota, 2007).

employment volatility of foreign-owned firms is 11.8 percent *lower* than that of local firms.

[Table 2 about here.]

Second, employment in firms that engage in both exporting and importing is less volatile. Employment in firms that purchase more imported products is also less volatile, which is consistent with the findings of Kurz and Senses (2016). Third, firms that engage in outward FDI are more volatile. This result clearly highlights the difference between Korean multinational firms that engage in outward FDI and foreign multinational firms (i.e., foreign-owned firms).

In columns (2) through (4), we add industry-level control variables (Y_j^w), industry fixed effects, region fixed effects, and industry-region fixed effects to account for observed and unobserved heterogeneity.[20] The sign and magnitude of the coefficient of foreign-ownership status shows the same pattern for statistical significance. In column (4) where industry-region fixed effects are included, employment in foreign-owned firms is 11.2 percent less volatile than in local firms. The results related to trade status, especially for firms engaged in both exporting and importing, become statistically insignificant as we control for industry-region level covariates.

In columns (5) and (6), we separate industries into manufacturing and non-manufacturing to investigate differential impacts of foreign ownership and other variables on employment volatility. There are 5,651 manufacturing firms and 5,397 non-manufacturing firms in our sample. First, the coefficient of foreign-ownership status decreased slightly in absolute terms for both manufacturing firms and non-manufacturing firms. However, there is no significant difference between manufacturing firms and non-manufacturing firms.

For manufacturing firms, export and import intensities are negatively associated with employment volatility, and outward FDI is positively associated with employment volatility. For non-manufacturing firms, size and import intensity are negatively associated with employment volatility, exporting is non-monotonically associated with volatility, and outward FDI is positively associated with volatility.

[20] Industry-level variables are industry export and import intensities, and industry employment. Owing to limited availability of space, their coefficients are not reported.

In sum, we find that the employment volatility of foreign-owned firms is *lower* than that of local firms. This result is robust even after we control for industry and region-level heterogeneity. Before discussing the potential mechanisms of our main result, the next section further checks the robustness of our results.

3.2 Robustness check

3.2.1 Different measures of employment volatility

To check the robustness of our results, we begin by asking whether our results are sensitive to the measurement of employment volatility. We use two alternative measures to calculate firm-level employment volatility. First, we calculate the growth rate of employment as the log difference in employment, $\gamma_{i,t} = \ln(E_{it}) - \ln(E_{it-1})$, and use this measure to calculate volatility as the standard deviation of firm employment growth as follows:

$$\sigma_i^w = \sqrt{\frac{1}{w-1}\sum_{\tau=0}^{w}(\gamma_{i,t+\tau} - \overline{\gamma_{it}})^2}, \tag{4}$$

where w is the length of the window and $\overline{\gamma_{it}}$ is the average growth rate over the window w. We call this measure the "log difference" approach.

Second, we calculate the growth rate of employment as $\eta_{it} = \dfrac{E_{it} - E_{i,t-1}}{(E_{it} + E_{i,t-1})/2}$ and use this measure to calculate volatility as the standard deviation of firm employment growth as follows:

$$\sigma_i^w = \sqrt{\frac{1}{w-1}\sum_{\tau=0}^{w}(\eta_{i,t+\tau} - \overline{\eta_{it}})^2}, \tag{5}$$

where w is the length of the window and $\overline{\eta_{it}}$ is the average growth rate over the window w. As was discussed in Kurz and Senses (2016), this measure has the advantage of being bounded and symmetric around zero. In addition, this measure allows us to incorporate births and deaths into our analysis. We call this measure the "growth rate" approach.

In the upper panel of Table 3, we use the log difference approach to measure firm-level employment volatility to check the validity of our main results in Ta-

ble 2.[21] The coefficient of our main interest, the foreign-ownership status, shows the same sign and statistical significance. Regression results with industry-region fixed effects in column (4) of Table 3 show that employment in foreign-owned firms is 11.6 percent less volatile than in local firms. Columns (5) and (6) show the results for manufacturing and non-manufacturing firms, respectively. Employment in foreign-owned firms is 12.5 percent and 10.4 percent less volatile than in local firms for manufacturing and non-manufacturing firms, respectively. The magnitudes in the log difference approach are quite close to those in the residual approach.

[Table 3 about here.]

In the lower panel of Table 3, we use the growth rate approach to measure firm-level employment volatility. The coefficient of our main interest, foreign-ownership status, shows the same sign and statistical significance. Regression results with industry-region fixed effects in column (4) show that employment in foreign-owned firms is 11.5 percent less volatile than in local firms. Columns (5) and (6) show the results for manufacturing and non-manufacturing firms. Employment in foreign-owned firms is 12.2 percent and 10.4 percent less volatile than in local firms for manufacturing and non-manufacturing, respectively. Similar to the results of the log difference approach, the magnitudes in the growth rate approach are quite close to those in the residual approach. In sum, our main results hold even when we use different measures of employment volatility.

3.2.2 Different measure of foreign ownership

One may be concerned that our results are sensitive to the definition of foreign ownership because our definition of foreign-owned firms (firms with more than a 50 percent share of foreign ownership) is stricter than the definition of foreign-owned firms regulated by the Foreign Investment Promotion Act in Korea. In the Foreign Investment Promotion Act, foreign ownership is defined as ownership of 10 percent or more of a Korean firm. To address this concern, we run our calculations using the Foreign Investment Promotion Act's definition of foreign ownership averaged over the window w.

[21] The coefficients of control variables in Table 2 are reported in Tables B1 and B2.

The results are presented in the Panel A of Table 4.[22] The notable findings are threefold. First, in columns (1)–(4), all the coefficients of foreign-ownership share are significantly negative, although the coefficients are smaller in absolute terms than those in the baseline results in Table 2. Second, for manufacturing, the coefficient of foreign ownership continues to be significantly negative. This implies that the relationship between foreign ownership and employment volatility is uniformly negative once the foreign equity share exceeds 10 percent. Finally, for non-manufacturing, the coefficient of foreign-ownership status is negative but statistically insignificant. This implies that the negative relationship between foreign ownership and employment volatility becomes more evident for majority-foreign-owned firms in non-manufacturing.

[Table 4 about here.]

In the Panel B of Table 4, we replace foreign-ownership status with foreign-ownership intensity as an alternative measure. Foreign-ownership intensity is defined as the foreign-ownership dummy (50 percent rule) multiplied by the foreign-ownership share. Reassuringly, all the coefficients are significantly negative, and the magnitudes are similar to those in Table 2.

In this connection, it is important to ask how our results change if we restrict foreign-owned firms to firms with 100 percent foreign ownership. In the Panel C of Table 4, we show that all coefficients of foreign ownership are significantly negative, while the magnitudes are smaller in absolute terms than those in the baseline results. The other notable finding is that the coefficient for the manufacturing industry becomes statistically insignificant. For non-manufacturing firms, the coefficient of foreign-ownership share continues to be significantly negative. The results imply that, for manufacturing, there is a negative relationship between foreign ownership and employment volatility when ownership is shared between local and foreign firms.

Another concern may be that our foreign-owned firms include firms that change their status from foreign-owned to domestic (or vice versa) over the window w. One might argue that the switching firms, not the continuously foreign-owned firms, are the key drivers of decreasing employment volatility. To address this concern, we define foreign-owned firms as firms in which 50 percent or more of

[22] The coefficients of control variables in Table 4 are reported in Table B3–B6.

equity is owned by the foreign parent firm over the window w and firms that do not change their foreign-owned status during the window w. We find that 752 out of 908 foreign-owned firms are non-switchers. Reassuringly, Panel D of Table 4 shows that all the coefficients of foreign-ownership status are negative and statistically significant. Our main findings hold even when we use different measures of foreign ownership.

3.2.3 Different windows of time

It is possible that our results are sensitive to the size of the window because a 10-year window is long. To address this concern, we use employment volatility calculated over two 5-year windows, 2006–2010 and 2011–2015, as the dependent variable. Other control variables are calculated as averages over each 5-year window. For each specification, we include spell fixed effects to control for unobserved heterogeneity between the two windows.

In column (4) of the Panel A of Table 5, we again find that foreign ownership decreases firm-level employment volatility.[23] Quantitatively, employment in foreign-owned firms is 10.8 percent less volatile. Panel A of Table 5 also shows that the coefficient of foreign-ownership status is significantly negative for manufacturing in columns (5) and for non-manufacturing in column (6). These results together suggest that our results are robust to the different windows of time.

[Table 5 about here.]

3.2.4 Balanced panel

One may be further concerned that the estimation could be contaminated if foreign-owned firms are more persistent than other firms. In this case, we cannot separate whether employment in persistent firms or in foreign-owned firms tends to be less volatile. Or, one could also argue that if the nature of foreign capital is footloose, then foreign-owned firms are less likely to be persistent. To alleviate both of these concerns, we select foreign-owned firms and other firms that report positive employment for the full 10-year window.

[23] The coefficients of control variables in Table 5 are reported in Table B7–B9.

