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# To Whom does Outward FDI Give Jobs?

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## EXECUTIVE SUMMARY

In this paper, we examine the impact of outward foreign direct investment (OFDI) on the overall employment, using Korean industry-level data for the period 2007-2014. We further decompose the effects of OFDI into types of foreign investment and workers' skill levels, separately for each employment status (permanent and temporary), so that we capture whether the MNEs initiating foreign investment prefer to employ temporary instead of permanent workers. Our main findings show that there is little evidence of the impact of OFDI on the overall industry employment of permanent workers, while OFDI is positively associated with the overall employment of temporary workers. Besides, OFDI leads to an increase in the number of jobs created for medium-skilled workers regardless of employment status, whereas there is a negative relationship between OFDI and the temporary employment of low-skilled workers. To be more specific, efficiency-seeking and export-platform-seeking types of OFDI is associated with an increase in the employment of medium-skilled workers.

**Keywords:** Foreign Direct Investment, Industry-level Employment, Skill Level,  
Employment Status

**JEL classification:** F2, J21

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# CONTENTS

Executive Summary .....	3
1. Introduction .....	7
2. Literature Review .....	14
3. Estimation Strategy .....	17
3-1 Data Description .....	17
3-2 Model Specification .....	21
3-3 Econometric Issues .....	24
4. Estimation Results .....	26
4-1 Regular Workers .....	26
4-2 Temporary Workers .....	30
4-3 The Relative Demand between Permanent and Temporary Workers .....	34
5. Concluding Remarks .....	36
Appendix .....	38
References .....	39

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## TABLES

Table 1.	Mapping of major skill levels according to ISCO-o8 .....	19
Table 2.	Summary statistics of the main variables .....	20
Table 3.	The effects of OFDI on regular workers: estimating eqs. (1) and (2) .....	28
Table 4.	The effects of OFDI on regular workers: estimating eq. (4) .....	30
Table 5.	The effects of OFDI on temporary workers: estimating eqs. (1), (2) and (3) .....	32
Table 6.	The effects of OFDI on temporary workers: estimating eq. (4) .....	33
Table 7.	The effects of OFDI on the ratio of regular to temporary workers by skill-level .....	35
Table 8.	The effects of OFDI on the relative demand for regular workers by skill-level .....	38

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## FIGURES

Figure 1.	OFDI-to-GDP ratio (1980 to 2015) .....	18
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# To Whom does Outward FDI Give Jobs?

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## 1. Introduction

Over the past several decades, for multinational enterprises (MNEs), the strategy of using outward foreign direct investment (OFDI) for seeking better business opportunities has played an important role in increasing firms' efficiency and overseas sales. Nevertheless, an increase in outward foreign direct investment has raised public concerns about the possibility of domestic job losses being associated with OFDI. This concern arises because OFDI could transfer some production activities from domestic to foreign affiliates, so that some domestic workers are replaced with foreign labor. With the rise in OFDI, a large number of literatures have focused on a relationship between OFDI and employment in a source country in that multinational enterprises' OFDI is closely linked to the relocation of their productive activities (e.g., Brainard and Riker 2001; Braconier and Ekholm 2000; Becker and Muendler 2008; Bajo-Rubio

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and Diaz-Mora 2015; Amiti and Ekholm 2008; Egger and Egger 2005; Frederico and Minerva 2008). These studies have produced mixed results, however, and there remain many controversies on the impact of OFDI on employment in a source country. This paper attempts to clear up some of these controversies at least in the case of Korea.

The relationship between OFDI and employment in a source country may depend on the forms of foreign direct investment, such as horizontal versus vertical FDI; it also depends on the types of workers involved, in terms of skill level and employment status (permanent or temporary workers). First, horizontal FDI (HFDI), where MNEs duplicate the same production activities across multiple countries, should be distinguished from vertical FDI (VFDI), where MNEs relocate their parts of the primary activities in value chains across different countries.<sup>1</sup> Second, the effect of OFDI on employment varies according to worker skill levels (or the routine content of tasks) in the sense that different production stages or tasks are being moved abroad through OFDI, especially VFDI. Third, firms' overseas investment may have differential effects on domestic employment depending on employment status (that is, permanent or temporary workers) due to the uncertainty about the success of firms initiating FDI and the flexibility of the labor market in the countries in which the FDI takes place.<sup>2</sup>

MNEs tend to make HFDI to lower their costs (e.g., by lowering their transportation costs and avoiding tariffs) and to serve new markets (e.g., to gain easier access to the host-country market). On the one hand, HFDI can have a negative effect on employment in the parent firms because the relocation of entire production activities means that the investing firms' employees are sub-

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<sup>1</sup> According to Porter (1985), these primary activities include inbound logistics, operations, outbound logistics, marketing and sales, and service.

<sup>2</sup> According to Ayumu (2012), firms initiating FDI may prefer to use temporary workers instead of permanent workers when they are unsure to the success of OFDI. Firms that invest abroad may also prefer to employ temporary workers in the frictional labor market in the short run.

stituted with labor found in the new markets abroad. This negative effect can occur if the foreign markets were previously served by exports produced by the MNEs in their home country.<sup>3</sup> On the other hand, HFDI can lead to an increase in employment in the sense that it is related to the higher profitability that comes with the lower costs and strategic gains achieved by relocating production to the host country (see Copenhagen Economics 2010).<sup>4</sup> These cost saving would allow the MNEs to hire more labor at home.

Unlike HFDI, VFDI is mainly driven by production cost differences between countries. In this type of investment, MNEs decide where to locate each stage of production, across multiple countries, so as to minimize production costs.<sup>5</sup> Efficient resource allocation, across multiple countries, through VFDI, allows MNEs to be more productive, which results in a positive effect on their employment at home (i.e., scale effect). In contrast, VFDI replaces part of the MNEs' own production stage at home with production in its foreign affiliates; this leads to less employment at home, since some workers who were previously employed by the MNEs' parent firms are now replaced by foreign labor (e.g., substitution effect). This negative link between VFDI and employment in MNEs' parent firms is feasible if the production activities that are moved to the foreign affiliates abroad formerly took place within the MNEs' parent firms.

Another important aspect to be considered is that the impact of OFDI on employment within MNEs possibly differs across skill levels of their workforce in that different stages or tasks of production activities are outsourced

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<sup>3</sup> In other words, this negative effect can occur because the MNEs and the foreign affiliates produce the same good but serve different markets.

<sup>4</sup> The increases in domestic employment can be also possible through a positive firm-level scale economies in that MNEs are more likely to appear when there exists a relatively high firm-level scale economies combined with a low plant-level of scale economies.

<sup>5</sup> In addition to reducing production costs, VFDI often occurs if MNEs intend to access specialized resources, such as the knowledge and advanced technologies that are abundant in foreign countries. For more details, see Copenhagen Economics (2010).

abroad.<sup>6</sup> In this case, the MNEs' labor force that was previously employed in a certain stage of production, in the domestic market, is now reduced because production is being moved overseas. To be more specific, when MNEs relocate overseas a certain stage of the production chain that is relatively unskilled-labor intensive, then the domestic demand for unskilled labor might decrease. Meanwhile, if the remaining stages of the production chains at home are relatively high-skilled labor intensive, then the relative demand for skilled labor might increase.

Furthermore, the effect of OFDI on employment may vary across types of workers in terms of employment condition, that is, whether employment is permanent or temporary. The impact of OFDI on domestic employment could differ between permanent and temporary workers in that firms initiating FDI may prefer to use temporary workers in order to avoid uncertainty.<sup>7</sup> This phenomenon also can occur due to frictional labor markets within which MNEs increase their numbers of temporary workers in the short run until they find the permanent workers. Thus, in the short run, the impact of OFDI on temporary employment may depend on the flexibility of the labor market in the countries in which the FDI takes place.

Finally, OFDI plays an important role in determining the level of employment in other related firms (e.g., subcontracting firms to MNEs or domestic suppliers) within an industry. The labor market effects of OFDI may go beyond employment within firms that invest abroad. On one hand, OFDI has a negative effect on employment within domestic suppliers, due to input replacement (the substitution of domestic inputs by the inputs of foreign intermediates). On the other hand, other firms within the same industry might ex-

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<sup>6</sup> See Driffield *et al.* (2005), Strauss-Kahn (2003), Helg and Tajoli (2004) for the impact of OFDI on the relative demand for skilled-workers (that is, the ratio of skilled to unskilled workers).

