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# Does FDI Affect Domestic Employment in OECD Countries?

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## Abstract

To verify the employment impact of two-directional FDI, the study analyzes panel data composed of 26 OECD countries from 2006 to 2018 by using the system GMM. Furthermore, we decompose domestic employment into types of industries and skill compositions to identify the heterogeneous employment impact. The results show that inward and outward FDI at lag one period promote domestic employment at the overall level. In terms of workers' skill levels, lagged inward FDI significantly persistently promotes high-skilled workers' employment, likewise, the positive employment impact also appears with a time lag in low-skilled labor subgroups. Outward FDI, on the other hand, initially inhibits both high- and low-skilled labor demand, but then changes to a positive effect in the high-skilled labor subgroups. Although there is a time difference between inward and outward FDI, it has a significant and positive impact on employment in the manufacturing and service industries. The results indicate that the relationship between manufacturing and service employment is a mutual substitute. To attract international investors, governments should promote a favorable investment climate and maintain stable economic growth. Because low-skilled labor is more susceptible to changes in FDI, policy measures are required to ensure employment stability.

**Keywords:** FDI, Employment, Skill Levels, System GMM

**JEL Classification Code:** B22, C23, J23

## 1. Introduction

As one of the forms of internationalization, foreign direct investment (after this referred to as FDI) causes tremendous changes in the home and host countries' labor markets; it has also become an issue of increasing concern for economists and policymakers. To maximize profits, multinational enterprises (after this referred to as MNEs) split and reconfigure production processes based on global value chains, thereby promoting international trade and FDI. MNEs are primarily headquartered in these high-income economies: OECD countries. These countries dominate the fragment and reconfiguration of production processes because most of them are at the front end of global value chains. According to OECD international direct investment statistics released in 2019, we know that total outward FDI stocks (23,791,799 million dollars) are larger than inward FDI stocks (21,864,604 million dollars) until 2018. It illustrates that MNEs in these countries seem to be more inclined to control the production activities' relocation through outward FDI.

In the light of the link between FDI and employment, it affects domestic employment in several ways. In the case of inward FDI, it delivers a new investment project directly to the host country, resulting in increased domestic employment through increased investment in productive activities. Furthermore, the technology spillover effect of inward FDI may boost productivity, hence increasing domestic labor demand indirectly (Marelli et al., 2014). Most studies that looked at the relationship between inward FDI and domestic employment found that inward FDI had a positive employment impact at a micro-level.

Outward FDI, on the other hand, has had an ambiguous influence on employment. On the one hand, outward FDI

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combined with the transfer of some productive activities has resulted in a contraction of domestic productive activities, lowering domestic labor demand. Outward FDI hurts domestic employment, according to Huijie (2018), Debaere et al. (2010), and Harrison and McMillan (2011), who studied Japan, Korea, and the United States, respectively. MNEs, on the other hand, can reduce transportation costs and avoid tariffs by engaging in horizontal outward FDI, resulting in lower trade costs, getting strategic advantages, and boosting product profitability. The cost-saving would allow them to hire more labor in the home country (Kang & Whang, 2018). Bajo-Rubio and Diaz-Morza (2015) and Kang and Whang (2018) provide empirical evidence from the case of Italy and Korea.

Depending on the literature review, there is still no consensus on the relationship between FDI and domestic employment based on different national or industrial characteristics. As a result, verifying them is still important and helpful. Indeed, we do not deny that correctly grasping the impact of FDI on the labor market at the macro level is challenging, as it may be influenced by multiple factors at the same time, such as skill levels, industries, or institutions, which resulted in the majority of studies have focused on micro-level analysis. Scientific macro studies, indeed, are better suited to providing policy suggestions than micro investigations.