In Panel B of Table 5,we restrict our sample to firms that report positive employment for the full 10-year window. The number of firms then drops from 11,048 to 6,069. We compare column (4) in the lower panel of Table 5 to column (4) in Table 2. Reassuringly, the estimated coefficient of the foreign-ownership dummy shows the same signs with statistical significance. Employment in foreign-owned firms is 11.4 percent less volatile in the balanced 10-year window, which is almost the same as that in the baseline sample. The results show that our main messages hold even when we utilize the balanced panel data.

3.2.5 Adding temporary workers

Some may question whether the main estimation results will hold if the analysis takes into account temporary workers, since we define employment as the number of permanent workers only. In other words, employment adjustment may occur mainly through changes in the number of temporary workers rather than the number of permanent workers. If this were the case, our analysis would miss an important aspect of the adjustment.

Note that a significant number of firms do not hire temporary workers. This in turn means that focusing only on temporary workers reduces the sample size significantly. To address this concern, therefore, we redefine employment as the sum of the number of permanent and temporary workers. The estimation results are presented in column (4) of Panel C of Table 5. We continue to find that employment volatility in foreign-owned firms is lower than in local firms even when employment includes temporary workers. Our main messages are not sensitive to the inclusion or exclusion of temporary workers.

3.2.6 Adding output volatility

A potential threat to our identification strategy is that foreign-owned firms have lower output volatility (through, for example, productivity shocks) than domestic firms. In such a case, lower output volatility rather than foreign ownership may lead to lower employment volatility. To address this concern, we include output volatility as a control variable. Because output quantity is not directly observed in our dataset, we use nominal revenue and value added and convert them into real variables using an industry-level production price index to construct real value

added and real revenue variables. We confine our analysis to manufacturing industries because we can consistently match each industry code in the production price index data to each industry code in the Korean Standard Industrial Classification (KSIC). Using real value added and revenue, we follow the residual approach described in Section 2.1 and calculate output volatility at the firm level.

Column (1) of Table 6 replicates our benchmark regression result for manufacturing in column (5) of Table 2. We then add revenue volatility, value-added volatility, and both variables as control variables into the benchmark regression. From columns (2) to (4) of Table 6, the coefficients of output volatility are positively correlated with employment volatility. More important, we find that the coefficients of foreign-ownership status are still negative and statistically significant, even after controlling for output volatility. This result alleviates the concern that output volatility is confounded with foreign ownership in explaining employment volatility.

[Table 6 about here.]

4 Explaining Potential Mechanisms

4.1 Theoretical background

The previous section documents that employment in foreign-owned firms is less volatile than in local firms after controlling for various sources of heterogeneity at the firm, industry, and region level. Why is employment volatility lower for foreign-owned firms than for local firms? Note that, even though Korea is one of the OECD countries, its GDP per capita is still smaller than that of such countries as the United States, Japan, and Germany. Therefore, Korea has a strong incentive to attract technologically advanced multinational firms to facilitate technology transfer to local firms.

Based on this background, one possible mechanism of our finding is the hypothesis proposed by Glass and Saggi (2002). They construct an oligopoly model in which a multinational firm has technology that is superior to that of local firms. In their model, workers can acquire knowledge about the superior technology when

they are employed by the multinational firm. Local firms can acquire the superior technology if they are able to hire those workers, which is called technology transfer. The multinational firm can prevent such technology transfer by paying a wage premium to workers. In this setting, the host government has an incentive to attract FDI because it will lead to technology transfer to local firms or to higher wages for workers employed by the multinational firms.

We would make two observations about their study. First, Glass and Saggi's (2002) model does not specify industries. Their results may not be limited to manufacturing, but could include services activities such as management and marketing. Second, they cited literature that found substantial technology transfer when foreign production managers left multinationals to join local Korean firms. Like Glass and Saggi (2002), we focus our analysis on both manufacturing and non-manufacturing, and some of the literature has pointed out the technology transfer that occurs in Korea. Our empirical study of Korea is therefore a perfect setting in which to test Glass and Saggi's (2002) hypothesis.

Their model suggests that foreign-owned firms have technology that is superior to that of local firms and pay a wage premium to prevent local firms from hiring their workers. This could lead to a decline in job turnover in foreign-owned firms. To further relate our results to Glass and Saggi's (2002) hypothesis, we need to clarify the following two questions. First, do foreign-owned firms pay higher wages than local firms? Second, do foreign-owned firms have superior technology? The following sections attempt to answer these questions.

4.2 Do foreign-owned firms pay higher wages?

The wage premium for foreign-owned firms has been documented in other countries such as the United States (e.g., Doms and Jensen, 1998) and the United Kingdom (e.g., Girma and Görg, 2007a).[24] However, it is not necessarily clear whether such wage premium was found in Korea. This section thus investigates whether foreign-owned firms pay higher wages.

In the first, second, and third rows of Table 7, we report differences between foreign-owned firms and local firms for employment, share of skilled workers,

[24]Similar findings are also confirmed in China (Girma, Görg, and Kersting, 2019) and Japan (Kimura and Kiyota, 2007) although the wage differences are the differences of simple average wages without any controls in these studies.

and wages. Skilled workers are defined as the number of non-production workers (such as corporate executives, managers and other workers whose tasks include management, planning, personnel, and accounting) at a firm's headquarters plus the number of researchers. Table 7 indicates that, after controlling for differences in firm characteristics across industry-region, foreign-owned firms hire 16.6 percent more workers. Foreign-owned firms have 8.0 percent more skilled workers than local firms, after controlling for differences in firm characteristics across industry-region and employment. The result implies that the skill intensity of foreign-owned firms is higher than that of local firms.

[Table 7 about here.]

Our main interest here is the wage difference between foreign-owned firms and local firms. The third row of Table 7 indicates that foreign-owned firms pay 23.8 percent higher wages even after controlling for differences in firm characteristics across industry-region, employment, and skilled workforce.[25] This result suggests that wages of foreign-owned firms are higher than those of local firms and that the wage premium can be a potential mechanism for retaining workers.

A concern may be that the wage premium for foreign-owned firms does not necessarily lead to lower turnover among skilled workers in foreign-owned firms. Because our analysis is based on firm-level data, we are unable to investigate the gross job flows of skilled workers at the firm level. As a short cut, we investigate whether the employment volatility of skilled workers is lower in foreign-owned firms than in local firms, measuring the employment volatility in equation (3) for skilled workers only. Under the same specification as column (4) in Table 2, we find that the estimated coefficient becomes –0.126 (and its standard error is 0.032) with statistical significance at the 1 percent level, which is smaller than the baseline coefficient (-0.112 in column (4) in Table 2).[26] This implies that the employment volatility of skilled workers is much lower in foreign-owned firms than in local firms. These results together suggest that the wage premium can be a potential mechanism through which employee turnover is lower in foreign-owned firms.

[25] Wage is defined as the total wages paid to permanent workers divided by the number of permanent workers at the firm level.

[26] The estimation results are presented in Table B10.

4.3 Are foreign-owned firms technologically advanced?

Even though it is not easy to identify the technology level in individual firms, one possible measure is the firm's productivity. We thus compute labor productivity and total factor productivity (TFP) as proxies for the level of technology.[27] In the fourth and the last row of Table 7, foreign-owned firms present 27.7 percent higher labor productivity and 37.3 percent higher TFP than local firms, respectively, after controlling for industry-region heterogeneity, size, and skill share.[28] This implies that foreign-owned firms are technologically more advanced than local firms.[29]

We also investigate the country of origin for each foreign-owned firm because firms from advanced countries are more likely to have advanced technology than local firms in general. Our unique dataset contains a parent company's country of origin for most of the observations. In Table 1, there is a sample of 11,048 firms in the full sample, among which 908 firms (8.2 percent of the total) are defined as foreign-owned firms. Out of 908 foreign-owned firms, we can identify 825 foreign-owned firms with the parent company's country of origin (90.9 percent of the total foreign-owned firms).

Table 8 provides the country of origin for each foreign-owned firm. By region, 38.6 percent are from Europe, 35 percent from Asia, and 25.2 percent from North America. The top seven countries are Japan (225 firms, 27.3 percent), the United States (200 firms, 24.2 percent), Germany (78 firms, 9.5 percent), the Netherlands (58 firms, 7.0 percent), the U.K. (48 firms, 5.8 percent), France (42 firms, 5.1 percent), and Switzerland (32 firms, 3.8 percent). Those seven countries represent 82.8 percent of total foreign-owned firms in Korea. Based on the World Bank International Comparison Program database (2010), all seven countries have higher GDP per capita (on a PPP basis) than Korea.[30] These results suggest that multinationals are more likely to come from advanced countries and hence have technology that is superior to that of local firms.

[27] See Appendix I. Production Function Estimation for a more detailed explanation of the construction of TFP.

[28] The TFP difference is based only on the manufacturing sector.

[29] In this connection, Girma and Görg (2007b) found that the productivity advantage of the foreign-owned firms are attributable not to scale but to tecchnology for establishments in the UK electronics and food industries.

[30] See Table 8 for more details. GDP per capita in Korea was $30,377 in 2010. For Taiwan, we obtain the data from Penn World Table, version 7.1.