<sup>7</sup> Indeed, Ayumu (2012) examines the OFDI's effect on the composition of the workforces, which is the share of temporary workers, and the author finds that manufacturing firms initiating FDI experience higher growth in their share of temporary workers than do firms that remain domestic.

pect to enjoy an increase in productivity through increased competition and technology spillovers, so that they tend to increase their employment. In this regard, an analysis at the industry-level should be considered in order to fully understand the relationship between OFDI and employment in a source country.<sup>8</sup>

When taking all these facts mentioned above into consideration, it is interesting to use the Korean industry level data in order to examine the role of FDI motives, skill levels, and employment status in shaping the impact of OFDI on domestic employment. First, Korea has experienced a dramatic increase in the OFDI-to-GDP ratio, since 2007; that is, the OFDI-to-GDP ratio has exceeded 2% since 2007. Second, Korea is one of the countries that have a serious rigidity in labor market. Thus, we take advantage of using the Korean data to capture the role of employment status to determine the impact of OFDI on employment. According to OECD statistics, Korea has more stringent employment protection than the OECD average.<sup>9</sup>

In this study, we examine the overall effect of OFDI on employment in Korea using Korean industry-level data for the period of 2007-2014. To accomplish this, we employ data from the Local Area Labor Force Survey (LALFS), provided by Statistics Korea, and the outward FDI data, which we obtained from the Export-Import Bank of Korea. The annual LALFS data provides detailed information on the employment status of any household member 15 years of age and over in a sample of about 190,000 Korean households. The

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<sup>8</sup> Although the industry level employment can be affected by OFDI occurred in different industries through inter-industry linkage like technology spillovers across industries, we focus on the employment of firms within an industry, such as MNEs and the other related firms (e.g, subcontracting firms to MNEs and domestic supplier). See Egger and Egger (2005) and Hijzen and Swaim (2007) where they take into account the employment channels of other firms in a related industry.

<sup>9</sup> In fact, the OECD indicator of the strictness of employment protection for Korea in 2013 is 2.3, which is higher than the OECD average, 2.04. Those indicators of employment protection for the U.S. and Japan are 0.26 and 1.37, respectively, while the indicators for Germany and Sweden are 2.68 and 2.61, respectively.

LALFS data includes information on employment status (permanent, temporary, part-time and self-employed) and occupation, industry and monthly wage. This permits us to decompose the effects of OFDI on employment into both worker skill level and work status. In addition, the industry-level OFDI provides information on the destination countries and the motivations for OFDI, such as market access, reducing production costs (i.e., lower wages), and the acquisition of an export platform etc.<sup>10</sup> These two data sets allow us to analyze the two-dimensional heterogeneous effects of OFDI on employment across motivations for OFDI and worker skill-levels, so that we can emphasize the both roles of the forms of OFDI and the labor skill levels in shaping the impact of OFDI on the home country's employment. Furthermore, we use the information on employment status, such as permanent and temporary workers, to see whether outward FDI involves changes in the share of temporary workers, which is an important issue for both researchers and policy makers to consider.<sup>11</sup> To address the endogeneity issue, we use the system GMM estimator as a dynamic panel analysis.

This paper contributes to the existing literature in the two dimensions. First, we look into the impact of outward FDI on employment at the industry level, taking into consideration two-sided heterogeneity in terms of both the motives for FDI and skill levels of labor force. In contrast to our paper, most previous studies focus on the one-dimensional heterogeneity effect of outward FDI on

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<sup>10</sup> Export-platform-seeking FDI is motivated by a desire to exports to third countries rather than to serve the local market. VFDI for the purpose of reducing production costs should be distinguished from export-platform-seeking FDI in that VFDI is a type of export-platform-seeking FDI, where the exports from foreign affiliates are sent back to the home country. In export-platform type FDI, MNEs tend to contract with foreign affiliates within a trade block and use these affiliates to serve the entire trade block. With NAFTA, for instance, MNEs use foreign affiliates in Mexico as the export platform for the US market. For more details on this topic, see Yeaple (2003) and Moran and Oldenski (2013).

<sup>11</sup> Machikita and Sato (2016) explore a link between the shift from permanent to temporary workers and economic globalization using Japanese manufacturing-level data. The authors found that outsourcing is positively associated with the replacement of permanent with temporary workers.

employment in a sourcing country in terms of either the forms of OFDI or the workers' skill levels. As previously mentioned, an industry level analysis should be considered as it fully captures the relationship between OFDI and domestic employment in the sense that OFDI plays an important role in determining employment in other related firms as well as within the MNEs. The second dimension, which also differs this paper from previous studies, is that we further decompose the labor market impacts of OFDI into workers' employment status: permanent and temporary work. Since the NMEs initiating FDI may prefer to use temporary workers, so as to avoid uncertainty, the impact of OFDI on employment may depend on the working conditions, i.e. permanent or temporary. Therefore, it is necessary to look into the effect of OFDI on the changes in the share of temporary workers, which is an important issue for both researchers and policy makers.<sup>12</sup>

The remainder of this paper is organized as follows. Section 2 provides a brief review of the related literature on the effects of OFDI on domestic employment at the industry level. Section 3 describes the estimation strategy including a description of the data, the model specifications, and some econometric issues. Section 4 and 5 provide the econometric results and a conclusion.

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<sup>12</sup> OECD statistics shows that temporary employment in Korea has increased from 17% of total paid employment, in 2001, to 29% in 2006, which is the fastest rate of growth among OECD countries (Grubb *et al.* 2007). This increase in temporary employment is an important issue for policy makers due to the concern that the temporary nature of work may be closely related to low labor productivity.

## 2. Literature Review

There are two streams of literature on the impact of OFDI on employment. One stream uses firm-level data (Brainard and Riker 2001; Braconier and Ekholm 2000; Berker and Muendler 2008; Konings and Murphy 2006; and Bajo-Rubio and Diaz-Mora 2015, to name of few), and the other stream uses industry-level data (Federico and Minerva 2008; Amiti and Ekholm 2008; Amiti and Wei 2005; Egger and Egger 2005; Hijzen and Swaim 2007). As mentioned earlier, the results at the industry level should be distinguished from those at the firm level in the sense that the other domestic firms (e.g., subcontracting firms to MNEs or domestic suppliers) that are related to the MNEs' production activities can influence the overall impact of outward FDI on the source country's employment. Since this study looks into the overall effects of outward FDI on domestic employment, caused by both MNEs and other related firms, we focus on the literature that is associated with the industry level impact of outward FDI.

Federico and Minerva (2008) use Italian industry level data and find that OFDI is associated with faster local employment growth, relative to the national industry average. Their finding refutes the conventional idea that OFDI destroys local jobs in the home country. Egger and Egger (2005) show that international outsourcing is positively associated with local employment in all industries using data for Austrian manufacturing industries. They also emphasize the role of technology spillover and feedback channels across industries to determine the effects of international outsourcing on employment in the home country.

The OECD (2007) uses data on 26 industries, in 12 OECD countries, for the period 1995-2000, to study the impact of offshoring on domestic industry-level employment.<sup>13</sup> In contrast to the above studies, which emphasize the pos-

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<sup>13</sup> Offshoring is defined as the whole or partial transfer abroad of a production process either to a new foreign affiliate or to an arms-length entity.

itive association between OFDI and home country employment, the OECD (2007) argues that international outsourcing has a negative impact on domestic employment in both the manufacturing and service sectors. To be more specific, the OECD (2007) shows that a one percent increase in offshoring leads to a 0.15 (0.08) percent reduction in employment in the manufacturing (service) sector. Similarly, Hijzen and Swaim (2007) use the same data as the OECD (2007) and find that offshoring within the same industry has no overall impact on industry employment. They point out the substitution effect from offshoring, that is, the number of domestic jobs decreases as a result of replacing by labor abroad, and note that its effect is sufficiently large to completely offset the jobs creation in the domestic market due to the scale effect.<sup>14</sup> Amiti and Ekholm (2008) also show that offshoring related to material inputs has no impact on employment. Further, they assert that a negative effect is more likely to occur in countries with rigid labor markets.

