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It matters where you go
Outward foreign direct investment and multinational employment growth at home

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ABSTRACT

How does outward foreign direct investment (FDI) affect employment growth of the multinational corporations (MNCs) in the home country? Does the impact of outward investment differ by the level of development of the destination country of the FDI? Using a difference-in-difference approach, we assess the impact of starting to invest in less-advanced countries compared with investing in more-advanced countries. To obtain suitable control groups in each case, we use the propensity score method to select national firms that ex post did not take the investment decisions that we study even though ex ante they would have been equally likely to. We find that moving to less-advanced countries decreases a company's employment growth rate especially in the short run. On the other hand, moving to more-advanced countries does not consistently affect employment growth in any significant way. Including investment decisions of established multinationals in the estimation somewhat weakens but does not overturn this conclusion.

1. Introduction

Multinationals have played an important role in the recent wave of globalization with its worldwide increase in exports and foreign direct investment (FDI). The public often views multinational activities with some skepticism, as it is concerned that off-shoring activities will reduce domestic employment in the firms that venture abroad. Such concerns are heard not only in the U.S. and Europe, but also in Asia. In this paper, we study the link between a multinational corporation's (MNC) employment growth rate at home and its decision to invest in either more- or less- advanced countries. With a unique dataset of South Korean firms that links the South Korean parent of an MNC with its affiliates abroad at the firm level, we can explicitly differentiate the impact of foreign direct investment by destination. Using matched sampling techniques to address self-selection and endogeneity, we compare the employment trajectories of multinationals with affiliates in either more- or less- advanced economies with the employment growth of firms that do not expand through foreign direct investment but that otherwise share all other forms of access to foreign markets.

Since the mid-1980s, increasingly larger flows of foreign direct investment have found their way into China. China now tops the list of FDI recipients worldwide. China is also the predominant destination of FDI in East Asia, where the FDI flows into China and their effects on domestic production have become one of the premier policy concerns. The South Korean investment promotion agency *KOTRA* for example fears a "hollowing out of Korea's production base as a result of the rush into China" and suggestive data in Figs. 1 and 2 indeed show a falling share of employment in manufacturing in the 1990s as the share of trade with China as well as FDI into LDCs increase. As if to underscore the similarity with the debates surrounding *NAFTA* in the U.S., Ross Perot's notorious 1993 phrase "A giant sucking sound" has popped up again in the Asian context.[1]

The case of South Korea as an emerging economy is of particular interest. Most of the available studies of the impact of multinational activity on employment focus on advanced economies and established multinationals. Emerging economies, however, have a relatively young history of outward foreign direct investment. Before 1980, for example, only some 30 South Korean multinationals were active abroad, which is why assessing the impact of outward multinational activity on employment in emerging economies is to a large extent assessing the impact of first-time investments abroad, an aspect that has not received much attention in the literature so far.[2] Moreover, as a middle-income country, South Korea's multinational activity is almost equally split between more- and less- advanced

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[1] A few examples: "The Sucking Sound of FDI flowing into China", Asia Pacific Review, 2001. "A New Giant Sucking Sound", The Nation, 2001. "Giant Sucking Sound Rises in the East", Utne Magazine, 2003.

[2] Navaretti and Venables (2004) criticize the literature for inferring the impact of multinational activity on employment from the operations of established multinationals. A recent paper by Becker and Muendler (2009) explicitly considers the intensive and extensive margin of multinational activity while assessing the impact on domestic employment.

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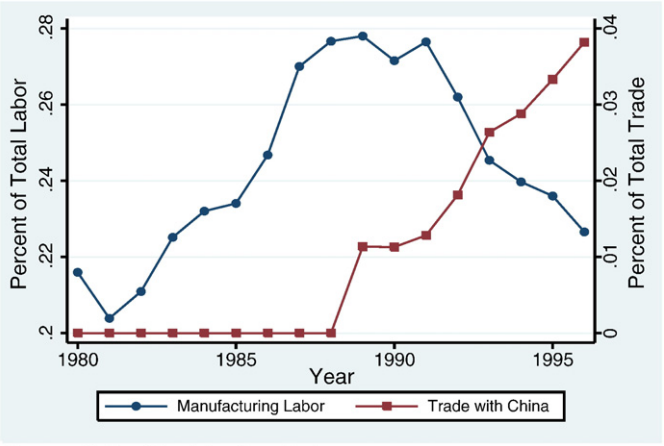


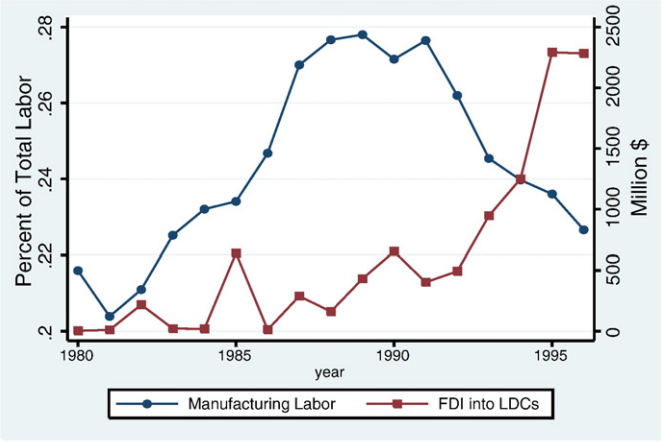
Source: National Statistics Organization
Trade is the sum of exports and imports.

Fig. 1. Share of manufacturing labor vs. share of trade with China.

countries, which makes it ideal for comparing the impact of FDI into more- vs. less- advanced countries.

Whether the particular destination country of FDI matters for the employment in the parent company is primarily an empirical question. The newer theories of multinational activity that focus on firm heterogeneity as well as the earlier literature that hinged upon the distinction between vertical and horizontal multinationals offer no conclusive answer. Horizontal multinational activity, for example, has been defined through market-seeking FDI especially to advanced economies. As Markusen (1984) and Brainard (1997) show, firms with moderate increasing returns should set up affiliates abroad to save transportation costs. Firms would relocate closer to the foreign consumer to produce the same goods that they produce at home. Going abroad would substitute for arm's-length exports and foreign labor would substitute for domestic labor. However, at the same time, moving to other markets could increase the local headquarter services that the multinational typically provides to affiliates and actually lead to more employment in the long term.