Unlike the previous studies, we attempt to observe the employment impact of FDI on a macro-level. For this, we use the system GMM model to examine panel data from 26 OECD nations from 2006 to 2018 by applying a dynamic labor demand function. Due to these countries' characteristics of the national economy may be with high development levels, the results we reach are unlikely to apply to other emerging countries. As a result, the contribution of our research is to examine the employment impact of FDI by subdividing groups based on industries and skill compositions to account for the heterogeneous labor demand, which was not taken into account previously.

The structure of this paper is as follows: Section 2 reviews the literature about the impact of FDI on domestic employment; Section 3 develops the model specification, data description, and econometric issues; Section 4 shows the empirical results; Section 5 presents the conclusion.

## 2. Literature Review

### 2.1. The Impact of Inward FDI on Domestic Employment

There are many reasons for attracting inward FDI. It can bring capital and technology to the recipient countries' firms and industries, thus promoting domestic employment and average productivity (Hale & Xu, 2016). In more detail, for every new investment project, regardless of the origin of the investors, promoting domestic employment through the expansion of investment in production facilities requires new labor (Marelli et al., 2014). Brincikova and Darmo (2013) concluded that the employment impact of inward FDI depends on its form of entering the host country. Greenfield investment would have a favorable impact on employment, but M&A would have a negative impact. However, they are unable to produce empirical evidence of a significant positive influence between 1993 and 2012 in the V4 nations (Czech Republic, Poland, Hungary, and Slovakia). Later, Lee and Park (2020) use firm-level data from 20 Korean industries to show that inward greenfield FDI has a beneficial impact on industry employment.

Meanwhile, Jude and Silaghi (2016) analyzed panel data composed of 20 Central and Eastern European countries from 1995 to 2012 with a dynamic labor demand model. They reveal that FDI inflows lead to an initial negative employment effect because of the labor-saving techniques. Then, the progressive vertical integration of foreign affiliates into the local economy eventually converges toward a positive long-run impact in EU countries only. Also, Schmerer (2014) uses data from 19 OECD countries and finds a negative relationship between net FDI flow and unemployment.

Moreover, some studies focus on a specific single country. Wong and Tang (2011) applied ARDL to examine the causality relationship between inward FDI and domestic employment in Singapore's manufacturing and services sectors, revealing that inward FDI promotes the manufacturing sector's employment in the long run. Since these sectors mutually support, the services sector's employment can complement the manufacturing industry. Additionally, Saucedo et al. (2020) used quarterly panel data composed of 32 Mexican states from 2005 to 2018, finding that inward FDI only positively affects the manufacturing sector employment and has no obvious impact on the service sector.

A technology spillover effect may indirectly improve the recipient countries' productivity efficiency and then changes in local labor demand and economic growth (Driffield & Taylor, 2000, Hoang et al., 2021, Lee & Xuan, 2019). Marelli et al. (2014) first divide the EU regions into four parts as dummy variables to control for similar labor market features and institutions, then they introduced a new explanatory variable to capture the FDI-induced indirect effects on employment. The findings show that while the total positive employment effect in EU regions is small, the indirect employment effect is significant and positive.

### 2.2. The Impact of Outward FDI on Domestic Employment

The impact of outward FDI on employment can be described in two ways. On the one hand, the transfer of

some manufacturing facilities to other nations would lower home production and undermine domestic jobs, which is mostly occurring in developed countries. After controlling for domestic output and the real wage variables, Molnar et al. (2008) concluded that outward FDI improves domestic employment in 11 OECD nations using panel data from eight industrial sectors and five service sectors.

Similarly, Huijie (2018) tested the employment impact of outward FDI in Japan's manufacturing sector. The finding illustrates that outward FDI causes a decrease in Japan's manufacturing sector productions. Especially, the negative impact of the exports substitution effect and imports inverse effect is larger than the positive impact of the exports promotion effect from 2000 to 2014. As well, Koji and Bae (2015) also confirmed a negative employment impact of outward FDI in Japan's manufacturing sector. Debaere et al. (2010) mentioned the "hollowing out of Korea's production base" due to the FDI rush into China. Conversely, Kang and Whang (2018) used the Korean industry-level data from 2007 to 2015 to confirm a positive relationship between outward FDI and temporary workers' employment.