None of these above-mentioned studies deal with the effect of OFDI on employment across skill levels. Although some studies found that OFDI is positively associated with overall employment in the home country, this does not imply that workers across all skill levels can expect to gain from OFDI. When MNEs relocate part of their production activities across multiple countries, this tends to change the skill composition in the home economy. In particular, VFDI (rather than HFDI) is more likely to change the skill composition in the sense that MNEs relocate a specific part of their production activities to capture the efficiencies gained from such production aspects as lower factor costs.<sup>15</sup>

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<sup>14</sup> When inter-industry employment effects are taken into account offshoring, however, may have a positive effect on overall industry employment, which is consistent with the results from Egger and Egger (2005). The findings of Egger and Egger (2005) suggest that, to fully understand the overall impact of OFDI on employment in the home country, it is necessary to take into account the employment channels of other firms in a related industry.

<sup>15</sup> Even though firms using HFDI tend to move all of their production activities to other countries for easier market access (market-seeking purposes), the service and R&D activities at these firms' head-

Some empirical studies look into industry-level data to investigate the impact of OFDI on employment across skill levels (that is, skilled and unskilled labor) or on the relative demand for skilled labor. Using UK industry-level data (that is, OFDI from 11 UK manufacturing industries relocating some production to 13 destination countries), Driffield *et al.* (2005) find that the majority of forms of OFDI have negative effects on the demand for both unskilled and skilled labor. For unskilled labor this negative impact is relatively severe because, for the UK, the aim of OFDI is mainly to achieve lower unit labor costs. Falk and Koebel (2002) examine the effects of the imported inputs and purchased services that are related to international outsourcing on the demand for different skills in manufacturing sectors in Germany. They find no evidence that unskilled labor can be substituted for either imported intermediates or purchased services. Falk and Koebel (2002) show that, unlike unskilled workers, high-skilled workers tend to be a substitute for purchased services.

Imported intermediates are closely linked to the degree of VFDI. With regard to the relative demand for unskilled labor, Strauss-Kahn (2003) uses French manufacturing industry data to examine the effect of imported intermediates, as a share of industry production, on the relative demand for unskilled labor. He finds that international outsourcing is negatively associated with the share of unskilled labor. For example, international outsourcing accounts for 25% of the overall decline in the share of unskilled workers in France. Similarly, Helg and Tajoli (2004) use data on Italy and Germany to quantify the labor-market effects of the international fragmentation of production and, specifically, how it affects the relative demand for skilled workers. They find that the international fragmentation of production is linked to an increase in the ratio of skilled-to-unskilled labor in Italy, whereas in Germany it has no significant impact on the relative demand for skilled labor.

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quarters are relatively more skilled-labor intensive than are their other production activities, and these tend to remain in the home country. In this regard, HFDI is also likely to change the skill structure in the home country.

## 3. Estimation Strategy

### 3-1. Data Description

For our empirical analysis we use three datasets that span the period 2007–2014. These datasets include FDI inflows and outflows and the Local Area Labor Force Survey (LALFS), produced by the Korea National Statistical Office; and the Survey of Mining and Manufacturing, which we obtained from the National Statistical Office of Korea. The dataset on the inflow and outflow of FDI was obtained from the Export-Import Bank of Korea. The industry-level information on OFDI, in this dataset, includes the number of cases of foreign investment, the planned volume, actual volume, destination, purpose of foreign investment, and so on, for the period 1980-2015. By using information on the destination of the individual investment flows, we exclude 14 countries that are tax havens.<sup>16</sup>

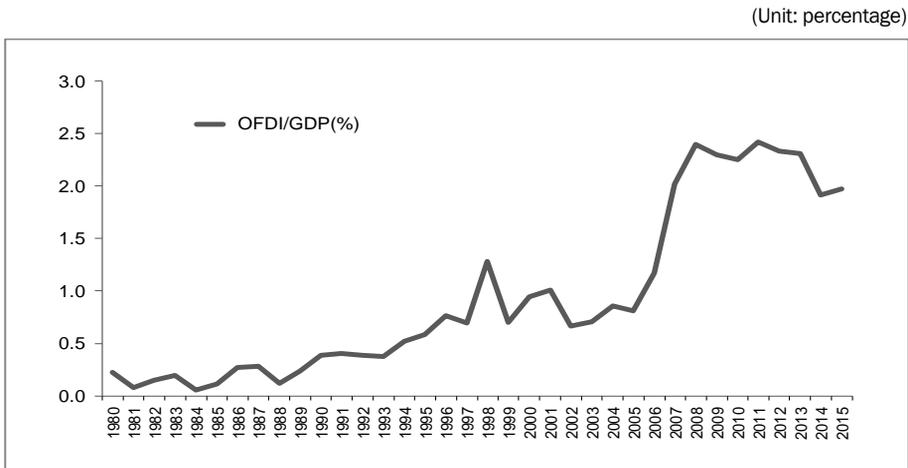
As illustrated in Figure 1, South Korea has experienced a dramatic increase in the OFDI-to-GDP ratio, since 2007; that is, the OFDI-to-GDP ratio has exceeded 2% since 2007 while, before 2007, the ratio was less than 1%.<sup>17</sup> The FDI dataset provides an important advantage in that it specifies the purpose of the individual OFDI flows. This permits us to divide the overall OFDI volume into five categories, exclusively: export-platform-seeking, resource-seeking, efficiency-seeking, market-seeking, and advanced-technology-seeking.

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<sup>16</sup> This paper excludes Bahamas, Bahrain, Belize, British Virgin Islands, Cayman Islands, Dominican Republic, Liberia, Marshall Islands, Monaco, Panama, Saint Lucia, Samoa, Vanuatu, and Solomon Islands.

<sup>17</sup> Korean government announced the deregulation plans on March 2006 to deregulate restrictions on overseas investment for corporate sectors, and it also eliminated all individual limits on foreign investment. As a consequence, outward FDI sharply increased during 2006-2007. In fact, the total amount of OFDI, which was smaller than that of inward FDI until 2007, began to exceed the inward FDI after 2008. See Pardo (2015) for more details.

Figure 1. OFDI-to-GDP ratio (1980 to 2015)



Source: Calculated based on the FDI Statistics of the Export-Import Bank of Korea.

We use the Local Area Labor Force Survey (LALFS) for employment data across industries and occupations. This dataset is composed of household members over 15 years of age in approximately 176,000 households in Korea. After 2013, the household sample size increased to approximately 199,000. As this dataset was originally designed to analyze the specific employment structure by industry and occupation, and it might be representative enough of the Korean labor market for the purposes of this study. This dataset also consists of rich labor market and demographic variables, such as wages, employment by contract type, worker age, years of education, marital status, and so on. Specifically, this paper uses the information on detailed occupation classifications that are broken down according to the Korean Standard Classification of Occupations (KSCO). In order to classify occupations into skill levels provided by ILO (2008), we link KSCO with the International Standard Classification of Occupation (ISCO-08) by using ILO (2008) corresponding table. Skill level is measured using the information on the nature of the work performed, the level of formal education, and the amount of informal on-the-job training and previous experience. As shown in Table 1, we classify occupations into three skill levels

because we are unable to distinguish skill level 4 from skill level 3. To obtain the necessary industrial characteristics, we use the industry-level real shipments (that is, the industry-level real output aggregated across plants) and capital intensity, which we obtain from the Survey of Mining and Manufacturing.

**Table 1. Mapping of major skill levels according to ISCO-08**

ISCO-08 major groups	Skill level	Skill level used in this paper
1 Managers	3+4	Skill 3
2 Professionals	4	Skill 3
3 Technicians and Associated Professionals	3	Skill 3
4 Clerical Support Workers	2	Skill 2
5 Service and Sales Workers	2	Skill 2
6 Skilled Agricultural, Forestry and Fishery Workers	2	Skill 2
7 Craft and Related Trades Workers	2	Skill 2
8 Plant and Machine Operators, and Assemblers	2	Skill 2
9 Elementary Occupations	1	Skill 1

Source: Calculated based on International Labor Organization (2012), p. 14.

We merge these three datasets by using Korea Standard Industry Code (KSIC) Rev. 9 industry classifications. The number of manufacturing industries is about 83. The sample period is 2007-2014. Table 2 shows the summary statistics of the variables in the empirical equations.