[Table 8 about here.]

We further explore country heterogeneity by regressing the following equation:

$$\ln \sigma_{ij}^{w} = \alpha + \text{Country FEs} + \gamma Z_{i}^{w} + \text{Industry-region FEs} + \epsilon_{ij}^{w}, \tag{6}$$

where Z_i^w is a list of firm-level control variables averaged over the window w; Country FEs capture the parent company's country of origin; and ϵ_{ij}^w is an error term. The above specification is identical to our baseline specification in column (4) of Table 2 except that we replace Foreign-ownership status with Country FEs. Then the estimated country fixed effects can be interpreted as the log difference between the average employment volatility of local firms and that of foreign-owned firms from any source country after controlling for firm-control and industry and region fixed effects.

[Figure 1 about here.]

Based on the estimated country fixed effects, we draw a scatter plot of the estimated coefficients and the log of GDP per capita for each observation. In Figure 1, most of the observations are located in the fourth quadrant, suggesting that foreign-owned firms are more likely to come from more advanced countries than Korea and have lower employment volatility than local firms. Then we separate observations into two groups: statistically significant observations at the 10 percent level and statistically insignificant observations. We fit a linear model using the statistically significant group and estimate the slope of the coefficient. We find that the estimated value is -0.36 with statistical significance at the 10 percent level. This suggests that there is a negative relationship between employment volatility and GDP per capita. More specifically, a 10 percent increase in GDP per capita in the source country is associated with a 3.6 percent drop in employment volatility, even after controlling for other confounding factors.[31]

In sum, while only indicative, our results support the mechanism hypothesized by Glass and Saggi (2002): foreign-owned firms tend to have superior technology

[31] A further concern may be that our results do not hold if we focus on manufacturing because firms from advanced countries are more likely to be engaged in sales activities than in manufacturing activities (Table A.2). Note, however, that, as we discussed earlier, technology in this paper includes not only manufacturing activities but also non-manufacturing activities such as management and marketing. Even though we restrict our sample to manufacturing firms, we continue to find the same pattern, although the significance level is slightly different.

and thus are more likely to keep skilled workers by paying higher wages, which results in their lower employment volatility.

5 Concluding Remarks

With the expansion of foreign direct investment (FDI), the effect of foreign ownership on the domestic labor market is an important concern for policy makers as well as academic researchers. Among various labor market outcomes, one important aspect is whether domestic employment becomes more or less volatile as a consequence of foreign ownership. This is because higher employment volatility implies higher job insecurity. Nevertheless, studies of this issue are still limited.

This paper examines the relationship between foreign ownership and employment volatility at the firm level. We used Korean firm-level data for the period from 2006 to 2015, in which detailed information on foreign ownership is available. We find that the employment volatility of foreign-owned firms is lower than that of local firms. This result stands up to several robustness checks. We also find that foreign-owned firms are more likely to pay higher wages, to have lower employment volatility among skilled workers, to be more productive, and to come from advanced countries. The results together suggest that, as was hypothesized by Glass and Saggi (2002), foreign-owned firms tend to have superior technology and thus are more likely to keep skilled workers by paying higher wages, which results in their lower employment volatility.

An important policy implication is that an increase in inward FDI does not necessarily increase the job insecurity of domestic workers. Our results suggest that the expansion of inward FDI can even mitigate job insecurity for domestic workers. Our analysis thus sheds lights on a potential benefit of inward FDI that has not been explored in the previous literature.

Future research could take several further steps in this regard. First, it is essential to analyze the relationship between foreign ownership and worker separation in more detail. Our study is based on firm-level data, which allows us to investigate gross job flows within an industry, but not within a firm. Even if employment volatility is lower among foreign-owned firms, their gross job turnover could be high. To address this issue, the use of matched employer-employee data may be useful. Second, like the productivity comparison between exporters and non-

exporters, it may also be possible to employ alternative methodologies such as the propensity score matching and non-parametric Kolmogorov–Smirnov test to compare the employment volatility between foreign-owned and domestic firms. Such alternative approaches have not been employed by the previous studies on employment volatility and we believe that employing alternative approaches are also interesting future research avenue. Finally, it is important to examine the external validity of our results. Because our study focuses on a single country, the results might not be generalizable to other countries. The application of our analysis to firm-level data in other countries would address this issue.

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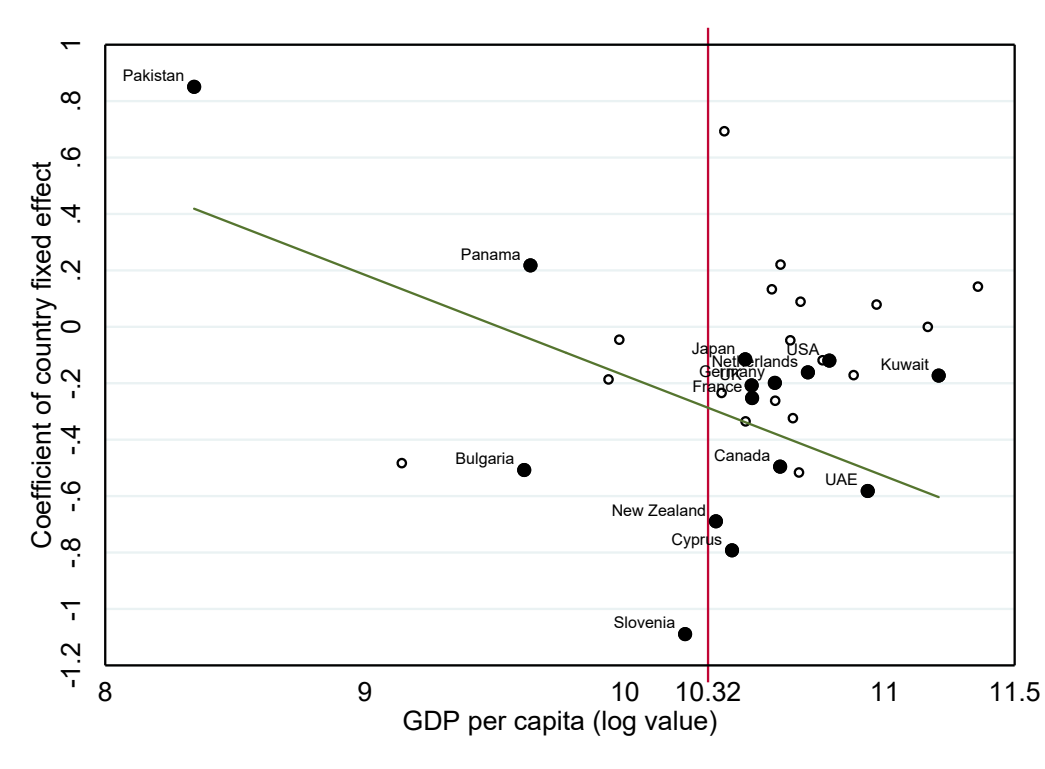
Figure 1: Estimated Country Fixed Effects and GDP Per Capita



Notes: The y-axis represents coefficients for each country fixed effects. The x-axis denotes the log of GDP per capita in the year 2010 (World Bank International Comparison Program Database). Each circle represents each country. The red vertical line indicates the level of GDP per capita of Korea in the year 2010 (10.32 in log value). The black dots with country label denote coefficients with statistically significant at the 90 percent significance level; the small circles without a country label indicate insignificant coefficients.

Table 1: Descriptive Statistics

	Full sample		Foreign-owned firms	
	(1)	(2)	(3)	(4)
	Mean	Std. Dev.	Mean	Std. Dev.
Employment	304.45	1,467.78	347.19	994.45
Export status	0.65	0.48	0.83	0.37
Import status	0.60	0.49	0.82	0.38
Export intensity	0.12	0.18	0.15	0.20
Import intensity	0.12	0.19	0.36	0.30
Outward FDI status	0.48	0.50	0.62	0.49
Employment volatility	0.223	0.214	0.199	0.200
log(Employment volatility)	-1.803	0.767	-1.936	0.771
Number of firms	11,048		908	

*Notes:*Descriptive statistics are calculated as averages over the 10-year window from 2006 to 2015 with at least five consecutive years of positive employment. Employment is counted as the number of people employed. Export status and Import status denote dummy variables such that they equal one if firms are engaged in exporting and importing for at least one year during the 10-year window. Export intensity is defined as the share of exports in revenue. Import intensity is defined as the share of imports in purchases. Outward FDI status denotes dummy variables such that they equal one if firms are engaged in outward FDI for at least one year during the 10-year window. Employment volatility is measured using the "residual method."