Firms, on the other hand, could reduce production costs and increase international competitiveness by reducing transportation costs, avoiding tariffs, and transferring production activities to places where the production factors they use frequently are relatively cheap, thereby promoting domestic employment. Bajo-Rubio and Diaz-Morza (2015) analyzed the case of Spain from 1995 to 2011 to show that outside outward FDI has a small quantitatively beneficial employment impact. Increasing the competitiveness of those Spanish businesses allows them to create more jobs in their own country.

Furthermore, the type of FDI can be divided into vertical and horizontal FDI. For vertical FDI, firms fragment different stages of the production process across other countries. The location of stages depends on where the production factor they use intensively is relatively cheap. Minimizing production costs can boost headquarters profits, which can help to boost domestic employment. Conversely, the relocation of manufacturing activity to other countries may result in job losses in the home country. According to Harrison and McMillan (2011), American parent companies export low-wage jobs to low-income countries. When Korea's outward FDI flows to developing nations, the employment growth rate of firms reduces in the short run, according to Lee and Xuan (2019).

Multi-plant enterprises that may produce similar outputs in both the home and host countries are known as horizontal FDI. MNEs can save money on transportation and avoid taxes, resulting in lower trade costs, getting strategic gains and more profitable products. They would be able to hire more employees as a result of the cost savings (Kang & Whang, 2018). However, because of the reallocation of production activity, domestic labor may be replaced by foreign labor. The impact on the labor market in the home country will be determined in part by the scope of the production processes reproduced by the parent business and its affiliates (Head & Ries, 2002). Elia et al. (2009) examined the globalization of Italian enterprises' production from 1996 to 2002, using the "industrial region" as the analysis unit. It demonstrates that when FDI is directed to high-income nations, foreign activities would undermine the demand for high-skilled workers. After then, Hong et al. (2019) applied a sample of 18,252 Japanese MNEs in 59 countries between 1996 and 2010. According to the findings, outward FDI motivated by market-seeking for scale and scope expansion, natural resource-seeking, or strategic asset-seeking would increase domestic employment. Outward FDI, on the other hand, is motivated by labor source-seeking, market-seeking, and decreases in domestic demand, all of which will affect domestic employment.

FDI may also have an impact on the employment impact of international trade. FDI, for example, has a complementary or substitutive connection with exports, influencing domestic output and employment. FDI can certainly have a direct impact on capital accumulation and an indirect impact on productivity through technology diffusion. Indeed, the indirect effects of FDI are a source of concern for academics.

To summarize, the relationship between FDI and domestic employment has yet to be clarified, particularly when attempting to determine the total effect of FDI. According to the these earlier studies, investigations including a variety of geographical contexts, industries, enterprises, and skill levels have produced a variety of results. As a result, the relationship between inward or outward FDI and domestic employment should be investigated further.

## 3. Methodology and Data

### 3.1. Model Specification

In the empirical application, we will assume a representative profit-maximizing firm from the country "*i*" at the time "*t*." It has a technology constraint given by a Cobb-Douglas production function (Jude & Silaghi, 2016).

$$Y_{it} = A_{it} K_{it}^{\alpha} L_{it}^{\beta} \quad (1)$$

where "*Y*" denotes the real output, and "*A*" is the total factor productivity. "*K*" is the total capital stock, and "*L*" represents the units of labor utilized. "$\alpha$," "$\beta$," is the elasticity of the output concerning capital, labor, respectively. We assume that in an open economy, total capital stock

consists mainly of domestic capital and FDI, and those are not homogeneous, so that total capital stock can be defined as the weighted average of domestic capital and FDI.