**Table 2. Summary statistics of the main variables**

Variable	Definitions	Mean	St. Dev
Log (EMP_all)_regular	Log of the number of the permanent workers in i industry	9.75	1.36
Log (EMP_all)_temp	Log of the number of the temporary workers in i industry	8.20	1.55
Log (Skill 3)_regular	Log of the number of the permanent high-skilled workers in industry i	7.47	2.28
Log (Skill 2)_regular	Log of the number of the permanent medium-skilled workers in industry i	9.34	1.60
Log (Skill 1)_regular	Log of the number of the permanent low-skilled workers with in industry i	6.67	2.06
Log (Skill 3)_temp	Log of the number of the temporary high-skilled workers with in industry i	2.87	3.01
Log (Skill 2)_temp	Log of the number of the temporary medium-skilled workers with in industry i	7.31	2.26
Log (Skill 1)_temp	Log of the number of the temporary low-skilled in workers with in industry i	6.82	2.18
Log (OFDI_all)	Log of the amount of the OFDI flow in industry i	9.56	2.84
Log (export-platform)	Log of the amount of export-platform-seeking OFDI flow in industry i	3.05	2.33
Log (resource-seeking)	Log of the amount of resource-seeking OFDI flow in industry i	0.90	1.48
Log (efficiency-seeking)	Log of the amount of efficiency-seeking OFDI flow in industry i	2.87	2.11
Log (market-seeking)	Log of the amount of market-seeking OFDI flow in industry i	4.14	2.37
Log (technologyseeking)	Log of the amount of technology-seeking OFDI flow in industry i	1.17	1.80
Log (Capital intensity)	Log of the ratio of tangible assets-to-wage expenses in industry i	1.41	0.54
Log (real shipment)	Log of real shipments in industry i	10.86	1.65
Log (real wage)_regular	Log of the average real wage of permanent workers in industry i	0.80	0.21
Log (real wage)_temp	Log of the average real wage of temporary workers in industry i	0.28	0.28
Log (real wage)_r_s3	Log of the average real wage of high-skill permanent workers in industry i	1.09	0.29
Log (real wage)_r_s2	Log of the average real wage of medium-skill permanent workers in industry i	0.81	0.21
Log (real wage)_r_s1	Log of the average real wage of low-skill permanent workers in industry i	0.30	0.22
Log (real wage)_t_s3	Log of the average real wage of high-skill temporary workers in industry i	0.45	0.40
Log (real wage)_t_s2	Log of the average real wage of medium-skill temporary workers in industry i	0.28	0.28
Log (real wage)_t_s1	Log of the average real wage of low-skill temporary workers in industry i	-0.08	0.30

Source: Calculated based on materials from the Export-Import Bank of Korea, FDI Statistics; Korean Statistical Information Service (KOSIS), Statistics Korea, the Local Area Labor Force Survey Online.

### 3-2. Model Specification

For the empirical analysis, we employ a dynamic panel approach to reflect the persistence of industry-level employment. The model specifications based on a dynamic labor demand equation (see Nickell 1986) can be summarized as follows:

#### i) *Baseline model*

$$\ln(n)_{i,t} = \alpha_1 \ln(n)_{i,t-1} + \alpha_2 \ln(w)_{i,t-1} + \beta \ln(OF_{all})_{i,t-1} + X'_{i,t-1} \gamma + \delta_t + \rho_i + \varepsilon_{i,t} \quad (1)$$

where  $\ln(n)_{i,t}$  and  $\ln(n)_{i,t-1}$  are the logarithms of the employment level in industry  $i$  at time  $t$  and  $t-1$ , respectively.  $\ln(w)_{i,t-1}$  refers to the logarithm of the average real wage in industry  $i$  at time  $t-1$ .  $\ln(OF_{all})_{i,t-1}$  is the logarithm of the overall OFDI in industry  $i$  at time  $t-1$ .  $X_{i,t-1}$  represents the set of control variables, including the value of capital intensity and the logarithm of real shipments in industry  $i$  at time  $t-1$ .  $\delta_t$  and  $\rho_i$  are the time- and industry-specific effects, respectively.  $\varepsilon_{i,t}$  is the error term.

Using equation (1), we estimate a dynamic labor demand equation so that we quantify the overall effect of total OFDI on employment at the industry level. To control for industry characteristics, we include the value of capital intensity and the logarithm of real shipments. To deal with endogeneity problem, we employ the lagged values of all the explanatory variables.

#### ii) *Model allowing for the heterogeneous effects of OFDI in terms of the motives for FDI*

$$\ln(n)_{i,t} = \alpha_1 \ln(n)_{i,t-1} + \alpha_2 \ln(w)_{i,t-1} + \beta_1 \ln(OF_a)_{i,t-1} + \beta_2 \ln(OF_b)_{i,t-1} + \beta_3 \ln(OF_c)_{i,t-1} + \beta_4 \ln(OF_d)_{i,t-1} + \beta_5 \ln(OF_e)_{i,t-1} + X'_{i,t-1} \gamma + \delta_t + \rho_i + \varepsilon_{i,t} \quad (2)$$

where  $\ln(OF_a)_{i,t-1}$  is the logarithm of export-platform-related OFDI in industry  $i$  at time  $t-1$ .

The subscripts  $b$ ,  $c$ ,  $d$  and  $e$  refer to resource-seeking OFDI, efficiency-seeking OFDI (i.e., low-wage-seeking), market-seeking OFDI, and advanced-technology-seeking OFDI, respectively.

In equation (2) above, we use FDI data provided by the Export-Import Bank of Korea and decompose the overall industry level of the OFDI into the five types of OFDI that are determined according to the motives of foreign investment. These are export-platform-seeking, resource-seeking, efficiency-seeking, market-seeking, and technology-seeking. This approach is closely related to that of the previous studies on the effects of both vertical and horizontal FDI on employment. Efficiency-seeking OFDI (i.e., to take advantage of abundant low-wage labor) is related to vertical OFDI, while market-seeking FDI is related to horizontal OFDI. As mentioned in the previous sections, regardless of the motives for OFDI, OFDI has both positive and negative effects on the source country's employment, and the overall impact is ambiguous. Indeed, the empirical evidence provided by the previous studies on the impact of OFDI on overall employment in a source country is far from clear, especially in cases of industry-level analyzes.

iii) *Model allowing for the heterogeneous effects of OFDI in terms of skill levels*

$$\ln(n_{s1})_{i,t} = \alpha_1 \ln(n_{s1})_{i,t-1} + \alpha_2 \ln(w_{s1})_{i,t-1} + \beta \ln(OF_{all})_{i,t-1} + X'_{i,t-1} \gamma + \delta_t + \rho_i + \varepsilon_{i,t}, \quad (3a)$$

$$\ln(n_{s2})_{i,t} = \alpha_1 \ln(n_{s2})_{i,t-1} + \alpha_2 \ln(w_{s2})_{i,t-1} + \beta \ln(OF_{all})_{i,t-1} + X'_{i,t-1} \gamma + \delta_t + \rho_i + \varepsilon_{i,t}, \quad (3b)$$

$$\ln(n_{s3})_{i,t} = \alpha_1 \ln(n_{s3})_{i,t-1} + \alpha_2 \ln(w_{s3})_{i,t-1} + \beta \ln(OF_{all})_{i,t-1} + X'_{i,t-1} \gamma + \delta_t + \rho_i + \varepsilon_{i,t}, \quad (3c)$$

where  $\ln(n_{s1})_{i,t}$ ,  $\ln(n_{s2})_{i,t}$ , and  $\ln(n_{s3})_{i,t}$  are the logarithms of the em-

ployment level by each specific skill level (low, medium, and high) in industry  $i$  at time  $t$ , respectively.

As shown in equation (3), we further decompose the overall employment level into three groups, according to skill level, by using ILO (2008) in order to look into the heterogeneous impact of OFDI on employment by skill level. The first group (that is, low-skilled workforce), denoted by  $s1$ , includes elementary occupations. The workforce in this group mainly require simple and routine tasks connected with mining, construction and manufacturing including product sorting, simple hand-assembling of components, and packaging by hand (e.g., see ILO (2008) for more details about the International Standard Classification of Occupations, ISCO). The second group, denoted by the subscript  $s2$ , refers to the medium-skilled workforce, including craftspeople and related trade workers/plants, machine operators, and assemblers. The third group consists of high-skilled labor, which is denoted by the subscript  $s3$  and includes managers/professionals, technicians, associate professionals, clerical support workers, and sales workers.