The analysis of vertical FDI is similarly ambiguous. Vertical FDI is motivated by fragmentation of production, see Helpman (1984). Instead of producing the same product at different locations, firms would break up the value chain and relocate parts of their production off shore to take advantage of low labor cost in emerging economies. It is easy to see how



Source: Export-Import Bank of Korea and National Statistics Organization.
FDI measured in Millions of U.S. dollars;

Fig. 2. Share of manufacturing labor vs. FDI into LDCs.

this vertical strategy could lessen employment in the parent plants of the home country. However, nothing precludes this off-shoring strategy from being part of a long-term growth strategy. Here again, it is hard to judge a priori whether moving abroad would in the end decrease or increase employment at home.

In recent years, the literature has moved beyond the distinction between horizontal and vertical FDI. Empirical work by Hanson et al. (2001) and theoretical work by Yeaple (2003) and Ekholm et al. (2007) have emphasized that the complexity of MNC integration strategies. There is likely to be both a horizontal and a vertical dimension to any multinational activity. In addition, the newer literature now explicitly includes firm heterogeneity, so that particular firm characteristics will also determine the strategy that a firm takes to enter foreign markets. As theoretical work by Grossman et al. (2006) illustrates, heterogeneity leads to a multiplicity of possible strategies that offer only limited guidance about the long-term employment effects of moving to more- or less-advanced countries.

So far, the empirical evidence on the impact of multinational activities abroad is mixed. Brainard and Riker (1997) was the first study to suggest that there is no negative impact of off-shoring activities on domestic employment in the multinational. Also Desai et al. (2009) and Borga (2005) find that U.S. multinationals actually support job growth at home, which is consistent with Becker and Muendler (2008) who argue that FDI leads to less job losses when studying job separations for multinationals and non-multinationals in Germany. Brainard and Riker (2001) and Hanson et al. (2003), on the other hand, come to a different conclusion: they find that foreign employment may be a substitute for domestic employment. These mixed empirical results pose a challenge. We agree with Harrison and McMillan (2006) that they call for an empirical approach that differentiates the nature of the multinational operations at the firm level in order to assess the impact of MNC operations. Harrison and McMillan (2006), for example, differentiate the impact of multinational activity by location and by whether vertical or horizontal activities are involved. Our approach is consistent with this. Also Becker and Muendler (2009) allow for the impact of multinational activity to differ by location.

To differentiate the impact of MNC operations by destination we apply difference-in-difference estimation plus propensity score matching, techniques that have been widely applied in labor economics and that are particularly well fit to study the impact of first-time investments. Among the first to apply these techniques to multinational operations were Castellani and Navaretti (2004) who studied Italian outward FDI and its effect on domestic employment and Egger and Pfaffermayr (2003) who compared the performance of multinationals and exporters.[3] Becker and Muendler (2008) is another recent application that focuses on job separations in Germany while comparing multinationals and national firms. We explicitly compare the employment trajectory of the parent of the MNC that goes to more- or less-advanced countries, the treatment group, with the performance of national firms, the control group. The control group that is matched with the MNCs is selected in such a way that the national firms ex ante would have been equally likely to invest abroad as the multinationals. Obviously, the quality of the results will depend on the quality of the matches between the treatment group and the control group and we go to great lengths to obtain a good match.

Our results indicate that where a multinational invests matters especially in the short run for the employment growth of the multinational's parent at home. We consistently find that a move into a country that in terms of per capita GDP is less advanced than South Korea yields lower employment growth in the parent firm than in national firms that did not invest abroad. The longer the time horizon, however, the less significant that distinction becomes. On the other

[3] Castellani and Navaretti (2004) and Egger and Pfaffermayr (2003) do not distinguish by destination and study advanced countries with predominantly established MNCs.

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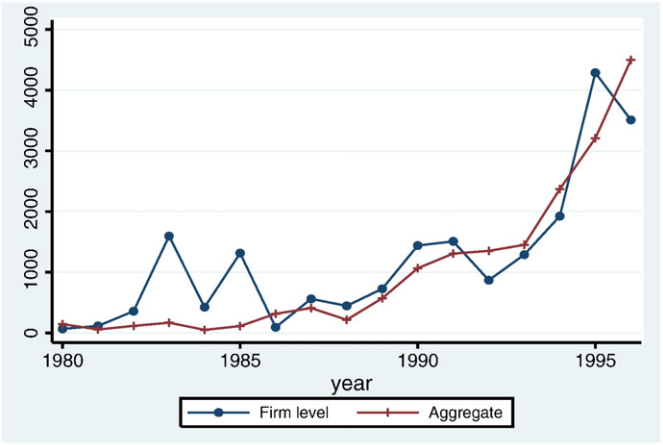


Source: Firm level data is from Export-Import Bank of Korea and aggregate data is from Korea National Statistics Organization. FDI measured in Millions of U.S. dollars.

Fig. 3. Total firm level data vs. aggregate data.

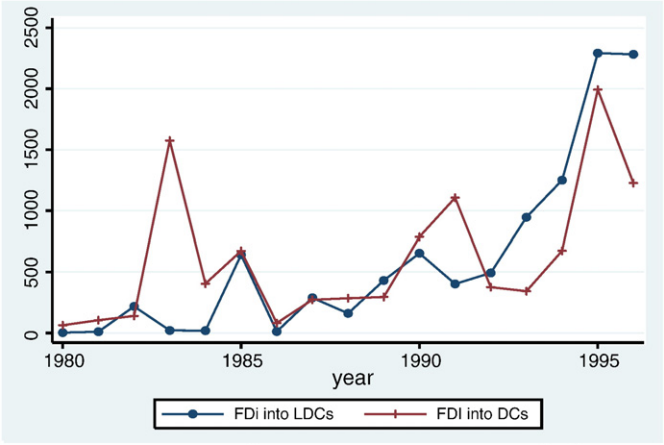
hand, we find in most cases no statistical difference between the employment growth rate of multinationals that open affiliates in more-advanced countries and national firms that do not. This finding is relatively robust.