Table 2: Foreign Ownership and Employment Volatility, 2006–2015: Residual Method

	(1)	(2)	(3)	(4)	(5)	(6)
	All sectors				Man	Non-Man
Foreign-ownership status	-0.118***	-0.118***	-0.119***	-0.112***	-0.110***	-0.108**
	(0.029)	(0.029)	(0.029)	(0.030)	(0.041)	(0.043)
Both	-0.081***	-0.044*	-0.040	-0.036	-0.054	-0.015
	(0.021)	(0.023)	(0.024)	(0.025)	(0.040)	(0.036)
Export only	-0.006	0.006	-0.020	-0.018	0.046	-0.078**
	(0.026)	(0.026)	(0.026)	(0.027)	(0.048)	(0.034)
Export intensity	-0.072*	-0.028	-0.008	-0.014	-0.116**	0.339***
	(0.043)	(0.045)	(0.045)	(0.047)	(0.050)	(0.124)
Import only	0.007	0.024	-0.009	-0.005	-0.027	0.024
	(0.035)	(0.035)	(0.035)	(0.036)	(0.057)	(0.047)
Import intensity	-0.080*	-0.117**	-0.169***	-0.169***	-0.132**	-0.256***
	(0.046)	(0.048)	(0.048)	(0.049)	(0.060)	(0.084)
Employment	-0.041***	-0.053***	-0.040***	-0.038***	-0.006	-0.055***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.015)	(0.012)
Outward FDI	0.157***	0.162***	0.134***	0.130***	0.153***	0.101***
	(0.016)	(0.016)	(0.016)	(0.017)	(0.022)	(0.025)
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes
Observations	11,048	11,048	11,048	11,048	5,651	5,397
R-squared	0.013	0.021	0.123	0.160	0.092	0.204

Notes: The dependent variable is firm-level volatility of employment growth rate calculated using the residual method over the 10-year window. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space).

Table 3: Foreign Ownership and Employment Volatility, 2006–2015:
Different Measures of Volatility

Panel A	(1)	(2)	(3)	(4)	(5)	(6)
Log-difference method	All sectors				Man	Non-Man
Foreign-ownership status	-0.124***	-0.124***	-0.124***	-0.116***	-0.125***	-0.104**
	(0.030)	(0.030)	(0.030)	(0.031)	(0.042)	(0.045)
Observations	11,044	11,044	11,044	11,044	5,651	5,393
R-squared	0.013	0.022	0.115	0.155	0.094	0.195
Panel B	(1)	(2)	(3)	(4)	(5)	(6)
Growth rate method	All sectors				Man	Non-Man
Foreign-ownership status	-0.123***	-0.122***	-0.122***	-0.115***	-0.122***	-0.104**
	(0.029)	(0.029)	(0.029)	(0.029)	(0.041)	(0.043)
Observations	11,044	11,044	11,044	11,044	5,651	5,393
R-squared	0.014	0.022	0.117	0.158	0.095	0.200
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes

Notes: The dependent variable is firm-level volatility of employment growth rate calculated using the log difference method over the 10-year window. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space). The coefficients of control variables are reported in Tables B1 and B2.

Table 4: Foreign Ownership and Employment Volatility, 2006–2015:
Different Measure of Foreign ownership

Panel A	(1)	(2)	(3)	(4)	(5)	(6)
Foreign ownership $\geq$ 10%		All sectors			Man	Non-Man
Foreign-ownership status	-0.076***	-0.073***	-0.077***	-0.073***	-0.098***	-0.049
	(0.023)	(0.023)	(0.023)	(0.023)	(0.031)	(0.035)
Observations	11,048	11,048	11,048	11,048	5,651	5,397
R-squared	0.012	0.020	0.123	0.160	0.092	0.203
Panel B	(1)	(2)	(3)	(4)	(5)	(6)
Foreign-ownership intensity		All sectors			Man	Non-Man
Foreign-ownership intensity	-0.116***	-0.117***	-0.124***	-0.116***	-0.101**	-0.121**
	(0.032)	(0.032)	(0.032)	(0.033)	(0.047)	(0.047)
Observations	11,048	11,048	11,048	11,048	5,651	5,397
R-squared	0.013	0.021	0.123	0.160	0.091	0.204
Panel C	(1)	(2)	(3)	(4)	(5)	(6)
Foreign ownership = 100%		All sectors			Man	Non-Man
Foreign-ownership status	-0.080**	-0.083**	-0.089**	-0.083**	0.021	-0.134***
	(0.038)	(0.038)	(0.039)	(0.040)	(0.064)	(0.052)
Observations	11,048	11,048	11,048	11,048	5,651	5,397
R-squared	0.012	0.019	0.122	0.160	0.090	0.204
Panel D	(1)	(2)	(3)	(4)	(5)	(6)
Non-switchers		All sectors			Man	Non-Man
Foreign-ownership status	-0.146***	-0.146***	-0.145***	-0.136***	-0.118***	-0.143***
	(0.032)	(0.032)	(0.031)	(0.032)	(0.044)	(0.047)
Observations	11,048	11,048	11,048	11,048	5,651	5,397
R-squared	0.013	0.021	0.123	0.161	0.092	0.205
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes

Notes: The dependent variable is firm-level volatility of employment growth rate. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space). Coefficients of control variables are reported in Tables B3–B6.

Table 5: Foreign Ownership and Employment Volatility, 2006–2015: Different Windows, Balanced Panel, and Temporary Workers

Panel A	(1)	(2)	(3)	(4)	(5)	(6)
5-year windows		All sectors			Man	Non-Man
Foreign-ownership status	-0.100***	-0.099***	-0.109***	-0.108***	-0.092**	-0.123***
	(0.026)	(0.026)	(0.026)	(0.027)	(0.036)	(0.040)
Observations	16,830	16,830	16,830	16,830	9,045	7,785
R-squared	0.016	0.017	0.112	0.140	0.077	0.189
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Spell	Yes	Yes	Yes	No	No	No
Industry-region-spell	No	No	No	Yes	Yes	Yes
Panel B	(1)	(2)	(3)	(4)	(5)	(6)
Balanced panel		All sectors			Man	Non-Man
Foreign-ownership status	-0.100***	-0.094***	-0.115***	-0.114***	-0.111***	-0.118**
	(0.034)	(0.034)	(0.034)	(0.035)	(0.043)	(0.060)
Observations	6,069	6,069	6,069	6,069	3,458	2,611
R-squared	0.014	0.020	0.184	0.233	0.133	0.303
Panel C	(1)	(2)	(3)	(4)	(5)	(6)
Adding temporary workers		All sectors			Man	Non-Man
Foreign-ownership status	-0.157***	-0.163***	-0.141***	-0.133***	-0.094**	-0.167***
	(0.029)	(0.029)	(0.029)	(0.029)	(0.040)	(0.043)
Observations	11,048	11,048	11,048	11,048	5,651	5,397
R-squared	0.022	0.029	0.189	0.225	0.098	0.293
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes

Notes: The dependent variable is firm-level volatility of employment growth rate. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space). Coefficients of control variables are reported in Tables B7–B9.

Table 6: Foreign Ownership and Employment Volatility, 2006–2015: Adding Productivity Shocks

	(1)	(2)	(3)	(4)
		Manufacturing Only		
Foreign-ownership status	-0.110***	-0.127***	-0.116***	-0.125***
	(0.041)	(0.039)	(0.039)	(0.039)
Both	-0.054	-0.035	-0.064	-0.047
	(0.040)	(0.039)	(0.040)	(0.039)
Export only	0.046	0.037	0.044	0.033
	(0.048)	(0.046)	(0.048)	(0.046)
Export intensity	-0.116**	-0.166***	-0.117**	-0.165***
	(0.050)	(0.050)	(0.050)	(0.050)
Import only	-0.027	0.007	-0.036	-0.005
	(0.057)	(0.056)	(0.056)	(0.056)
Import intensity	-0.132**	-0.084	-0.103*	-0.076
	(0.060)	(0.059)	(0.060)	(0.059)
Employment	-0.006	0.027*	0.001	0.025*
	(0.015)	(0.014)	(0.015)	(0.014)
Outward FDI	0.153***	0.119***	0.133***	0.112***
	(0.022)	(0.021)	(0.022)	(0.021)
Revenue volatility		0.264***		0.247***
		(0.017)		(0.017)
Value-added volatility			0.130***	0.062***
			(0.015)	(0.015)
Fixed effects:				
Industry-region	Yes	Yes	Yes	Yes
Observations	5,651	5,583	5,579	5,579
R-squared	0.092	0.142	0.105	0.146

Notes: The dependent variable is firm-level volatility of employment growth rate. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Foreign-owned Firm Premia, 2015

	(1)	(2)	(3)	(4)
Log employment	0.066*	0.166***		
Log skill share	0.172***	0.029	0.080***	
Log wage	0.336***	0.243***	0.244***	0.238***
Log labor productivity	0.437***	0.294***	0.290***	0.277***
Log TFP	0.372***	0.372***	0.376***	0.373***
Additional controls	None	Ind.-Region FE	Ind.-Region FE Log employment	Ind.-Region FE Log employment Log skill share

Notes: We define foreign-owned firms as firms in which 50 percent or more of equity is owned by the foreign parent firm in the year 2015. Labor productivity is defined as the value added per worker. Total factor productivity (TFP) is estimated using Ackerberg et al.'s (2015) method. In the TFP case, we only use firms in the manufacturing sector. All results are from bivariate ordinary least squares regressions of firm characteristics in the first column on a dummy variable indicating each firm's foreign-owned status. In column 2, we include industry-region fixed effects. In column 3, we include industry-region fixed effects and log firm employment as controls. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 8: Country of Origin for Foreign-owned Firms