$$K_{it} = \mathrm{Kd}_{it}^{\gamma}\mathrm{FDI}_{it}^{1-\gamma} \tag{2}$$

where "Kd" represents domestic capital, "$\gamma$" is the weight of domestic capital in total capital stock, which represents the output elasticity of domestic capital. "FDI" denotes FDI. Additionally, we hope that the production process's technical efficiency will improve over time. The increase in *x*-efficiency and technology adoption would be related to changes in FDI (Greenaway et al., 1999). Therefore, it is hypothesized that parameter A varies with time in the following manner:

$$A_{it} = e^{\delta_0 T_i}\mathrm{FDI}_{it}^{\delta_1};\ \delta_0, \delta_1 > 0 \tag{3}$$

where "$T$" represents the time variable, "$\delta$" denotes a positive constant. Then, substituting the total factor productivity function (3) and total capital stock function (2) into the function (1) and taking logarithms gives the following:

$$\ln L_{it} = \varphi_1 \ln K\, d_{it} + \varphi_2 \ln Y_{it} + \varphi_3 \ln \mathrm{FDI}_{it} + \varphi_4 T \tag{4}$$

$$\text{with } \varphi_1 = -\gamma\alpha/\beta;\ \varphi_2 = 1/\beta;$$
$$\varphi_3 = -[\delta_1 + (1-\gamma)\alpha]/\beta;\ \varphi_4 = -\delta_0/\beta$$

Short-term employment deviated from the steady-state path due to employment adjustment costs, which cannot be reflected in equation (4) (Whang, 2019). Therefore, we will introduce an employment lag variable into the equation (4) to solve this problem. Meanwhile, we will also introduce the real unit labor costs variable to control different productivity across countries. However, only specific dynamics based on the employment lag variable implicitly impose a common employment evolution following the explanatory variable changes. Since the source of the dynamics in the employment equation is unknown, we will relax this restriction by introducing a distributed lag structure for the explanatory variables (Greenaway et al., 1999). Then, to avoid the unit root problem, we difference all variables. It can also eliminate the time-invariant cross-section-specific fixed effect. The primary model of this study is specified as below:

$$\begin{aligned}\Delta\ln L_{i,t} = {} & \varphi_0 \Delta\ln L_{i,t-j} + \varphi_{11}\Delta\ln K\, d_{it} + \varphi_{12}\Delta\ln K\, d_{i,t-j} + \varphi_{21}\Delta\ln Y_{it} \\ & + \varphi_{22}\Delta\ln Y_{i,t-j} + \varphi_{31}\Delta\ln \mathrm{FDI}_{it} + \varphi_{32}\Delta\ln \mathrm{FDI}_{i,t-j} \\ & + \varphi_{41}\Delta\ln \mathrm{ULC}_{it} + \varphi_{42}\Delta\ln \mathrm{ULC}_{i,t-j} + \Delta\lambda_t + \Delta\varepsilon_{it}\end{aligned}$$

Where "$\Delta\ln L_{it}$" represents the employment growth; real output growth –"$\Delta\ln Y_{it}$" is measured with the growth rate of real GDP per capita; the data is collected from World Bank WDI. "$\Delta\ln \mathrm{FDI}_{it}$" is the change rate of the ratio of real FDI stock to real GDP; "$\Delta\ln \mathrm{ULC}_{it}$" indicates real unit labor costs growth, using the change rate in (real gross output divided the value from total employee numbers multiplied by the average wage) as a proxy variable. The data is drawn from OECD Statistics. Domestic capital growth –"$\Delta\ln K\, d_{it}$" is measured with the growth of real gross fixed capital formation. "$\Delta\lambda_t$" represents unobserved period-specific effects; "$\Delta\varepsilon_{it}$" means error terms. $j \in (0, 1, 2, ....)$. All monetary variables are deflated to 2010 prices.