Our findings give some credibility to public concerns about offshoring at least in the short run. Our results indicate that it is important to know the destination of FDI in order to be able to assess its impact, which is consistent with Harrison and McMillan (2006) who distinguish by vertical and horizontal multinational activities and with Becker and Muendler (2009) who find different employment effects across European locations. Using data that do not differentiate by destination risks masking the particular impact of investing abroad.

The rest of the article is structured as follows. First, we describe the estimation strategy that we follow. We then characterize the data and turn to the construction of counterfactuals. We finally discuss the estimation results before we conclude.

2. Data and preliminary analysis

The data of South Korean foreign investment is obtained by the Export–Import Bank of Korea. This unbalanced dataset includes the full list of South Korean annual investment flows since 1968. To avoid any complications related the Asian financial crisis that hit South Korea in 1997, we stop the investigation in 1996. By that time,



Source: Export-Import Bank of Korea. FDI measured in Millions of U.S. dollars.

Fig. 4. Outbound FDI from South Korea.

Table 1
Destination pattern of outward FDI.
Source: Export–Import Bank of Korea.

	China	Other Asia	North America	Rest of world
By No. FDI firms	44.48%	12.50%	27.19%	15.83%
By FDI amount	17.34%	33.63%	21.24%	27.79%

outward FDI across all sectors was still less than 1% of GDP. In Fig. 3, we illustrate the rapid increase in outward FDI. We provide the yearly total FDI flows by summing the individual investment flows from the Export–Import Bank of Korea, as well as the aggregate data reported by the Korea National Statistics Organization.

An important advantage of the Export–Import data (EXIM) is that it specifies the destination of the individual flows. Overall, South Korean FDI goes to 93 countries. We distinguish between FDI that goes to a country that is more or less advanced than South Korea depending on whether its per capita GDP is higher or lower than that of South Korea. As can be seen in Fig. 4, initially, more investment flows found their way to more-advanced countries and especially to the United States. However, from the early 1990s onward, there is a dramatic increase in investment in less-advanced countries. An important factor in this regard is the normalization of the relations between China and South Korea in 1992 when both countries established diplomatic relations. The cross sectional destination pattern is also reported in Table 1. Note that the electronics sector is with almost 38% of FDI by far the most important sector for outward FDI. Automobiles, textiles, and primary metals are also significant.

It is characteristic for South Korea and other emerging economies that outward multinational activity is relatively recent. Almost 90% of the 1556 multinationals in manufacturing that we count in the Export–Import Bank dataset come online in the 1990s. Before 1980, only about 30 South Korean multinationals invested abroad. The EXIM database only identifies the investment flows. To obtain additional investor information, we merge the Export–Import data with the Korea Information System (KIS) database that contains balance sheets and profit-and-loss statements of all South Korean firms that are registered as corporations since 1980. It includes over 35,000 observations for 8545 firms. The KIS database does not include the relatively small firms that are found in the EXIM data. However, we can identify 788 (about half) of the EXIM multinational corporations in manufacturing in the KIS dataset. These multinationals are responsible for more than 80% of FDI in manufacturing up to 1996. Of the 788 KIS MNCs, there are 526 that have the three consecutive years of data around the investment year that are needed for our difference-in-difference estimation.

Our initial focus is on 462 of these 526 multinational firms since they are new multinationals whose initial investment is part of the KIS database. They invest abroad for the first time in the period that we study. From the KIS dataset, we draw on a whole list of variables such as firm output (total sales), the number of employed workers, the export status (whether a firm exports or not), and whether a firm is part of a Chaebol, or a large South Korean conglomerate. Note that the data do not differentiate between high- and low-skilled workers.

Table 2 shows how the multinationals come online in our dataset.[4] The first line does not differentiate between multinationals that venture into more- or into less-advanced countries. The second and third line break down the number of multinationals by their destination. The table clearly illustrates the dramatic increase in multinational activity since the 1990s. The numbers of multinationals that go to developed and developing countries are in some cases less than the total number of multinationals. The reason is that there are some multinationals that invest in both more-and less-advanced countries.

[4] Since we need at least three consecutive years of data, we report data from 1981 to 1995.

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Table 2
Number of multinationals in the dataset.

Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
a. New MNCs															
MNCs	4	4	6	9	12	15	20	32	46	73	123	194	250	377	462
MNCs into LDCs	0	0	0	0	1	1	1	3	10	28	60	105	147	250	319
MNCs into DCs	4	4	6	9	11	13	18	27	33	41	58	84	96	114	129
b. Including additional investments of established MNCs															
MNCs	5	6	8	12	17	22	29	51	76	122	201	303	410	621	793
MNCs into LDCs	0	0	0	0	2	3	3	10	27	59	104	170	245	422	556
MNCs into DCs	5	6	8	12	15	20	27	44	55	76	114	151	191	243	291

Before 1980, about 30 firms invested abroad.

We include these multinationals when we do not differentiate by destination.

With so many new multinationals coming online, our dataset is ideal for studying the impact of becoming a multinational. We, however, also extend the analysis by including additional investments of already-established multinationals to study whether subsequent investment decisions in more- or less-advanced countries modify any of our results. Combining these additional investments with the new investments, we have a total 793 investment decisions for a total of 526 multinationals.