Country Code	Country Name	Frequency	Percentage	GDP per capita
102	Taiwan	4	0.48	32,294
105	Malaysia	9	1.09	20,680
111	Singapore	27	3.27	70,657
120	UAE	1	0.12	56,075
122	Japan	225	27.27	35,000
123	China	6	0.73	9,333
127	Kuwait	1	0.12	73,683
128	Pakistan	2	0.24	4,197
131	Hong Kong	13	1.58	47,135
199	Other Asia	1	0.12	
	Total: Asia	**289**	**35.03**	
202	Netherlands	58	7.03	44,543
203	Norway	4	0.48	58,022
204	Denmark	6	0.73	43,042
205	Germany	78	9.45	39,226
208	Luxembourg	3	0.36	85,697
210	Belgium	5	0.61	40,091
211	Bulgaria	2	0.24	14,949
212	Sweden	9	1.09	41,628
213	Switzerland	32	3.88	53,119
214	Spain	5	0.61	31,954
215	Slovenia	1	0.12	27,766
216	Ireland	5	0.61	43,299
220	United Kingdom	48	5.82	35,875
221	Austria	6	0.73	42,047
223	Italia	6	0.73	35,042
226	Cyprus	1	0.12	33,263
229	France	42	5.09	35,935
230	Finland	5	0.61	38,755
231	Hungary	1	0.12	21,556
299	Other Europe	1	0.12	
	Total: Europe	**318**	**38.55**	
301	United States	200	24.24	48,375
302	Canada	8	0.97	40,027
	Total: North America	**208**	**25.21**	
418	Panama	1	0.12	15,312
499	Other South America	4	0.48	
	Total: South America	**5**	**0.61**	
501	New Zealand	1	0.12	31,266
502	Australia	3	0.36	39,275
599	Other Oceania	1	0.12	
	Total: Oceania	**5**	**0.61**	
	Total	**825**	**100.00**	

Notes: Foreign-owned firms are defined as firms in which 50 percent or more of equity is owned by the foreign parent firm over the 10-year window from 2006 to 2015 with at least five consecutive years of positive employment. The total number of foreign-owned firms is 908, among which we can identify 825 foreign-owned firms and their country of origin. GDP per capita is drawn from the World Bank International Comparison database. GDP per capita is based on PPP (current international $) in 2010.

Appendix I. Production Function Estimation

To compare the technology level difference between foreign-owned firms and domestic firms, we estimate production function following Ackerberg et al. (2015). Consider the following production function equation:

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + \omega_{it} + \varepsilon_{it} \tag{A-1}$$

where i and t denote the firm and year, y_{it} is the log of output, k_{it} is the log of capital input, l_{it} is the log of labor input, ω_{it} represents "productivity" shocks that are observed by firms when they make input decisions, and ε_{it} denotes shocks to production that are not observable by firms before making input decisions in the year t. Firms' intermediate input demand function is given by:

$$m_{it} = \widetilde{f}_t\left(k_{it}, l_{it}, \omega_{it}\right) \tag{A-2}$$

where $\tilde{f}_t\left(k_{it}, l_{it}, \omega_{it}\right)$ is strictly increasing in ω_{it}. Invert intermediate input demand function $\omega_{it} = \tilde{f}_t^{-1}\left(k_{it}, l_{it}, m_{it}\right)$ and substitute it into the production function in equation (A-1) yields the first-stage equation,

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + \tilde{f}_t^{-1}\left(k_{it}, l_{it}, m_{it}\right) + \varepsilon_{it} = \widetilde{\Phi_t}\left(k_{it}, l_{it}, m_{it}\right) + \varepsilon_{it}. \tag{A-3}$$

Assuming that the exogenous Markov process and the fact that $\widetilde{\Phi_t}\left(k_{it}, l_{it}, m_{it}\right) = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + \omega_{it}$,

$$\begin{aligned} \omega_{it} = \mathbb{E}[\omega_{it}|\omega_{it-1}] + \xi_{it} &= g(\omega_{it-1}) + \xi_{it} \\ &= g\left(\widetilde{\Phi_{t-1}}\left(k_{it-1}, l_{it-1}, m_{it-1}\right) - \beta_0 - \beta_k k_{it-1} - \beta_l l_{it-1}\right) + \xi_{it}. \end{aligned} \tag{A-4}$$

Plugging the above equation (A-4) into the equation (A-1) yields the second-stage equation,

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + g\left(\widetilde{\Phi_{t-1}}\left(k_{it-1}, l_{it-1}, m_{it-1}\right) - \beta_0 - \beta_k k_{it-1} - \beta_l l_{it-1}\right) + \xi_{it} + \varepsilon_{it}. \tag{A-5}$$

Ackerberg et al. (2015) propose production function parameters in the second-stage equation using the following conditional moment:

$$\mathbb{E}[\xi_{it} + \varepsilon_{it} | I_{it-1}] = 0 \tag{A-6}$$

where I_{it-1} is the information set.

In practice, we use the log of real value added, log of employment, log of real tangible assets, and log of real intermediate input purchase to proxy for y_{it}, l_{it}, k_{it}, and m_{it}, respectively. Because the Survey of Business Activities (SBA) data is expressed in nominal values, we deflate nominal values of value added, tangible assets, and intermediate inputs by the industry-level production price index drawn from the Bank of Korea. We restrict our original sample to firms that report at least five consecutive years of positive permanent employees over the full 10-year window from 2006 to 2015, as in the main empirical analysis. We further restrict the sample to firms in the manufacturing sector.

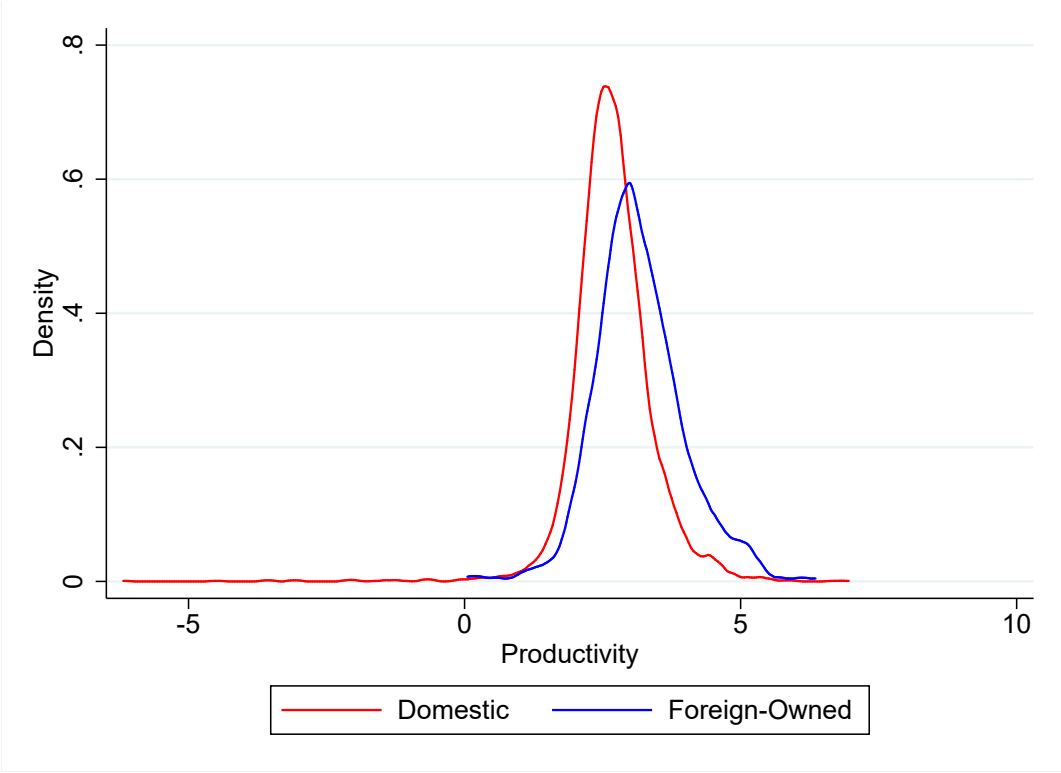
Then, we estimate the first stage equation (A-3) by regressing y_{it} on second-degree polynomials in the explanatory variables, k_{it}, l_{it}, and m_{it}. The first-stage produces an estimate $\widehat{\widetilde{\Phi}}_t(k_{it}, l_{it}, m_{it})$ of $\widetilde{\Phi}_t(k_{it}, l_{it}, m_{it})$. Plugging $\widehat{\widetilde{\Phi}}_t(k_{it}, l_{it}, m_{it})$ into the equation (A-5) and using the moment condition in equation (A-6), we conduct GMM procedure to estimate production function parameters. Finally, we obtain estimated log productivity $\widehat{\omega_{it}}$ as follows:

$$\widehat{\omega_{it}} = y_{it} - \widehat{\beta}_0 - \widehat{\beta}_k k_{it} - \widehat{\beta}_l l_{it}.$$

Based on the estimated log productivity for each firm, we compare the productivity of foreign-owned firms and domestic firms. To this end, we draw kernel density estimates of estimated log productivity for foreign-owned firms and domestic firms in the year 2015. A foreign-owned firm is defined as one in which 50 percent or more of equity is owned by the foreign parent firm in a given year. Figure A1 shows that foreign-owned firms are more productive than domestic firms. The average log productivity for foreign firms is 3.054, and the average log productivity for domestic firms is 2.682, implying that foreign-owned firms are 37.2 percent more productive than domestic firms. Although not reported in the paper, we find similar patterns for different years.