*iv) Model allowing for two-sided heterogeneity in terms of both FDI motives and skills*

$$\begin{aligned} \text{Ln}(n_{s1})_{i,t} = & \alpha_1 \ln(n_{s1})_{i,t-1} + \alpha_2 \ln(w_{s1})_{i,t-1} + \beta_1 \ln(OF_a)_{i,t-1} \\ & + \beta_2 \ln(OF_b)_{i,t-1} + \beta_3 \ln(OF_c)_{i,t-1} + \beta_4 \ln(OF_d)_{i,t-1} \\ & + \beta_5 \ln(OF_e)_{i,t-1} + X'_{i,t-1}\gamma + \delta_t + \rho_i + \varepsilon_{s,i,t} \end{aligned} \quad (4a)$$

$$\begin{aligned} \text{Ln}(n_{s2})_{i,t} = & \alpha_1 \ln(n_{s2})_{i,t-1} + \alpha_2 \ln(w_{s2})_{i,t-1} + \beta_1 \ln(OF_a)_{i,t-1} \\ & + \beta_2 \ln(OF_b)_{i,t-1} + \beta_3 \ln(OF_c)_{i,t-1} + \beta_4 \ln(OF_d)_{i,t-1} \\ & + \beta_5 \ln(OF_e)_{i,t-1} + X'_{i,t-1}\gamma + \delta_t + \rho_i + \varepsilon_{s,i,t} \end{aligned} \quad (4b)$$

$$\begin{aligned} \text{Ln}(n_{s3})_{i,t} = & \alpha_1 \ln(n_{s3})_{i,t-1} + \alpha_2 \ln(w_{s3})_{i,t-1} + \beta_1 \ln(OF_a)_{i,t-1} \\ & + \beta_2 \ln(OF_b)_{i,t-1} + \beta_3 \ln(OF_c)_{i,t-1} + \beta_4 \ln(OF_d)_{i,t-1} \\ & + \beta_5 \ln(OF_e)_{i,t-1} + X'_{i,t-1}\gamma + \delta_t + \rho_i + \varepsilon_{s,i,t} \end{aligned} \quad (4c)$$

where  $\ln(n_{s1})_{i,t}$ ,  $\ln(n_{s2})_{i,t}$ , and  $\ln(n_{s3})_{i,t}$  are the logarithms of the em-

ployment level by skill level. To be more specific, the subscripts  $s1$ ,  $s2$ ,  $s3$  refer to low-, medium-, and high-skilled workers, respectively.

In equation (4), we allow for the two-sided heterogeneity in terms of both FDI motives and skill levels, so that we capture the fact that the impact of OFDI on the employment can differ by both FDI motives and workers' skill levels.

Lastly, we estimate equations (1) to (4), separately for each type of employment status (permanent or temporary workers) so that we capture whether the MNEs initiating foreign investment prefer to employ temporary instead of permanent workers, which is an important issue for both researches and policy makers.

### **3-3. Econometric Issues**

As noted in section 3.2., this paper specifies the empirical equations (1) to (4) in an industry-level dynamic panel setting. Therefore, we can construct a panel dataset by using information from the LALF that tells us the industry in which the workers are employed, keeping in mind that the LALF is a repeated cross-section at the individual level. We use a panel model because it controls for time-invariant, unobserved industrial characteristics. However, the lagged dependent variable in a dynamic model can be one of the sources that cause endogeneity bias.<sup>18</sup> Omitting the time-variant variables and the simultaneity bias also induces endogeneity bias. For example, if a firm has difficulties finding a sufficient number of workers who meet its quality requirements, it would invest abroad, which implies a reverse causality between OFDI and employment.

We use the system GMM estimator proposed by Blundell and Bond (1998) because the fixed-effects estimator fails to deal with these types of endogeneity

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<sup>18</sup> The fixed-effects estimates of the lagged dependent variable can be severely biased downwards for small sample, as shown by Nickell (1981).

problems. The system GMM estimator combines a set of first-difference equations with lagged levels as instruments, with an additional set of level equations with lagged first-differences as instruments. Compared with the first-difference or the level GMM estimator, the strength of this estimator appears in the small sample. Hayakwa (2007) shows that the system GMM estimator suffers less from finite sample biases than do the first-difference and level GMM estimators. This is because, given that the level GMM estimator has an upward bias and the difference GMM estimator has a downward bias, in the system GMM estimator both biases cancel each other out. Furthermore, the standard error corrections made by Windmeijer (2005) were used to avoid the small sample bias. Since the number of industries is less than 100, the strengths of using the system GMM estimator and the standard error correction are important.

The system GMM estimator should satisfy two necessary criteria, that is, it should test for serial correlation in the first-difference errors and perform a Hansen test for over identifying restrictions. Since a system has first-differences, the first test is to check whether a serial correlation exists among the error terms, as proposed by Arellano and Bond (1991); that is, there should be an autocorrelation at lag 1, but not at lag 2. The standard Hansen test evaluates whether the instruments in this paper are valid.

One possible problem stems from using all of the available moment conditions, which is referred as an overfitting bias. Bowsher (2002) shows that the use of too many instruments in the GMM estimation causes the p-value of the test used for over-identifying the restrictions to be close to one. This implies that the test can lose its power. To correct this problem, this paper reduces the number of instruments by collapsing them (Roodman 2009). This strategy could improve the power of the test for over-identifying restrictions in spite of some efficiency loss of the estimates due to fewer instrument variables.

## 4. Estimation Results

### 4-1. Regular Workers

In evaluating the system GMM estimator in terms of the validity of instruments and the model specifications, this paper finds all three diagnostic statistics, in all of the tables, to be satisfactory. That is, the Hansen test does not reject the over-identification restrictions; and the absence of a first-order serial correlation is rejected, while the absence of a second-order serial correlation is not rejected.

Table 3 presents the results of the system GMM estimator, where we estimate equations (1) to (3) only for a group of regular workers. As can be seen in the first column of Table 3, the lagged employment shows a very high, positive, and statistically significant coefficient at the 1% level, which reveals a high degree of persistence of sectoral employment. In addition, the log of real shipments appears with the expected positive, significant effect, whereas the coefficients of wages and capital intensity are insignificant. Turning to the OFDI variables, these appear to be positive but insignificant. Accordingly, it would seem that the OFDI would not affect the regular workers' overall employment in the domestic labor market. This result is consistent with Hijzen and Swaim (2007) and Amiti and Ekholm (2008).

As shown in the second column of Table 3, FDI outflows have been disaggregated by their five different motives. This allows us to assess whether the impact of OFDI varies, depending on its investment purpose. First, the coefficient of efficiency-seeking OFDI significantly increases the employment of regular workers at the 5% level. The positive relationship between efficiency-seeking FDI and employment indicates that firms in the source country, including the MNEs, expand their overall employment as a result of productivity gains. In other words, the scale effect is large enough to offset the negative impact of the substitution effect. Second, the third-country export-platform-seeking OFDI is also positively and significantly associated with the employ-

ment of permanent workers. According to Moran and Oldenski (2013), export-platform-seeking FDI is more similar to vertical FDI (e.g., efficiency-seeking FDI) than it is to HFDI, in the sense that it fragments production and facilitates trade.<sup>19</sup> The export-platform-type FDI tends to take advantage of low corporate tax rates or abundant inputs (such as cheap labor) in foreign countries, so that the firms that initiate this type of FDI are likely to benefit from productivity gains. It is not surprising that the impact of export-platform-seeking FDI on employment seems to be similar to that of efficiency-seeking FDI.

The last three columns in Table 3 present the results of estimating equation (3), using a sample of regular workers. The table shows that OFDI has a positive impact on the overall employment of permanent workers with medium-level skills (skill group 2) and that this is significant at the 5% level. There is no significant relationship between OFDI and overall employment when taking the low-skilled (skill group 1) and high-skilled workers (skill group 3) into account. It should be noted that the labor force in skill group 2 (workers with medium-level skills) mainly performs tasks that are related to working in plants; for example, as machine operators, craftspeople, and assemblers.<sup>20</sup>

In contrast to the medium-skilled labor group, the high-skill group, which includes managers, senior officials and legislators (occupations whose main tasks require a high level of professional knowledge and skill level), are not influenced by an increase in OFDI. This result may indicate that firms' productivity gains are not enough to create jobs that require a high level of skill. Similarly, there is no evidence to show that OFDI has statistically significant impact

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<sup>19</sup> As an example of export-platform-seeking FDI, Moran and Oldenski (2013) mention that Ireland was one of popular locations, due to its low corporate tax rates and close proximity to EU markets. Motta and Norman (1996) develop a theoretical model of export-platform-seeking FDI, in which Free Trade Areas (FTAs) promote this type of FDI.