To get a sense of the difference between multinationals and non-multinationals, we run like Bernard and Jensen (1999), De Loecker (2007), and others, the log of output (sales), employment, and output per worker on a set of sector and year dummies, as well as on a dummy that is one for the year since the firm turned a multinational (irrespective of its destination), and zero otherwise. We also differentiate by whether the multinational went to developed or less-developed countries.

$$lnX_{ijt} = \alpha + \beta MNC_{ijt} + \sum_t \gamma_t \text{Year}_t + \sum_j \lambda_j \text{Sector}_j + \varepsilon_{ijt}, \quad (1)$$

where X_{ijt} measures employment, output, and output per worker for firm i at time t in sector j. Year and Sector are the year and industry effects. MNC is a dummy that is one from the year t onward in which a firm becomes a multinational. Table 3 reports the results. Multinationals, irrespective of their destination, tend to be larger in terms of employment and output and they tend to be more productive, which is in line with what the literature has found. In our dataset, all else equal, multinationals tend to have 98% higher sales and 84% higher employment and they also tend to be 13% more productive than South Korean national firms. Interestingly, once we separate MNCs that invest in more-advanced countries from those that invest in less-advanced countries, we see that those going to more-advanced countries are larger in size, and they are also more productive.

Fig. 5 provides an interesting perspective on the particular question that we investigate. We see the average log of employment trajectories for our four types of South Korean firms: South Korean national firms, MNCs irrespective of the destination of their FDI, MNCs that go to more-advanced countries, and finally the MNCs that venture into less-advanced countries.[5] Fig. 5 shows the employment trajectories before and after the investment decision. The figure provides suggestive evidence that the employment of MNCs in more-advanced countries takes a very different trajectory from that of MNCs that go into less-advanced countries.[6] The figure is instructive and suggestive of the type of concerns that surface in the public debate. Is it the case, when MNCs move to China and other less-advanced countries, that they are likely to shed employment and not increase their employment in step with South Korean firms that do not venture abroad?

At the same time, the trajectories bring to the foreground a major challenge. Fig. 5 suggests questions of potential selection bias in the data. Clearly, the different types of firms have different profiles before they set up affiliates abroad. While the employment path of national firms is relatively stable, there is a steeper slope of employment over time for MNCs that invest in advanced countries; that is, their labor increases faster before the investment than that of national firms or firms that will be setting up affiliates in less-advanced countries. This gets to the question of whether indeed moving to a particular destination affects the employment trajectory of firms differently. When firms perform differently before they invest abroad, they may actually also perform differently after the investment, which is why inferring the impact of FDI on employment by glimpsing employment profiles may be misleading. Ultimately, this figure provides the reason why we need to use matching techniques to pair firms in such a way that they are virtually indistinguishable before time t, so that we can attribute any difference in post-t performance to whether a firm went abroad or not, or to a more- or a less-advanced country.

3. Estimation strategy

A central concern when studying the impact of outward FDI on the evolution of South Korea's parents' employment relates to issues of simultaneity and self-selection. Does firm employment slow down

Table 3
Firm characteristics differentials.

Dep. variable	β	R-squared	Obs
1. Multinationals vs. national firms			
ln(Y)	0.984	0.2	45,333
	[0.016]***		
ln(L)	0.836	0.3	44,314
	[0.013]***		
ln(Y/L)	0.129	0.21	44,115
	[0.009]***		
2. Multinationals to LDCs vs. national firms			
ln(Y)	0.716	0.16	41,357
	[0.018]***		
ln(L)	0.626	0.27	40,355
	[0.014]***		
ln(Y/L)	0.069	0.2	40,161
	[0.011]***		
3. Multinationals to DCs vs. national firms			
ln(Y)	1.447	0.21	36,911
	[0.026]***		
ln(L)	1.206	0.31	35,948
	[0.021]***		
ln(Y/L)	0.227	0.2	35,760
	[0.015]***		

Regression results of $lnX_{ijt} = \alpha + \beta MNC_{ijt} + \sum_t \gamma_t \text{Year}_t + \sum_j \lambda_j \text{Sector}_j + \varepsilon_{ijt}$. i, j, and t denote firm, industry, and year, respectively. MNC_{ijt} is dummy variable whether i is a MNC. *Significant at 10%. **Significant at 5%. ***Significant at 1%.

[5] The data are purged for firm-specific (Di) and year-specific (Dt) Effects. On the vertical axes of Fig. 5 we have $e = lnL_{it} - \hat{\beta}_1 D_i - \hat{\beta}_2 D_t$. For national firms, t is the midpoint in the dataset (i.e., for a firm present between 1990 and 1994, its midpoint would be 1992).

[6] We test whether $e_{t+i} - e_t$, $i = 1,2,3$ is significantly different between MNCs and nationals. The trajectory of MNCs into LDCs is significantly different from nationals at 1% level while it is not for MNCs into DCs.

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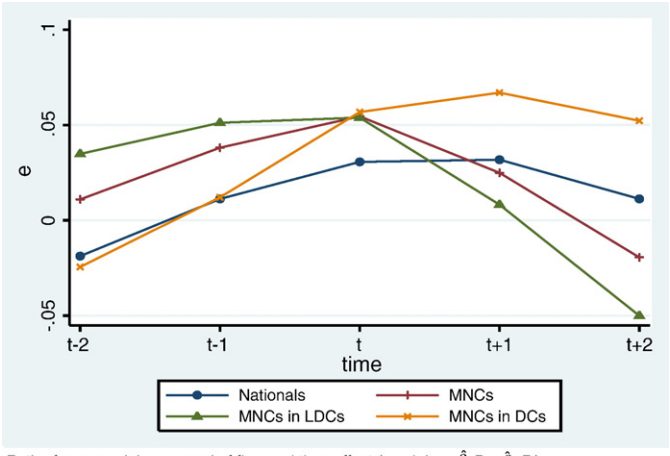

Path of average labor purged of firm and time effect ($e = lnL_{it} - \hat{\beta}_1 D_i - \hat{\beta}_2 D_t$)
$e_{t+i} - e_t$ is significantly different between MNCs into LDCs and Nationals at 1% level while MNCs into DCs is not. Source: Export-Import Bank of Korea.