Our study firstly tests the employment impact of FDI in OECD countries at an aggregate level. To make a more comprehensive analysis, we next distinguish the employment impacts with different skill compositions and industries. The manufacturing and service employment data is collected from World Bank WDI. FDI toward the agriculture industry is very little, compared to other industries. Thus, we will neglect it.

Likewise, we will classify the skill compositions subgroups, according to the occupational classification. A detailed description of the grouping is given in Table 1. The data is collected from Eurostat. As well known, there

**Table 1:** The Descriptions of the Groupings

| | | |
|---|---|---|
| Skill Level (ISCO-08) | Skill Level 1 (low-skilled) | 9. Elementary Occupations |
| | Skill Level 2 (medium-skilled) | 4. Clerical Support Workers<br>5. Service and Sales Workers<br>6. Skilled Agricultural, Forestry, and Fishery Workers<br>7. Craft and Related Trade Workers<br>8. Plant and Machine Operators, and Assemblers |
| | Skill Level 3 (high-skilled) | 1. Mangers<br>2. Professionals<br>3. Technicians and Associated Professionals |

are 37 OECD member countries; however, the reported data about the skill compositions is until 2014. Fortunately, we can find more complete data at Eurostat, but it cannot cover all 37 OECD member countries. When sorting out data, only 26 OECD member countries are left. The basic descriptions of the data are reported in Table 2.

An employment lag variable represents the short-term employment deviated from the steady-state path due to the employment adjustment costs (Whang, 2019). We expect a stable adjustment on employment, so the lagged dependent variable coefficients are expected to be less than one. In addition, we expect that the real unit labor costs growth coefficients will be negative. Conversely, we predict that the domestic capital growth and real output growth coefficients will be positive. Lastly, we would not predict the FDI variable coefficients because of analyzing the two-directional FDI.

## 3.2. Data Description

Figure 1 is derived from 26 OECD countries that we use in the empirical analysis. We convert nominal value to real value and calculate the growth rate to observe its trend. As shown, the change trends of inward and outward FDI are much similar to each other. During the 2008 financial crisis, FDI dropped sharply. Despite the short-term recovery, since the European debt crisis in 2010, the trend of FDI has been relatively sluggish again and only rebounded slightly in recent years. Instead, the response of employment growth was relatively mild, only the decline in 2008 and 2009 was even more pronounced. Except that, it mainly fluctuates around 0, showing a relatively stable trend of changes. Figure 1 reveals that the macroeconomic environment changes influence FDI and FDI also responds quickly to its change. In turn, controlling the unemployment rate, as one of the government's essential tasks, can ensure that the employment rate changes relatively stable to a certain extent.

Moreover, one of the common features not shown in Figure 1 is that the proportion of FDI flowing to the service industry is usually larger than that of the manufacturing industry. And, the service industry accounts for a larger proportion of the total employment than the

**Table 2:** Basic Descriptions

| Variables | Obs. | Mean | Std. Dev | Min | Max |
|---|---|---|---|---|---|
| Employment | 338 | 0.281 | 2.225 | −12.631 | 6.487 |
| Manufacturing Employment | 338 | −1.221 | 3.389 | −17.198 | 14.022 |
| Service Employment | 338 | 0.662 | 1.180 | −3.532 | 6.804 |
| Inward FDI | 338 | 3.852 | 17.137 | −52.134 | 87.949 |
| Outward FDI | 338 | 6.190 | 20.201 | −67.500 | 130.523 |
| Output | 338 | 1.496 | 4.842 | −23.981 | 34.032 |
| ULC | 338 | −0.009 | 3.398 | −12.771 | 19.332 |
| Skill1 | 325 | 0.101 | 7.738 | −23.224 | 38.877 |
| Skill2 | 325 | 0.010 | 3.751 | −18.922 | 15.871 |
| Skill3 | 325 | 1.692 | 4.082 | −21.337 | 29.543 |
| Kd | 338 | 0.857 | 11.894 | −65.026 | 45.571 |