<sup>20</sup> The medium-skill group includes clerical support workers; service and sales workers; skilled agricultural, forestry, and fishery workers; craftspeople and related trades workers; plant and machine operators; and assemblers who require some skills at the second ISCO skill level (i.e., an education level that begins at the age 14 or 15 and lasts about three years). For more detail, see ILO (2008).

on elementary occupations in the first group; that is, the one where workers require skills at the first ISCO skill level (i.e, a primary education level). This result is inconsistent with a prevalent view that an increase in OFDI would crowd out domestic production activities, especially those that entail unskilled routine tasks, and that this results in a reduction in the number of jobs in the domestic market for unskilled labor. These insignificant effects may appear because the aggregate values of all types of OFDI are considered in the pooled regression. Thus, we need to further examine how the impact of OFDI on employment varies, depending on both the workers' skill levels and the motives for FDI, which are shown in the following table.

**Table 3. The effects of OFDI on regular workers: estimating eqs. (1) and (2)**

	Eq. (1) Overall	Eq. (2) Overall	Eq. (3c) Skill 3	Eq. (3b) Skill 2	Eq. (3a) Skill 1
Dep (t-1)	0.515*** (0.111)	0.786*** (0.059)	0.221 (0.162)	0.593*** (0.088)	0.597** (0.267)
Log (OFDI_all) (t-1)	0.002 (0.014)		-0.031 (0.047)	0.033** (0.015)	0.029 (0.114)
Log (OFDI_export-platform) (t-1)		0.026* (0.014)			
Log (OFDI_resource-seeking) (t-1)		-0.028 (0.024)			
Log (OFDI_efficiency-seeking) (t-1)		0.035** (0.017)			
Log (OFDI_market-seeking) (t-1)		0.015 (0.021)			
Log (OFDI_technology-seeking) (t-1)		0.004 (0.020)			
Log (capital intensity) (t-1)	-0.050 (0.108)	-0.011 (0.109)	-0.433 (0.688)	-0.352** (0.173)	-1.554* (0.863)
Log (real shipment) (t-1)	0.268*** (0.061)	0.121** (0.046)	0.424*** (0.116)	0.316*** (0.085)	0.797*** (0.287)
Log (real wage) (t-1)	0.231 (0.212)	-0.157 (0.211)	0.039 (0.266)	-0.175 (0.222)	-0.973 (0.906)
Year / Industry fixed effects	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
AR(1)/AR(2)	0.04/0.147	0.01/0.103	0.02/0.30	0.01/0.09	0.02/0.52
Hansen	0.198	0.752	0.659	0.405	0.336
Number of ksic_3d	81	81	80	81	80
Observations	486	486	457	486	447

Note: <sup>a</sup>: Robust standard errors are reported in brackets. Significant variables at the 10%, 5%, and 1% significance levels are marked with \*, \*\* and \*\*\*, respectively.

<sup>b</sup>: This system-GMM uses the 'collapse' option of STATA in order to avoid overfitting the biases.

Table 4 reports the results of equation (4), using a sample of regular workers. For workers with medium-level skills, both export-platform- and efficiency-seeking FDI are positively associated with employment. In contrast, the other forms of FDI, such as resource-, market-, and better-technology-seeking FDI, have a negative and insignificant effect on the employment of medium-skilled workers. As shown in Table 3, OFDI has a positive impact on the overall employment of medium-skilled workers. This is mainly due to export-platform- and efficiency-seeking types of FDI, which are closely related to VFDI.

The export-platform-type FDI leads to an increase in high-skilled jobs in the domestic market, while the other forms of FDI have no measurable impact on the employment of high-skilled labor here. This increase in the demand for high-skilled workers in the domestic market indicates that firms that invest abroad, through export-platform-seeking FDI, tend to relocate certain parts of their primary activities, in their value chains that require lower-skilled workers who can perform tasks that require less skill. Consequently, the productivity gains (the scale effect) that occurs through this type of FDI leads to an increase in demand for high-skilled workers in the domestic market.

The type of FDI that aims to improve technology leads to an increase in the employment of low-skilled workers, while the other types of FDI have no statistically significant impact on the employment of this group of workers. The consequent increase in demand for low-skilled jobs may imply that the MNEs that are investing abroad for the purpose of technology advancement tend to transfer high-skill-related tasks abroad, so that the benefit related to efficiency gains (the scale effect) that are obtained from this type of FDI will go to low-skilled workers (e.g., an increase in demand for low-skilled workers).<sup>21</sup> In contrast to the medium-skill group, efficiency-seeking FDI does not impact em-

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<sup>21</sup> It should be noted that the domestic employment of low-skilled workers has a positive relationship with OFDI, but the relationship is weak and is only significant at 10% level, so that one should use caution when interpreting a relationship between these two variables.

ployment in elementary occupations that require the lowest level of skill, such as workers who do product sorting and simple hand assembling of components. This is because these MNEs tend to seek cheap labor abroad, which substitutes for the low-skilled labor at home and this substitution effect from OFDI is sufficiently large to completely offset the jobs creation in the domestic market (that is, a positive scale effect).

**Table 4. The effects of OFDI on regular workers: estimating eq. (4)**

VARIABLES	Eq. (4c) Skill 3	Eq. (4b) Skill 2	Eq. (4a) Skill 1
Dep (t-1)	0.340**(0.152)	0.491***(0.103)	0.522**(0.209)
Log (OFDI_export-platform) (t-1)	0.078**(0.039)	0.042*(0.023)	0.024(0.088)
Log (OFDI_resource-seeking) (t-1)	-0.033(0.044)	-0.012(0.031)	-0.005(0.085)
Log (OFDI_efficiency-seeking) (t-1)	0.008(0.031)	0.055**(0.023)	0.059(0.080)
Log (OFDI_market-seeking) (t-1)	-0.040(0.045)	-0.008(0.021)	-0.040(0.084)
Log (OFDI_technology-seeking) (t-1)	0.0004(0.041)	-0.018(0.026)	0.092*(0.049)
Log (capital intensity) (t-1)	-0.668(0.652)	-0.301**(0.118)	-0.592(0.782)
Log (real shipment) (t-1)	0.437***(0.089)	0.356***(0.084)	1.215***(0.405)
Log (real wage) (t-1)	0.133(0.250)	-0.109(0.202)	0.558(0.479)
Year / Industry fixed effects	Yes/Yes	Yes/Yes	Yes/Yes
AR(1)/AR(2)	0.013/0.484	0.013/0.103	0.009/0.307
Hansen	0.368	0.928	0.385
Number of ksic_3d	80	81	80
Observations	457	486	447

Note: <sup>a</sup>: Robust standard errors are reported in brackets. Significant variables at the 10%, 5%, and 1% significance levels are marked with \*, \*\* and \*\*\*, respectively.

<sup>b</sup>: This system-GMM uses the 'collapse' option of STATA in order to avoid overfitting the biases.

## 4-2. Temporary Workers

Table 5 presents the results of estimating equations (1) to (3), using the system GMM estimator on a sample of temporary workers. Interestingly, OFDI is positively associated with temporary jobs; this is shown in the first column of

Table 5. Note that OFDI has no effect on the overall employment of permanent workers (e.g., see Table 3). These results are consistent with the fact that firms initiating FDI may prefer to use temporary workers in order to avoid uncertainty. Note that the log of capital intensity appears with the expected negative and significant effect, whereas the coefficient of real shipments is positive and significantly different from zero, as expected.

The second column in Table 5 shows that efficiency-seeking and export-platform-seeking FDI lead to an increase in the overall employment of temporary workers. As mentioned in the previous subsection (e.g., see Table 3), both efficiency-seeking and export-platform-seeking FDI are also positively related to the overall employment of permanent workers. However, it should be noted that these types of FDI result in an increase in the relative demand for temporary workers, which we will address later, in Table 8. Additionally, capital intensity significantly reduces the employment level of temporary workers, at the 1% level, while the log of real shipments appears with the expected positive and significant effect. The average real wage has insignificant effects on the employment level of temporary workers.