Fig. 5. Employment trajectories before and after time *t*: multinationals(MNCs) vs. nationals.

because of the investments in a more- or a less-advanced country, or do firms whose employment has been increasing more or less simply tend to invest in different locations and accordingly perform differently past investment? Another equally important issue relates to whether changes in firm performance that one observes are specific to multinationals or whether they are due to unobservable shocks that affect national and multinational firms alike. To address both concerns and to answer the question of how investing in either a more- or a less-advanced country differs from not having done so, we take a difference-in-difference approach.

We focus on employment growth after firms change their activity abroad and compare their performance with firms that do not extend their activities abroad. We will also consider the change in the growth rate before and after the time of investment for the various groups of firms. Needless to say, it will be important to find proper matches for the new multinational corporations, which is why we specifically focus on the matching process in the next section. The matched firms should, in theory, proxy for the performance of the new multinational corporations under the alternative scenario in which they would not have changed status and would not have ventured abroad. The national firms are the counterfactuals. As indicated, after we have focused on only new MNCs that venture abroad, we include in our dataset also the subsequent investment decisions of already-established MNCs.

For firms that change their activities or status at time *t* (the *c*-firms), we denote the first difference between their employment level after the investment as $\Delta \ln \overline{E}^c_{t+}$. As indicated, we vary the length of the period that we consider. We take the difference between employment at time *t* and employment at time $t+1$, $t+2$, and $t+3$. Note that the calculated employment growth can represent three different cases. It can stand for the employment growth rate of a new multinational that starts investing: (1) in China or some other less-advanced countries, (2) in a more-advanced country, or (3) in any direction. To properly assess the growth rates of the first difference, we compare these growth rates with the control group of firms that do not change their activities (the *n*-firms) and whose employment growth is therefore not affected by the decision to invest in a particular location, i.e., $\Delta \ln \overline{E}^n_{t+}$. Once such proper controls are found, we can determine whether the double-difference estimator of Eq. (2) is consistent with public sentiment about FDI. Is it negative for the multinationals that extend their activities to China and for the firms that invest in less-developed countries for the first time? Or, is the estimated coefficient positive or insignificant as suggested by those who minimize the impact of outward FDI?

$$\hat{\alpha}_{\mathrm{DID}} = \Delta ln\overline{E}^c_{t+} - \Delta ln\overline{E}^n_{t+} \quad (2)$$

To properly isolate the effect of investing in a more- or less-advanced country, Meyer (1995) suggests we construct a group of control firms that are as similar as possible to the firms that change status in terms of observables. It is for this purpose that we use the propensity score matching procedure. One of the advantages of propensity score matching is that it makes matching over a whole set of characteristics feasible since it summarizes all pre-treatment characteristics into one number, the propensity score (see next section). We want to match each firm that changes status and becomes a multinational with national firms that are virtually indistinguishable in terms of observable characteristics from the MNCs before they went abroad. Ex ante these matched firms are equally likely to move to a developed or less-developed country, even though they eventually ended up not changing their status and staying in South Korea. In other words, what distinguishes one firm that goes abroad from one that does not going is a random event.

Once we have the control group of firms, we can calculate the difference-in-difference estimator $\hat{\alpha}_{\mathrm{DID}}$. The estimator is obtained from the following regression (3) with the assumption of $E[\varepsilon^s_{it+}|d^s] = 0$.

$$\Delta lnE^s_{it+} = \delta_0 + \hat{\alpha}_{\mathrm{DID}} d^s + \varepsilon^s_{it+} \quad (3)$$

The superscripts $s = n,c$ refer to the status of the firms, with *n* denoting those firms that do not change status and *c* the ones that do. *d* is a dummy variable that equals one in case a firm does change status, $s = c$, and zero otherwise, $s = n$. If the estimated coefficient α_{DID} is positive (negative), it implies that changing status has a positive (negative) effect on the employment growth rate.

We extend the analysis to assess differences in the growth rates of employment before and after the investment decision with Eq. (4). For the new multinationals, the *c*-firms, and their matched national firms, the *n*-firms, we consider two measures of employment growth, $\Delta \ln E^s_{it}$, depending on whether we look at employment growth before *t*, $t = 0$, or after *t*, $t = 1$.

$$\Delta lnE^s_{it} = \gamma_0 + \gamma_1 d^s + \gamma_2 d_t + \hat{\alpha}_{\mathrm{DID}} d^s_t + \varepsilon^s_{it}, \quad (4)$$

where *d* refers to different sets of dummies.
$d^s = 1$ if $s = c$ and 0 otherwise
$d_t = 1$ if $t = 1$ and 0 otherwise
$d^s_t = 1$ if $s = c$, $t = 1$ and 0 otherwise.[7]

The first and second dummy variables respectively control for any difference between firms that change status and the ones that do not and between the pre- and post-change period.

4. Constructing control groups

We study firms that change status. They become an MNC irrespective of destination or they become an MNC that invests in respectively a more- or a less-advanced country. We want to match these MNCs with national firms. The national firms should ex ante be equally likely to move to a developed or a less-developed country even though they eventually don't change their status and stay in South Korea. Matching methods can yield an unbiased estimate of the coefficient that captures the impact of the change in status, when the differences between any two firms are picked up by the observable characteristics before the change of status. In other words, the outcomes (investing abroad, in an emerging or in a more-advanced country) should be independent of the assignment to the class of outward-investing companies conditional on the pre-treatment covariates. To construct such a control group, we rely on the propensity score method

[7] By setting *t* equal to 1 in Eq.(4), one obtains Eq.(3).

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as used by Heckman et al. (1997) and extend the list of observables as much as we can. Still, the key assumption needed to perform matching based on the propensity score is that, conditional on a vector of observables, the choice of investing abroad does not depend on future performance (the conditional independence assumption). In other words, to the extent that the decision to go abroad is explicitly a function of the future performance as a multinational in the particular destination country, this assumption may be violated.