Appendix II. Appendix Figure

Figure A1: Kernel Density Estimates of Productivity, 2015



*Notes:*We include observations with at least five consecutive years of positive employment from 2006 to 2015. We follow Ackerberg et al. (2015) to estimate the productivity of each firm. The figure plots kernel densities for domestic firms and foreign-owned firms in the year 2015. A foreign-owned firm is defined as one in which 50 percent or more of equity is owned by the foreign parent firm in the year 2015. The blue line represents kernel density estimate using foreign-owned firms in the year 2015; the red line denotes kernel density estimate using domestic firms in the year 2015.

Appendix III. Appendix Tables

Table A1: Administrative Divisions of Korea

Type	Code	Name	Share of Foreign-owned firms
Special city	11	Seoul	11.71
Metropolitan city	21	Busan	4.22
Metropolitan city	22	Daegu	3.17
Metropolitan city	23	Incheon	7.24
Metropolitan city	24	Gwangju	3.91
Metropolitan city	25	Daejeon	1.76
Metropolitan city	26	Ulsan	7.45
Metropolitan autonomous city	29	Sejong	-
Province	31	Gyeonggi-do	6.49
Province	32	Gangwon-do	1.11
Province	33	Chungcheongbuk-do	8.36
Province	34	Chungcheongnam-do	7.77
Province	35	Jeollabuk-do	2.72
Province	36	Jeollanam-do	3.24
Province	37	Gyeongsangbuk-do	5.48
Province	38	Gyeongsangnam-do	6.98
Special autonomous province	39	Jeju	6.25

Notes: Korea is made up of 17 first-tier administrative divisions: 1 special city, 6 metropolitan cities, 1 metropolitan autonomous city, 8 provinces, and 1 special autonomous province. Sejong metropolitan autonomous city is newly established in the year 2012. Previously, it was part of Chungcheongbuk-do. In calculating the share of foreign-owned, Sejong metropolitan autonomous city is included in Chungcheongbuk-do.

Table A2: Korean Standard Industrial Classification (KSIC)

Code	Name	Share of Foreign-owned firms
1	Agriculture	0.00
2	Forestry	
3	Fishing and aquaculture	0.00
5	Mining of coal, crude petroleum and natural gas	
6	Mining of metal ores	
7	Mining of non-metallic minerals, except fuel	0.00
8	Mining support service activities	
10	Food products	2.76
11	Beverages	19.23
12	Tobacco products	
13	Textiles, except apparel	1.38
14	Wearing apparel, clothing accessories and fur articles	0.55
15	Leather, luggage and footwear	0.00
16	Wood and of products of wood and cork; except furniture	0.00
17	Pulp, paper and paper products	7.26
18	Printing and reproduction of recorded media	0.00
19	Coke, briquettes and refined petroleum products	18.18
20	Chemicals and chemical products; except pharmaceuticals and medicinal chemicals	18.66
21	Pharmaceuticals, medicinal chemical and botanical products	4.73
22	Rubber and plastics products	8.40
23	Other non-metallic mineral products	10.70
24	Basic metals	3.88
25	Fabricated metal products, except machinery and furniture	4.13
26	Electronic components, computer; visual, sounding and communication equipment	5.23
27	Medical, precision and optical instruments, watches and clocks	8.74
28	Electrical equipment	8.61
29	Other machinery and equipment	8.78
30	Motor vehicles, trailers and semitrailers	10.64
31	Other transport equipment	2.78
32	Furniture	6.98
33	Other manufacturing	2.22
35	Electricity, gas, steam and air conditioning supply	3.45
36	Water supply	
37	Sewage, wastewater, human and animal waste treatment services	0.00
38	Waste collection, treatment and disposal activities; materials recovery	0.00
39	Remediation activities and other waste management services	
41	General construction	1.76
42	Specialized construction activities	0.66

(continued)

Notes: The Korean Standard Industrial Classification (KSIC) was based on the International Standard Industrial Classification (ISIC) adopted by the UN. KSIC is divided into 21 sections (denoted by 1 digit). The sections can be defined by the next breakdown, the divisions (denoted by 2 digits). We present 76 divisions in the table, and use them as our main industry units.

Table A2: Korean Standard Industrial Classification (KSIC), continued

Code	Name	Share of Foreign-owned firms
	(continued)	
45	Sale of motor vehicles and parts	26.67
46	Wholesale trade on own account or on a fee or contract basis	27.71
47	Retail trade, except motor vehicles and motorcycles	10.55
49	Land transport and transport via pipelines	0.22
50	Water transport	9.38
51	Air transport	11.11
52	Warehousing and support activities for transportation	25.87
55	Accommodation	7.55
56	Food and beverage service activities	11.59
58	Publishing activities	4.63
59	Motion picture, video and television programme production, sound recording and music publishing	2.50
60	Broadcasting activities	0.00
61	Postal activities and telecommunications	2.78
62	Computer programming, consultancy and related activities	6.43
63	Information service activities	4.76
64	Financial service activities, except insurance and pension funding	26.27
65	Insurance and pension funding	32.50
66	Activities auxiliary to financial service and insurance activities	20.99
68	Real estate activities	2.33
69	Rental and leasing activities; except real estate	5.88
70	Research and development	20.00
71	Professional services	15.63
72	Architectural, engineering and other scientific technical services	3.81
73	Other professional, scientific and technical services	0.00
74	Business facilities management and landscape services	0.00
75	Business support services	2.70
84	Public administration and defence; compulsory social security	
85	Education	4.48
86	Human health activities	
87	Social work activities	
90	Creative, arts and recreation related services	0.00
91	Sports activities and amusement activities	1.69
94	Membership organizations	
95	Maintenance and repair services of personal and household goods	7.32
96	Other personal services activities	0.00
97	Activities of households as employers of domestic personnel	
98	Undiferentiated goods-and services-producing activities of private households for own use	
99	Activities of extraterritorial organizations and bodies	

Notes: The Korean Standard Industrial Classification (KSIC) was based on the International Standard Industrial Classification (ISIC) adopted by the UN. KSIC is divided into 21 sections (denoted by 1 digit). The sections can be defined by the next breakdown, the divisions (denoted by 2 digits). We present 76 divisions in the table, and use them as our main industry units.

Table B1: Foreign Ownership and Employment Volatility, 2006–2015: Log Difference Method

	(1)	(2)	(3)	(4)	(5)	(6)
	All sectors				Man	Non-Man
Foreign-ownership status	-0.124***	-0.124***	-0.124***	-0.116***	-0.125***	-0.104**
	(0.030)	(0.030)	(0.030)	(0.031)	(0.042)	(0.045)
Both	-0.081***	-0.046*	-0.045*	-0.041	-0.051	-0.030
	(0.022)	(0.024)	(0.026)	(0.026)	(0.041)	(0.037)
Export only	-0.005	0.007	-0.020	-0.020	0.046	-0.080**
	(0.027)	(0.027)	(0.027)	(0.028)	(0.049)	(0.036)
Export intensity	-0.058	-0.023	-0.006	-0.011	-0.114**	0.338***
	(0.045)	(0.046)	(0.046)	(0.048)	(0.052)	(0.128)
Import only	0.009	0.027	-0.009	-0.004	-0.031	0.031
	(0.036)	(0.037)	(0.036)	(0.037)	(0.059)	(0.048)
Import intensity	-0.077	-0.109**	-0.163***	-0.161***	-0.126**	-0.243***
	(0.047)	(0.049)	(0.049)	(0.050)	(0.062)	(0.086)
Employment	-0.045***	-0.059***	-0.046***	-0.044***	-0.008	-0.063***
	(0.009)	(0.009)	(0.010)	(0.010)	(0.015)	(0.013)
Outward FDI	0.167***	0.172***	0.146***	0.142***	0.159***	0.118***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.022)	(0.026)
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes
Observations	11,044	11,044	11,044	11,044	5,651	5,393
R-squared	0.013	0.022	0.115	0.155	0.094	0.195

Notes: The dependent variable is firm-level volatility of employment growth rate calculated using the log difference method over the 10-year window. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space).