Columns 3 to 5 in Table 5 present the results of the system GMM estimator on equation (3), using a sample of temporary workers, where we see different OFDI impacts on employment, across different skill levels. Here, OFDI is positively associated with the overall employment of medium-skilled labor. This is consistent with the results from the sample of regular workers.

OFDI, however, has a negative impact on the overall employment of low-skilled temporary workers. Note in Table 3 that OFDI has no significant effect on the permanent employment of low-skilled labor. These results can be interpreted as indicating that the cheap, unskilled labor within foreign affiliates tends to substitute for temporary rather than permanent workers at home. Lastly, there is no evidence to show that OFDI has statistically significant impact on the overall employment of high-skilled workers at home, which is consistent with the results from the sample of regular workers.

**Table 5. The effects of OFDI on temporary workers: estimating eqs. (1), (2) and (3)**

VARIABLES	Eq. (1) Overall Emp.	Eq. (2) Overall Emp.	Eq. (3c) Skill 3	Eq. (3b) Skill 2	Eq. (3a) Skill 1
Dep (t-1)	0.459*** (0.162)	0.417*** (0.126)	0.762** (0.331)	0.476* (0.248)	0.819*** (0.157)
Log (OFDI_all) (t-1)	0.135** (0.064)		-0.179 (0.311)	0.124** (0.059)	-0.090* (0.047)
Log (OFDI_export-platform) (t-1)		0.093* (0.050)			
Log (OFDI_resource-seeking) (t-1)		0.166 (0.120)			
Log (OFDI_efficiency-seeking) (t-1)		0.075* (0.041)			
Log (OFDI_market-seeking) (t-1)		-0.040 (0.035)			
Log (OFDI_technology-seeking) (t-1)		-0.085 (0.112)			
Log (capital intensity) (t-1)	-0.706* (0.418)	-0.793*** (0.283)	-1.551 (0.960)	-1.719** (0.767)	-0.561 (0.496)
Log (real shipment) (t-1)	0.473* (0.263)	0.465*** (0.165)	1.152*** (0.387)	1.025*** (.221)	0.240** (0.119)
Log (real wage) (t-1)	0.095 (0.289)	0.181 (0.234)	-0.284 (1.017)	-0.089 (0.581)	0.133 (0.683)
Year / Industry fixed effects	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
AR(1)/AR(2)	0.045/0.45	0.045/0.55	0.049/0.74	0.01/0.41	0.00/0.70
Hansen	0.226	0.834	0.251	0.259	0.192
Number of ksic_3d	81	81	69	81	80
Observations	469	469	234	469	435

Note: <sup>a</sup>: Robust standard errors are reported in brackets. Significant variables at the 10%, 5%, and 1% significance levels are marked with \*, \*\* and \*\*\*, respectively.

<sup>b</sup>: This system-GMM uses the '*collapse*' option of STATA in order to avoid overfitting the biases.

Finally, Table 6 shows how the impact of OFDI on employment differs across both FDI motives and workers' skill levels. In a group of medium-skill workers (e.g., see the second column in Table 6), efficiency-seeking FDI has a positive impact on employment, whereas the other forms of FDI have no effect on employment. This indicates that the scale effect, from employing cheap labor abroad, is larger than the substitution effect. Note that this positive effect is larger in a sample of temporary workers compared to a group of regular

workers, which implies that MNEs prefer to hire temporary rather than full-time employees, in order to avoid uncertainty.

In contrast, market-seeking FDI is negatively associated with the temporary employment of low-skilled workers (skill group 1). Notice that these low-skilled workers consist of those who perform routine tasks, such as the simple hand assembling of components that mainly require the use of hand-held tools and some physical effort. Market-seeking FDI leads to the reduced employment of low-skilled workers at home as these workers are replaced by unskilled labor abroad. Temporary unskilled workers at home tend to be easily substituted with unskilled labor abroad because there is no significant relationship between OFDI and the employment of regular unskilled workers. Lastly, with the exception of technology-seeking FDI, OFDI has nothing to do with the temporary employment of high-skilled workers in domestic markets.

**Table 6. The effects of OFDI on temporary workers: estimating eq. (4)**

VARIABLES	Eq. (4c) Skill 3	Eq. (4b) Skill 2	Eq. (4a) Skill 1
Dep (t-1)	0.698(0.432)	0.478**(0.223)	0.484(0.262)
Log (OFDI_export-platform) (t-1)	-0.015(0.187)	0.093(0.064)	0.054(0.083)
Log (OFDI_resource-seeking) (t-1)	0.185(0.162)	0.090(0.062)	-0.079(0.052)
Log (OFDI_efficiency-seeking) (t-1)	-0.029(0.185)	0.139**(0.063)	-0.031(0.070)
Log (OFDI_market-seeking) (t-1)	0.135(0.288)	-0.052(0.065)	-0.162*(0.094)
Log (OFDI_technology-seeking) (t-1)	0.311**(0.153)	0.067(0.050)	0.171(0.128)
Log (capital intensity) (t-1)	-2.042***(0.555)	-1.549***(0.588)	-0.760(0.921)
Log (real shipment) (t-1)	0.565(0.364)	1.111***(0.259)	0.631**(0.252)
Log (real wage) (t-1)	0.160(0.734)	-0.219(0.467)	-0.142(0.392)
Year / Industry fixed effects	Yes/Yes	Yes/Yes	Yes/Yes
AR(1)/AR(2)	0.040/0.675	0.012/0.627	0.003/0.626
Hansen	0.839	0.444	0.335
Number of ksic_3d	69	81	80
Observations	234	469	435

Note: <sup>a</sup>: Robust standard errors are reported in brackets. Significant variables at the 10%, 5%, and 1% significance levels are marked with \*, \*\* and \*\*\*, respectively.

<sup>b</sup>: This system-GMM uses the 'collapse' option of STATA in order to avoid overfitting the biases.

### 4-3. The Relative Demand between Permanent and Temporary Workers

It is interesting to note the type of workers a firm hires in response to OFDI. To determine this, we look into the impact of OFDI on the relative demand for permanent workers (that is, the employment ratio of permanent-to-temporary workers within each skill group).

Table 7 shows that the impact of OFDI on the ratio of permanent-to-temporary workers varies with the workers' skill level and the form of FDI. First, OFDI does not affect this ratio in a group of high-skilled workers, and it occurs regardless of the forms of FDI. Second, efficiency-seeking FDI leads to a decrease in the ratio of permanent-to-temporary medium-skill-level workers, which is consistent with the results from Tables (4) and (6). This fact together with the results from Tables (4) and (6) implies that, rather than hiring permanent workers, efficiency-seeking FDI firms, that is, those that aim to achieve higher productive efficiency through lower factor costs, prefer to use temporary labor because of uncertainty or the flexibility of the labor market. Similarly, efficiency-seeking FDI has a negative impact on the ratio of permanent-to-temporary low-skill-level workers. However, it should be noted that efficiency-seeking FDI has no statistically significant impact on low-skilled jobs regardless of employment status, which shown in Tables (4) and (6).<sup>22</sup>

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<sup>22</sup> See Table 8 in Appendix for the impact of OFDI on the relative demand for skilled workers (for example, the employment ratio of high-to-medium-skilled labor). According to Table 8 in Appendix, there are no significant effects of OFDI on the demand for high-skilled relative to the lowest-skilled workers, which is consistent with Marcolin *et al.* (2016). As noted by Marcolin *et al.* (2016), some empirical evidence suggests that some low-skill tasks can be complementary to high-skill ones. Second, export-platform-seeking FDI leads to an increase in the high-to-medium-skilled work employment ratio, while other forms of FDI have no significant impact. Third, an interesting finding is that efficiency-seeking FDI has a positive effect on the employment ratio of medium-to-low-skilled workers.