We estimate a probability model of the decision to change status for the three different cases that we investigate. Each time, the sample includes the firms that change status and national firms. The probit models are a function of observable firm-specific characteristics of the year before the change of status. The indicator variable *CS* is 1, if the firm changes status and zero otherwise.

$$\text{Prob}(\text{CS}_{it} = 1 | x_{it-1}, d_{\text{ind}}, d_t)$$

Our firm-specific characteristics include output, output per worker, capital, as well as a dummy for export status and for whether a unit is part of a Chaebol, which are all important dimensions along which MNCs and non-MNCs often differ. We also include industry and year effects to control for common demand or supply shocks. The aim is to minimize the possibility that pre-treatment differences in observables (and unobservables) between our treatment and control group could explain any differences in employment growth afterwards, which is why we use an extensive list of variables. The full list of firm-specific x_{it-1} variables and probit results are reported in Table 4. Similar to Becker and Muendler (2008), we use levels in our probit estimates while focusing on changes in our analysis of employment. We also included a post-1992 dummy to highlight the impact the 1992 diplomatic relations between China and South Korea had on the likelihood that multinationals move to less-advanced countries.

We compute a firm's propensity score using the probit estimates. We predict the probability that each firm changes status. Next, we pair each multinational with the *k*-nearest neighbor national firms that have a comparable predicted probability in a common support.[8] This group of '*k*-nearest neighbors' constitute the control groups. These selected *k*-nearest neighbors for each multinational is assigned equal weight $(1/k)$ in calculating DID estimates.[9] The vast majority of our matches take place between firms in the same sector. Only in a few cases do we match a national firm with a multinational from a different sector.[10]

The probit estimates in Table 4 are mostly in line with the expectations. The first column explains the likelihood that firms do FDI, whereas the second and third column investigate the likelihood that a firm becomes a multinational by investing into a country that is more or less advanced than South Korea. As one can see, across the three columns, larger firms are more likely to become multinationals or move to more- or less-advanced countries, and so are firms that exported before or that had a larger capital stock. Higher previous profitability also seems to matter. Conditional on size, capital stock and all other variables, productivity enters negatively, which seems to be driven by MNCs that go to developing countries.

Table 4
Probit.

	MNCs	MNCs into LDCs	MNCs into DCs
ln(Y)	0.265	0.317	0.035
	[0.052]***	[0.057]***	[0.095]
ln(Y/L)	−0.209	−0.27	0.012
	[0.038]***	[0.043]***	[0.064]
ln(fixed asset)	−0.019	−0.009	0.039
	[0.092]	[0.098]	[0.166]
ln(net profit)	0.006	0.008	0.001
	[0.004]*	[0.004]*	[0.006]
ln(management cost)	0.004	−0.08	0.246
	[0.035]	[0.039]**	[0.065]***
ln(tangible asset)	0.037	0.011	0
	[0.063]	[0.067]	[0.114]
ln(total asset)	−0.151	−0.182	−0.079
	[0.107]	[0.121]	[0.186]
ln(total capital)	0.021	0.014	0.046
	[0.007]***	[0.007]**	[0.019]**
ln(total liability)	0.051	0.064	0.007
	[0.071]	[0.080]	[0.116]
ln(age)	−0.004	0.04	−0.074
	[0.028]	[0.033]	[0.047]
Export	0.233	0.211	0.238
	[0.046]***	[0.052]***	[0.082]***
Chaebol	−0.072	−0.148	−0.138
	[0.101]	[0.140]	[0.141]
Post 1992	−0.047	4.595	−0.98
	[0.244]	[0.713]***	[0.279]***
Year effect	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes
Observations	24,703	21,956	24,167
Pseudo-*R*2	0.1	0.09	0.13

*Significant at 10%. **Significant at 5%. ***Significant at 1%.

We evaluate the quality of the matches in different ways. Table 5 helps us gauge the quality of the propensity scores. We take the case of moving abroad irrespective of destination. The first column shows the predicted probability of investing abroad, broken down into 5% brackets. The second column gives the actual FDI rate that is found in the dataset for the corresponding 5% brackets. It is the rate of multinationals relative to the total number of firms (column three divided by four). As one can see, the predicted probabilities of doing FDI track the actual FDI rates reasonably well, which testify to the quality of the probit estimates.

In addition, we compare the mean differences for our three types of firms with those of the matched control groups before *t*. As can be seen in Table 6, there is no statistically significant difference between the means of the characteristics of both groups of firms after matching, whereas there are statistically significant differences before the matching. This is very important for the quality of the match since we want the exposure to treatment or the change of status to be random for a given propensity score, so that treatment and control groups on average should be similar. Table 7 reports other statistics to check the match quality. The first and second column shows the number of treated and controls, MNCs and Nationals in our study. The third and fourth column shows the pseudo R2 from probit estimation, which indicates the degree to which regressors predict the treatment probability. After matching, regressors should have no explanatory power for selection into treatment. If they don't then treatment and matched control samples are said to have balanced characteristics. Our results show that this is the case. The pseudo R2 drops from max 9% to less than 1%. The

Table 5
Features of the Probit.

Predicted prob. of FDI	FDI rate	No. of MNCs	Total no. of obs
.00–.05	0.016	321	19,824
.05–.10	0.056	98	1733
.10–.15	0.088	26	296
>.15	0.170	17	100

[8] We drop multinationals whose propensity score is higher than the maximum or less than the minimum of the control groups(national firms) as they are not in the support. These multinationals cannot be matched, which is why the number of multinationals in Table 2 is different from those used in the estimation in Tables 8 through 9.

[9] *k* can be any positive integer. We report results for 10-nearest neighbors. The maximum p-score difference is 0.015. Our estimation results are stable irrespective of the choice of *k*. Another widely used technique is non-parametric kernel matching. The sample is split in equally spaced intervals of the propensity score and various weight to matched controls are given depending on kernel types and specified bandwidths. We tried various kernel types and bandwidth and the results are stable. See Leuven and Sianesi (2003) for various matching techniques.

[10] To avoid that these matches outside a sector do not drive the results, we include sector fixed effects in the regressions (3) and (4).