Table B2: Foreign Ownership and Employment Volatility, 2006–2015: Growth Rate Method

	(1)	(2)	(3)	(4)	(5)	(6)
	All sectors				Man	Non-Man
Foreign-ownership status	-0.123***	-0.122***	-0.122***	-0.115***	-0.122***	-0.104**
	(0.029)	(0.029)	(0.029)	(0.029)	(0.041)	(0.043)
Both	-0.072***	-0.039*	-0.039	-0.036	-0.047	-0.025
	(0.021)	(0.023)	(0.024)	(0.025)	(0.039)	(0.035)
Export only	0.002	0.012	-0.014	-0.014	0.047	-0.070**
	(0.025)	(0.026)	(0.026)	(0.027)	(0.048)	(0.034)
Export intensity	-0.052	-0.022	-0.007	-0.012	-0.109**	0.316***
	(0.043)	(0.044)	(0.045)	(0.046)	(0.050)	(0.121)
Import only	0.010	0.028	-0.008	-0.003	-0.035	0.032
	(0.035)	(0.035)	(0.034)	(0.035)	(0.057)	(0.046)
Import intensity	-0.077*	-0.105**	-0.154***	-0.152***	-0.120**	-0.228***
	(0.046)	(0.047)	(0.047)	(0.048)	(0.060)	(0.083)
Employment	-0.049***	-0.062***	-0.049***	-0.047***	-0.012	-0.065***
	(0.008)	(0.009)	(0.009)	(0.009)	(0.015)	(0.012)
Outward FDI	0.161***	0.166***	0.140***	0.135***	0.151***	0.113***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.022)	(0.025)
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes
Observations	11,044	11,044	11,044	11,044	5,651	5,393
R-squared	0.014	0.022	0.117	0.158	0.095	0.200

Notes: The dependent variable is firm-level volatility of employment growth rate calculated using the growth rate method over the 10-year window. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space).

Table B3: Foreign Ownership and Employment Volatility, 2006–2015:
Different Measure of Foreign Ownership (Foreign Ownership $\geq$ 10%)

	(1)	(2)	(3)	(4)	(5)	(6)
	All sectors				Man	Non-Man
Foreign-ownership status	-0.076***	-0.073***	-0.077***	-0.073***	-0.098***	-0.049
	(0.023)	(0.023)	(0.023)	(0.023)	(0.031)	(0.035)
Both	-0.079***	-0.043*	-0.039	-0.035	-0.054	-0.014
	(0.021)	(0.023)	(0.024)	(0.025)	(0.039)	(0.036)
Export only	-0.007	0.004	-0.021	-0.019	0.045	-0.081**
	(0.026)	(0.026)	(0.026)	(0.027)	(0.048)	(0.034)
Export intensity	-0.063	-0.019	0.000	-0.007	-0.113**	0.354***
	(0.043)	(0.045)	(0.045)	(0.046)	(0.050)	(0.123)
Import only	0.010	0.027	-0.007	-0.003	-0.026	0.027
	(0.035)	(0.035)	(0.035)	(0.036)	(0.057)	(0.047)
Import intensity	-0.104**	-0.143***	-0.192***	-0.191***	-0.134**	-0.299***
	(0.045)	(0.046)	(0.047)	(0.048)	(0.060)	(0.082)
Employment	-0.039***	-0.051***	-0.038***	-0.037***	-0.003	-0.054***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.015)	(0.012)
Outward FDI	0.159***	0.164***	0.137***	0.132***	0.156***	0.101***
	(0.016)	(0.016)	(0.016)	(0.017)	(0.022)	(0.025)
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes
Observations	11,048	11,048	11,048	11,048	5,651	5,397
R-squared	0.012	0.020	0.123	0.160	0.092	0.203

Notes: We define foreign-owned firms as firms with 10% or more of foreign ownership during the period. The dependent variable is firm-level volatility of employment growth rate calculated using the residual method over the 10-year window. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space).

Table B4: Foreign Ownership and Employment Volatility, 2006–2015:
Different Measure of Foreign Ownership (Foreign-ownership Intensity)

	(1)	(2)	(3)	(4)	(5)	(6)
	All sectors				Man	Non-Man
Foreign-ownership intensity	-0.116***	-0.117***	-0.124***	-0.116***	-0.101**	-0.121**
	(0.032)	(0.032)	(0.032)	(0.033)	(0.047)	(0.047)
Both	-0.081***	-0.045*	-0.040	-0.036	-0.054	-0.015
	(0.021)	(0.023)	(0.024)	(0.025)	(0.040)	(0.036)
Export only	-0.006	0.005	-0.020	-0.018	0.046	-0.078**
	(0.026)	(0.026)	(0.026)	(0.027)	(0.048)	(0.034)
Export intensity	-0.070	-0.027	-0.007	-0.014	-0.115**	0.337***
	(0.043)	(0.045)	(0.045)	(0.047)	(0.050)	(0.124)
Import only	0.007	0.024	-0.010	-0.006	-0.027	0.023
	(0.035)	(0.035)	(0.035)	(0.036)	(0.057)	(0.047)
Import intensity	-0.085*	-0.122**	-0.171***	-0.171***	-0.141**	-0.250***
	(0.047)	(0.048)	(0.048)	(0.049)	(0.061)	(0.085)
Employment	-0.041***	-0.053***	-0.040***	-0.038***	-0.007	-0.055***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.015)	(0.012)
Outward FDI	0.156***	0.162***	0.134***	0.130***	0.153***	0.100***
	(0.016)	(0.016)	(0.016)	(0.017)	(0.022)	(0.025)
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes
Observations	11,048	11,048	11,048	11,048	5,651	5,397
R-squared	0.013	0.021	0.123	0.160	0.091	0.204

Notes: We define foreign-owned intensity as firms with 50% or more of foreign ownership during the period times the foreign-ownership share. The dependent variable is firm-level volatility of employment growth rate calculated using the residual method over the 10-year window. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space).

Table B5: Foreign Ownership and Employment Volatility, 2006–2015:
Different Measure of Foreign Ownership (Foreign Ownership = 100%)

	(1)	(2)	(3)	(4)	(5)	(6)
	All sectors				Man	Non-Man
Foreign-ownership status	-0.080**	-0.083**	-0.089**	-0.083**	0.021	-0.134***
	(0.038)	(0.038)	(0.039)	(0.040)	(0.064)	(0.052)
Both	-0.081***	-0.045*	-0.041*	-0.037	-0.053	-0.017
	(0.021)	(0.023)	(0.024)	(0.025)	(0.040)	(0.036)
Export only	-0.007	0.004	-0.022	-0.020	0.046	-0.079**
	(0.026)	(0.026)	(0.026)	(0.027)	(0.048)	(0.034)
Export intensity	-0.064	-0.021	-0.003	-0.011	-0.111**	0.337***
	(0.043)	(0.045)	(0.045)	(0.047)	(0.050)	(0.123)
Import only	0.009	0.026	-0.009	-0.005	-0.024	0.022
	(0.035)	(0.035)	(0.035)	(0.036)	(0.057)	(0.047)
Import intensity	-0.118***	-0.155***	-0.203***	-0.202***	-0.189***	-0.259***
	(0.045)	(0.047)	(0.047)	(0.048)	(0.059)	(0.083)
Employment	-0.042***	-0.054***	-0.041***	-0.039***	-0.008	-0.056***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.015)	(0.012)
Outward FDI	0.155***	0.161***	0.134***	0.130***	0.154***	0.100***
	(0.016)	(0.016)	(0.016)	(0.017)	(0.022)	(0.025)
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes
Observations	11,048	11,048	11,048	11,048	5,651	5,397
R-squared	0.012	0.019	0.122	0.160	0.090	0.204

Notes: We define foreign-owned firms as firms with 100% of foreign ownership during the period. The dependent variable is firm-level volatility of employment growth rate calculated using the residual method over the 10-year window. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space).

Table B6: Foreign Ownership and Employment Volatility, 2006–2015:
Different Measure of Foreign Ownership (Non-switchers)

	(1)	(2)	(3)	(4)	(5)	(6)
	All sectors				Man	Non-Man
Foreign-ownership status	-0.146***	-0.146***	-0.145***	-0.136***	-0.118***	-0.143***
	(0.032)	(0.032)	(0.031)	(0.032)	(0.044)	(0.047)
Both	-0.081***	-0.045*	-0.041*	-0.037	-0.054	-0.016
	(0.021)	(0.023)	(0.024)	(0.025)	(0.040)	(0.036)
Export only	-0.005	0.006	-0.020	-0.018	0.046	-0.078**
	(0.026)	(0.026)	(0.026)	(0.027)	(0.048)	(0.034)
Export intensity	-0.074*	-0.030	-0.009	-0.016	-0.116**	0.333***
	(0.043)	(0.045)	(0.045)	(0.047)	(0.050)	(0.123)
Import only	0.006	0.023	-0.011	-0.007	-0.027	0.022
	(0.035)	(0.035)	(0.035)	(0.036)	(0.057)	(0.047)
Import intensity	-0.070	-0.107**	-0.161***	-0.162***	-0.133**	-0.237***
	(0.047)	(0.048)	(0.048)	(0.049)	(0.060)	(0.085)
Employment	-0.040***	-0.052***	-0.039***	-0.038***	-0.006	-0.055***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.015)	(0.012)
Outward FDI	0.157***	0.162***	0.135***	0.130***	0.153***	0.101***
	(0.016)	(0.016)	(0.016)	(0.017)	(0.022)	(0.025)
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes
Observations	11,048	11,048	11,048	11,048	5,651	5,397
R-squared	0.013	0.021	0.123	0.161	0.092	0.205

Notes: We define foreign-owned firms as firms if more than or equals to 50 percent of equity is owned by the foreign parent firm over the window w and firms if they do not change their foreign-owned status during the window w. The dependent variable is firm-level volatility of employment growth rate calculated using the residual method over the 10-year window. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space).