**Table 7. The effects of OFDI on the ratio of regular to temporary workers by skill-level**

VARIABLES	Ratio of regular/temporary		
	Skill level 3	Skill level 2	Skill level 1
Dep (t-1)	-0.091(0.162)	0.075(0.105)	0.194**(0.082)
Log (OFDI_export-platform) (t-1)	0.054(0.105)	-0.035(0.034)	0.018(0.036)
Log (OFDI_resource-seeking) (t-1)	-0.085(0.154)	0.015(0.061)	0.057(0.036)
Log (OFDI_efficiency-seeking) (t-1)	-0.074(0.120)	-0.086**(0.035)	-0.097**(0.042)
Log (OFDI_market-seeking) (t-1)	-0.029(0.135)	0.023(0.033)	0.008(0.038)
Log (OFDI_technology-seeking) (t-1)	0.043(0.074)	-0.013(0.025)	-0.036(0.027)
Log (capital intensity) (t-1)	-0.953(0.750)	0.105(0.301)	-0.284(0.393)
Log (real shipment) (t-1)	0.612(0.375)	0.174(0.132)	0.008(0.157)
Log (real wage) (t-1)	0.105(0.289)	0.032(0.227)	-0.026(0.188)
Year / Industry fixed effects	Yes/Yes	Yes/Yes	Yes/Yes
AR(1)/AR(2)	0.02/0.72	0.01/0.23	0.00/0.12
Hansen	0.997	0.437	0.582
Number of ksic_3d	47	79	73
Observations	165	456	400

Note: <sup>a</sup>: Robust standard errors are reported in brackets. Significant variables at the 10%, 5%, and 1% significance levels are marked with \*, \*\* and \*\*\*, respectively.

<sup>b</sup>: This system-GMM uses the 'collapse' option of STATA in order to avoid overfitting the biases.

## 5. Concluding Remarks

Over the past few decades, outward FDI has been considered MNEs' strategy for seeking better business opportunities abroad and for improving production efficiency. Nevertheless, an increase in outward foreign direct investment has raised public concerns about the possibility of domestic job losses being associated with OFDI. This concern arises because OFDI could transfer some production activities from domestic to foreign affiliates, so that some domestic workers are replaced with foreign labor. With rising public concern over this matter, a large number of literatures have examined the relationship between OFDI and employment in the source country. However, there are still many controversies on its impact on domestic employment. In fact, the relationship between OFDI and employment in the source country varies by type of investment (i.e. efficiency-seeking, resource-seeking, technology-seeking, market-seeking, export-platform-seeking), skill level (low, medium and high) and work status (temporary or permanent).

We analyzed the impact of outward FDI on employment in the source country, using data on 83 manufacturing industries for Korea, for the period 2007-2015. First, we differentiated the effects of OFDI on overall employment, according to the type of OFDI, which is determined by investment motive. Second, we analyzed the impact of OFDI on employment separately for each workforce skill level. We further decomposed the effect of OFDI on employment into employment by work status, i.e. temporary or permanent.

Our main finding is that there is little evidence to show that OFDI has statistically significant impact on the overall employment of regular workers, while it is positively associated with the overall employment of temporary workers. These results possibly indicate that the MNEs initiating FDI prefer to employ temporary workers so as to avoid uncertainty. Furthermore, the impact of OFDI on employment differs across FDI motives and worker skill levels. First,

both efficiency-seeking and export-platform-seeking types of OFDI have a positive impact on overall employment, regardless of the workers' employment status, while other forms of OFDI have no measurable impact on employment. Second, OFDI leads to an increase in jobs for medium-skilled workers, regardless of work status, whereas it is negatively associated with the employment of low-skilled temporary workers. It should be noted that there is no relationship between OFDI and the employment of high-skilled workers, regardless of work status.

Finally, market-seeking FDI has a negative impact on the employment of low-skilled temporary workers, while it has no significant impact on the employment of permanent workers. For medium-skilled workers, efficiency-seeking-type FDI leads to an increase in employment of both regular and temporary workers. For high-skilled workers, only export-platform-seeking FDI leads to an increase in permanent jobs, while only technology-seeking FDI increases temporary jobs.

To conclude, OFDI has no effect or only a slightly positive effect on sectoral employment, in Korea, in that i) market-seeking FDI, which is the most common motivation of the outward FDI issued by the Korean MNEs, has no impact on domestic employment at the industry level, and ii) both efficiency-seeking and export-platform-seeking types of OFDI are positively associated with employment, regardless of employment status. Another robust finding is that these positive effects (that is, the effects on employment of efficiency-seeking and export-platform-seeking FDI) are larger on temporary than permanent workers. This confirms the fact that MNEs initiating foreign investment prefer to employ temporary rather than permanent workers, which can be explained by two reasons: the uncertainty about the success of firms initiating FDI and the flexibility of the labor market in the countries in which the FDI takes place.

## APPENDIX

**Table 8. The effects of OFDI on the relative demand for regular workers by skill-level**

VARIABLES	Relative Demand		
	S3/S2	S3/S1	S2/S1
Dep (t-1)	0.016(0.096)	0.226*(0.116)	0.229(0.142)
Log (OFDI_export-platform) (t-1)	0.065***(0.023)	-0.008(0.047)	-0.020(0.057)
Log (OFDI_resource-seeking) (t-1)	0.042(0.035)	0.017(0.048)	-0.158**(0.077)
Log (OFDI_efficiency-seeking) (t-1)	0.012(0.028)	0.050(0.039)	0.136**(0.054)
Log (OFDI_market-seeking) (t-1)	-0.003(0.028)	-0.020(0.056)	0.048(0.070)
Log (OFDI_technology-seeking) (t-1)	0.003(0.022)	-0.011(0.027)	0.052(0.054)
Log (capital intensity) (t-1)	0.071(0.284)	0.498(0.494)	0.347*(0.194)
Log (real shipment) (t-1)	-0.042(0.103)	0.104(0.175)	0.089(0.151)
Log (real wage) (t-1)	0.233(0.259)	0.331(0.227)	0.708(0.547)
Year / Industry fixed effects	Yes/Yes	Yes/Yes	Yes/Yes
AR(1)/AR(2)	0.00/0.19	0.00/0.20	0.00/0.11
Hansen	0.651	0.550	0.865
Number of ksic_3d	80	76	77
Observations	455	420	430

Note: <sup>a</sup>: Robust standard errors are reported in brackets. Significant variables at the 10%, 5%, and 1% significance levels are marked with \*, \*\* and \*\*\*, respectively.

<sup>b</sup>: This system-GMM uses the '*collapse*' option of STATA in order to avoid overfitting the biases.

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## 국문요약

본 연구는 2007~14년 중 발생한 해외직접투자(outward FDI)와 지역별고용조사 자료를 이용하여 해외직접투자가 국내 노동시장의 숙련도별(high, middle, low-skill), 고용형태별(정규직, 비정규직 근로자) 일자리에 미치는 영향을 분석하였다. 이를 위해 산업수준 고용의 동태적 모형을 구축하고 Dynamic System GMM 기법을 이용하여 추정하였다. 대부분의 선행연구가 근로자의 이질성을 고려하지 않고 해외직접투자가 전체 고용에 미치는 영향을 분석하고 있는 반면, 본 연구는 해외직접투자의 유형별 이질성뿐 아니라 근로자의 이질성을 동시에 고려하고 있다는 점에서 기존연구와 차별된다. 또한 노동시장의 경직도가 상대적으로 높은 한국의 경우 해외직접투자가 고용형태별 일자리에 미치는 영향은 타 국가와 다를 수 있다는 점에서 본 연구가 갖는 의미가 크다. 실증분석 결과, 해외직접투자는 비정규직 근로자에 대한 수요를 증가시키는 반면, 해외직접투자가 정규직 고용에 미치는 효과는 거의 없는 것으로 나타났다. 해외직접투자와 숙련도별 일자리 간 관계를 분석한 결과, 해외직접투자의 증가는 고용형태와 관계없이 중숙련 근로자(middle-skilled workers)의 일자리를 증가시키는 것으로 조사됐다. 반면 해외직접투자가 고숙련(high-skilled) 및 저숙련(low-skilled) 근로자의 일자리에 미치는 영향은 거의 없는 것으로 나타났다. 특히 저임금 활용(efficiency-seeking) 및 제3국 수출 목적(export-platform-seeking) 해외직접투자의 경우 중숙련 근로자에 대한 국내 수요를 증가시키는 효과가 큰 것으로 분석됐다.

**핵심용어:** 해외직접투자, 노동숙련도, 임시직, 정규직 근로자

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