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Table 6
Mean difference between MNCs and nationals before time *t*: comparing matched and unmatched data.

	Unmatched			Matched		
	MNCs	National	Significance	MNCs	National	Significance
1. MNCs vs. nationals						
ln(Y)	19.574	18.852	Yes	19.574	19.532	No
ln(Y/L)	18.114	18.017	Yes	18.114	18.127	No
ln(fixed asset)	18.668	18.004	Yes	18.668	18.624	No
ln(net profit)	13.241	11.900	Yes	13.241	13.220	No
ln (management cost)	17.289	16.629	Yes	17.289	17.266	No
ln(tangible asset)	18.328	17.693	Yes	18.328	18.286	No
ln(total asset)	19.476	18.825	Yes	19.476	19.429	No
ln(total capital)	17.461	16.183	Yes	17.461	17.453	No
ln(total liability)	19.143	18.496	Yes	19.143	19.106	No
ln(age)	2.504	2.246	Yes	2.504	2.503	No
Export	0.655	0.378	Yes	0.655	0.651	No
Chaebol	0.051	0.048	No	0.051	0.048	No
Post 1992	0.580	0.430	Yes	0.580	0.600	No
2. MNCs into LDCs vs. nationals						
ln(Y)	19.325	18.847	Yes	19.325	19.330	No
ln(Y/L)	18.098	18.069	No	18.098	18.086	No
ln(fixed asset)	18.406	18.028	Yes	18.406	18.428	No
ln(net profit)	12.849	11.844	Yes	12.849	12.837	No
ln(management cost)	17.020	16.631	Yes	17.020	17.040	No
ln(tangible asset)	18.065	17.710	Yes	18.065	18.075	No
ln(total asset)	19.218	18.837	Yes	19.218	19.227	No
ln(total capital)	16.988	16.158	Yes	16.988	17.008	No
ln(total liability)	18.899	18.510	Yes	18.899	18.904	No
ln(age)	2.457	2.231	Yes	2.457	2.456	No
Export	0.630	0.399	Yes	0.630	0.624	No
Chaebol	0.031	0.044	No	0.031	0.031	No
Post 1992	0.670	0.483	Yes	0.670	0.680	No
3. MNCs into DCs vs. nationals						
ln(Y)	20.037	18.850	Yes	20.003	19.990	No
ln(Y/L)	18.152	18.016	Yes	18.148	18.181	No
ln(fixed asset)	19.151	18.001	Yes	19.114	19.108	No
ln(net profit)	13.890	11.910	Yes	13.849	13.737	No
ln(management cost)	17.814	16.629	Yes	17.782	17.771	No
ln(tangible asset)	18.808	17.690	Yes	18.771	18.747	No
ln(total asset)	19.963	18.822	Yes	19.927	19.916	No
ln(total capital)	18.392	16.198	Yes	18.355	18.341	No
ln(total liability)	19.604	18.492	Yes	19.568	19.569	No
ln(age)	2.580	2.244	Yes	2.570	2.578	No
Export	0.689	0.379	Yes	0.687	0.693	No
Chaebol	0.093	0.049	Yes	0.093	0.091	No
Post 1992	0.348	0.430	Yes	0.351	0.376	No

Units: L is in number of workers. Y is in Korean currency(*W*). Significance is at 10% level.

median absolute standardized biases before and after matching are reported in the next two columns. Though there is no formal criteria in the literature to judge the size of standardized bias, we see that bias decreases dramatically after matching.

5. Results

Table 8 provides the difference-in-difference estimates of Eq. (3) for our three types of firms. The three different horizontal blocks extend the time period for which we study the impact on employment growth after the time of investment. We go from a very short horizon of one year to somewhat longer three-year differences. The three left columns of the Table focus on new multinationals only. We look at MNCs that go to more- and to less-advanced countries. For reference to the early literature, we include estimates that do not differentiate by destination. For the three, right columns of Table 8, we include also the subsequent investments of established multinationals. As one notices, the difference-in-difference results between the left and the right side of the table are very similar. As the first column shows, the key coefficient in our difference-in-difference estimation is not significant when we do not differentiate by destination.

The estimates in the second and third columns on the left of Table 8 differentiate by investment destination. They seem to tell a somewhat different story. The estimates are not significant for multinationals that set up affiliates in advanced countries. Within a one-, two- and even three- year time-horizon, however, we do find a significant and negative coefficient for multinationals that move into less-advanced countries such as China. Compared with national firms, those firms that have extended their operations in less-affluent countries grow more slowly than firms with which they are ex ante comparable but that do not venture abroad. This finding, to some extent, confirms the public sentiment about job losses. As for the magnitude, the estimates indicate about 2% lower employment annual growth rate than the national firms. Note that when we include the subsequent investments, the results are comparable and

Table 7
Covariate balancing, before and after matching.

	No. of treated	No. of controls	Probit *R2* before	Probit *R2* after	Median bias before	Median bias after
MNCs vs. nationals	462	3763	0.067	0.001	43.855	1.781
MNCs into LDCs vs. nationals	319	2641	0.055	0.001	28.440	0.711
MNCs into DCs vs. nationals	128	1180	0.092	0.002	65.472	0.913

Table 8
Employment growth post-FDI, difference–indifference estimates of Eq. (3).

	New MNCs only			Incl. established MNCs		
	MNCs	MNCs into LDCs	MNCs into DCs	MNCs	MNCs into LDCs	MNCs into DCs
1. One-year diff.						
α	−0.015	−0.022	0.001	−0.02	−0.018	−0.007
	[0.010]	[0.012]*	[0.018]	[0.008]**	[0.009]**	[0.011]
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
No. MNCs	462	319	128	781	553	281
2. Two-year diff.						
α	−0.017	−0.047	0.036	−0.018	−0.028	−0.005
	[0.018]	[0.021]**	[0.033]	[0.015]	[0.017]*	[0.022]
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
No. MNCs	357	234	109	583	397	226
3. Three-year diff.						
α	−0.016	−0.063	0.072	−0.026	−0.051	−0.001
	[0.028]	[0.035]*	[0.048]	[0.024]	[0.028]*	[0.033]
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
No. MNCs	241	140	93	381	229	178

*Significant at 10%. **Significant at 5%. ***Significant at 1%.

slightly weaker. When we do not differentiate by destination we do obtain a negative and significant coefficient in the first year. The overall message is reinforced, however: Differentiation by destination is important.