Table B7: Foreign Ownership and Employment Volatility, 2006–2015:
Different Measure of Windows (5-year Windows)

	(1)	(2)	(3)	(4)	(5)	(6)
	All sectors				Man	Non-Man
Foreign-ownership status	-0.100***	-0.099***	-0.109***	-0.108***	-0.092**	-0.123***
	(0.026)	(0.026)	(0.026)	(0.027)	(0.036)	(0.040)
Both	-0.090***	-0.084***	-0.059***	-0.064***	-0.036	-0.101***
	(0.020)	(0.021)	(0.023)	(0.023)	(0.032)	(0.037)
Export only	0.017	0.022	0.011	0.001	0.077**	-0.096***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.038)	(0.035)
Export intensity	-0.050	-0.041	-0.007	0.001	-0.088*	0.405***
	(0.039)	(0.040)	(0.040)	(0.041)	(0.045)	(0.111)
Import only	0.023	0.026	-0.024	-0.027	-0.043	-0.000
	(0.030)	(0.030)	(0.030)	(0.031)	(0.045)	(0.043)
Import intensity	-0.071*	-0.076*	-0.144***	-0.141***	-0.164***	-0.102
	(0.040)	(0.041)	(0.041)	(0.042)	(0.051)	(0.075)
Employment	-0.083***	-0.089***	-0.082***	-0.082***	-0.067***	-0.089***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.012)	(0.011)
Outward FDi	0.158***	0.162***	0.120***	0.116***	0.133***	0.092***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.020)	(0.024)
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Spell	Yes	Yes	Yes	No	No	No
Industry-region-spell	No	No	No	Yes	Yes	Yes
Observations	16,830	16,830	16,830	16,830	9,045	7,785
R-squared	0.016	0.017	0.112	0.140	0.077	0.189

Notes: The dependent variable is firm-level volatility of employment growth rate calculated using the residual method over the two 5-year windows. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space).

Table B8: Foreign Ownership and Employment Volatility, 2006–2015:
Balanced Panel

	(1)	(2)	(3)	(4)	(5)	(6)
	All sectors				Man	Non-Man
Foreign-ownership status	-0.100***	-0.094***	-0.115***	-0.114***	-0.111***	-0.118**
	(0.034)	(0.034)	(0.034)	(0.035)	(0.043)	(0.060)
Both	0.047	0.104***	0.091***	0.100***	0.079	0.069
	(0.030)	(0.032)	(0.035)	(0.036)	(0.061)	(0.050)
Export only	0.043	0.059	-0.003	-0.003	0.038	-0.054
	(0.037)	(0.037)	(0.038)	(0.040)	(0.074)	(0.049)
Export intensity	-0.159***	-0.072	-0.039	-0.025	-0.096	0.388**
	(0.052)	(0.054)	(0.053)	(0.056)	(0.060)	(0.163)
Import only	0.078	0.105**	0.047	0.053	-0.027	0.109*
	(0.048)	(0.048)	(0.047)	(0.049)	(0.081)	(0.064)
Import intensity	-0.138**	-0.150***	-0.140**	-0.148**	-0.218***	0.016
	(0.055)	(0.057)	(0.055)	(0.058)	(0.067)	(0.114)
Employment	-0.024**	-0.038***	-0.053***	-0.059***	-0.047***	-0.064***
	(0.011)	(0.011)	(0.011)	(0.012)	(0.016)	(0.018)
Outward FDI	0.154***	0.155***	0.099***	0.093***	0.123***	0.054
	(0.021)	(0.021)	(0.020)	(0.021)	(0.026)	(0.034)
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes
Observations	6,069	6,069	6,069	6,069	3,458	2,611
R-squared	0.014	0.020	0.184	0.233	0.133	0.303

Notes: The dependent variable is firm-level volatility of employment growth rate calculated using the residual method over balanced 10-year window. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space).

Table B9: Foreign Ownership and Employment Volatility, 2006–2015:
Different Measure of Employment (Adding Temporary Workers)

	(1)	(2)	(3)	(4)	(5)	(6)
	All sectors				Man	Non-Man
Foreign-ownership status	-0.157***	-0.163***	-0.141***	-0.133***	-0.094**	-0.167***
	(0.029)	(0.029)	(0.029)	(0.029)	(0.040)	(0.043)
Both	-0.105***	-0.033	-0.021	-0.016	-0.062	0.014
	(0.022)	(0.024)	(0.024)	(0.025)	(0.039)	(0.035)
Export only	-0.022	-0.001	-0.019	-0.014	0.019	-0.062*
	(0.027)	(0.027)	(0.026)	(0.027)	(0.048)	(0.034)
Export intensity	-0.192***	-0.103**	-0.057	-0.062	-0.160***	0.274**
	(0.044)	(0.046)	(0.045)	(0.047)	(0.051)	(0.121)
Import only	0.046	0.085**	0.031	0.033	-0.036	0.085*
	(0.036)	(0.036)	(0.034)	(0.035)	(0.057)	(0.044)
Import intensity	-0.078*	-0.081*	-0.129***	-0.131***	-0.122**	-0.185**
	(0.047)	(0.049)	(0.048)	(0.049)	(0.060)	(0.083)
Employment	-0.064***	-0.079***	-0.059***	-0.058***	-0.016	-0.082***
	(0.008)	(0.009)	(0.009)	(0.009)	(0.015)	(0.012)
Outward FDI	0.186***	0.190***	0.136***	0.135***	0.148***	0.116***
	(0.017)	(0.017)	(0.016)	(0.016)	(0.022)	(0.024)
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes
Observations	11,048	11,048	11,048	11,048	5,651	5,397
R-squared	0.022	0.029	0.189	0.225	0.098	0.293

Notes: The dependent variable is firm-level volatility of employment growth rate calculated using the residual method over the 10-year window. We include both permanent workers and temporary workers when calculating the employment volatility. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space).

Table B10: Foreign Ownership and Employment Volatility, 2006–2015:
Different Measure of Employment (Skilled Workers Only)

	(1)	(2)	(3)	(4)	(5)	(6)
	All sectors				Man	Non-Man
Foreign-ownership status	-0.178***	-0.180***	-0.148***	-0.126***	-0.132***	-0.115**
	(0.032)	(0.032)	(0.032)	(0.032)	(0.045)	(0.045)
Both	-0.210***	-0.115***	-0.098***	-0.068**	-0.039	-0.111***
	(0.025)	(0.027)	(0.028)	(0.028)	(0.048)	(0.038)
Export only	-0.018	0.009	-0.012	0.011	0.033	-0.022
	(0.031)	(0.031)	(0.031)	(0.031)	(0.058)	(0.040)
Export intensity	-0.322***	-0.160***	-0.070	-0.088	-0.216***	0.307**
	(0.051)	(0.053)	(0.053)	(0.055)	(0.061)	(0.130)
Import only	-0.076**	-0.040	-0.048	-0.015	-0.027	0.007
	(0.038)	(0.039)	(0.038)	(0.038)	(0.065)	(0.049)
Import intensity	0.202***	0.137**	0.007	-0.050	-0.047	-0.051
	(0.053)	(0.055)	(0.055)	(0.056)	(0.071)	(0.091)
Employment	0.211***	0.197***	0.174***	0.164***	0.182***	0.158***
	(0.009)	(0.009)	(0.010)	(0.010)	(0.016)	(0.013)
Outward FDI	0.111***	0.119***	0.106***	0.112***	0.160***	0.056**
	(0.019)	(0.019)	(0.019)	(0.019)	(0.026)	(0.028)
Industry-level variables	No	Yes	No	No	No	No
Fixed effects:						
Industry	No	No	Yes	No	No	No
Region	No	No	Yes	No	No	No
Industry-region	No	No	No	Yes	Yes	Yes
Observations	11,048	11,048	11,048	11,048	5,651	5,397
R-squared	0.065	0.076	0.173	0.229	0.164	0.250

Notes: We define foreign-owned firms as firms if more than or equals to 50 percent of equity is owned by the foreign parent firm over the window w. The dependent variable is firm-level volatility of employment growth rate calculated using the residual method over the 10-year window. Robust standard errors are in parentheses. The employment is defined as skill workers only in which skill workers are defined as the share of the number of non-production workers in the headquarter and the number of researchers in the subsidiaries. *** p<0.01, ** p<0.05, * p<0.1. Man and Non-Man indicate manufacturing and non-manufacturing, respectively. Industry-level variables are industry export and import intensities, and industry employment (not reported due to the limited availability of space).