So far, we have focused on the effect on employment growth between nationals and multinationals after the time of the investments. We also include the employment growth rates before firms became multinationals and estimate Eq. (4) in Table 9. The first three columns show new multinationals with initial investment after 1980. The last three columns again include subsequent investment of established investment, which includes additional investments of the new multinationals in later years. The results are largely consistent with our earlier findings. Comparing employment growth for one or two years before and after the decision to move to a less-advanced country, we see slower growth for MNCs moving into less-advanced countries than for firms that don't. Note that the estimates in the

Table 9
Employment growth pre- and post-FDI, difference-in-difference estimates of Eq. (4).

	New MNCs only			Incl. established MNCs		
	MNCs	MNCs into LDCs	MNCs into DCs	MNCs	MNCs into LDCs	MNCs into DCs
1. One-year diff.						
$\gamma 1$	0.04	0.038	0.052	0.022	0.019	0.019
	[0.010]***	[0.012]***	[0.018]***	[0.008]***	[0.009]**	[0.012]
$\gamma 2$	−0.006	−0.007	0.001	−0.001	−0.01	−0.001
	[0.005]	[0.006]	[0.010]	[0.006]	[0.006]	[0.008]
α	−0.055	−0.059	−0.05	−0.043	−0.039	−0.028
	[0.013]***	[0.016]***	[0.025]**	[0.011]***	[0.013]***	[0.016]*
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
No. MNCs	462	319	128	781	553	281
2. Two-year diff.						
$\gamma 1$	0.057	0.033	0.076	0.012	0.007	0.035
	[0.016]***	[0.020]	[0.025]***	[0.013]	[0.016]	[0.019]*
$\gamma 2$	−0.024	−0.037	−0.03	−0.033	−0.047	−0.018
	[0.012]**	[0.016]**	[0.018]*	[0.012]***	[0.015]***	[0.014]
α	−0.076	−0.08	−0.039	−0.033	−0.037	−0.042
	[0.023]***	[0.029]***	[0.039]	[0.019]*	[0.023]	[0.028]
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
No. MNCs	357	234	109	583	397	226
3. Three-year diff.						
$\gamma 1$	0.042	0.011	0.069	−0.002	−0.025	0.003
	[0.028]	[0.035]	[0.044]	[0.022]	[0.027]	[0.030]
$\gamma 2$	−0.069	−0.09	−0.077	−0.048	−0.045	−0.074
	[0.023]***	[0.042]**	[0.030]**	[0.020]**	[0.028]	[0.025]***
α	−0.059	−0.074	−0.002	−0.025	−0.03	−0.003
	[0.038]	[0.049]	[0.060]	[0.031]	[0.038]	[0.042]
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
No. MNCs	241	140	93	381	229	178

*Significant at 10%. **Significant at 5%. ***Significant at 1%.

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three-year window are insignificant here. It is hard to tell whether the insignificance is due to the shrinking number of observations at longer horizon. As one can see in the right-hand side of the table, a comparable result is found when we include the subsequent investments of established multinationals. We have a negative coefficient of comparable magnitude, however, that becomes insignificant at the longer horizon. For MNCs that move to more-advanced countries, there is no such negative effect found, except for the new multinationals when we look at the one-year difference. This effect does not persist, however, for a slightly longer horizon. Compared to the first set of difference-in-difference estimates in Table 8 we see that the slowdown in employment growth of the MNCs going to less-advanced countries seems to be strong enough to make the negative impact on employment growth of FDI, irrespective of direction, significant.

In sum, to the extend that our propensity score matching does not violate conditional independence, moving to less-advanced countries has a negative impact on employment growth that is most easily detected in the short run for new multinationals. As the number of observations diminishes with the expanding time horizon, however, we cannot tell whether the effect diminishes because it does not persist or because we do not have a sufficient number of observations. When focusing on investments in more-advanced countries, no clear tendency is apparent. When including subsequent investments, the results are somewhat weakened.

6. Conclusion

We have investigated the effect of outward FDI on home employment for South Korea, an emerging economy. For emerging economies, outward FDI is a recent phenomenon and many new multinationals have come online in recent years. The latter allows us to explicitly study the impact of these new multinationals on employment by comparing the performance of multinationals and non-multinationals, which is largely absent from the literature that has focused mostly on advanced economies with established multinationals. In addition, our particular South Korean dataset lets us directly link the South Korean parent with the particular destination country of its outward FDI. This helps us differentiate the performance of multinationals by whether they set up affiliates in countries that are more or less advanced than South Korea. In doing so, we take advantage of South Korea's position as a middle-income country that has divided its investment almost evenly across more- and less-advanced nations.

To address issues of endogeneity and self-selection, we take a difference-in-difference approach with propensity score matching. We go through great lengths to guarantee the quality of the matches between investing and non-investing firms by conditioning on a long list of observables before the investment decision and by testing the quality of the match. To the extent that our matches indeed make the investment decision independent of our classification as a an investing or non-investing firm, our estimates suggest that firms that invest in less-advanced countries pay a short-term price in terms of employment growth. Including subsequent investments does not alter this conclusion. At the same time, our findings for firms that venture into more-advanced countries do not show a consistent tendency. In most instances there is no significant impact. Our findings thus support the public anxiety about multinationals only in the short term and only for investments into less-advanced countries. More importantly, our results suggest that any assessment of the impact of multinational activity on the parents' performance should differentiate by destination. If not, there can be a bias in the obtained results that depends on the destination composition of a country's FDI.

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