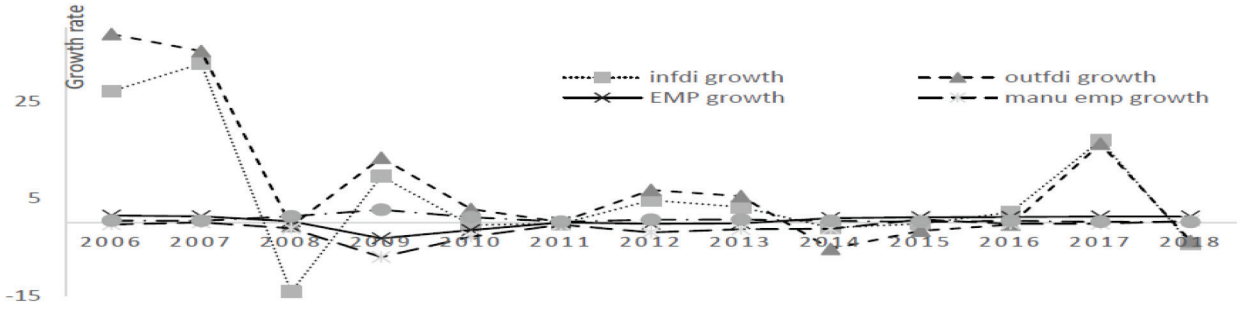


**Figure 1:** 26 OECD Countries' Employment and FDI Trend

manufacturing industry. During the period of decline in the total employment level, the ratio of the manufacturing industry decreased; conversely, the ratio of the service industry increased. It illustrates that the manufacturing employment change may be more significant than that in the service industry during an employment demand shock.

### 3.3. Econometric Issues

Note that a lag process has been introduced in our model. One immediate problem in adopting OLS to this model and generally is that there exists a potential endogenous problem between the error terms and the lagged dependent variables (Nickell, 1981). Thus, we use lags of the endogenous variable dated t-2 and earlier as instruments variables to solve the existing endogenous problems. It is efficient in the sense that it expands the instrument set as the panel progresses and the number of potential lags increases (Greenaway et al., 1999).

A set of first difference equations with lagged levels as instruments is combined with a set of level equations with lagged first differences as instruments in the system GMM estimator (Kang & Whang, 2018). As a result, it can effectively adjust for: (1) time-varying country-specific effects; (2) the endogeneity problem of the lagged dependent variable; and (3) allow for some endogeneity in the other regressors (Fukase, 2010). Similarly, small sample size does not appear to have a substantial impact on the system GMM estimator's features (Soto, 2009). Thus, we still consider that the system GMM is suitable for our panel data, although the estimators would suffer from finite sample biases.

Following that, it's crucial to check the efficiency of the system's GMM estimators. Because utilizing lag variables as instruments can break the assumption of white noise errors, the estimators' consistency will suffer. As a result, it is critical to satisfy oneself that this is not the case by presenting test data on the validity of the instrumental variables and parameter estimations (Arellano & Bond, 1991). Therefore, we will carry out a serial correlation test of the residuals and expect this test to reject the null hypothesis at lag 1 and not reject it at lag 2. Besides, a crucial assumption for the validity of GMM is that the instruments are exogenous. The Hansen test and Sargan test can be used to test the validity of subsets of instruments and confirm the instrument variables' over-identify restrictions (Roodman, 2009).

## 4. Empirical Results

### 4.1. Inward FDI

In column (1) of Table 3, inward FDI significantly promotes domestic employment, although only at lag one period, which indicates that there is a time lag in the employment growth effect of inward FDI. It is similar to the results from Jude and Silaghi (2016) and Marelli et al. (2014). Intuitively, domestic employment would increase by 0.03% when inward FDI at lag one period increases by 1%. The finding illustrates that inward FDI, as an inflow of external capital, can increase investment in productive activities in the recipient country, and thus promoting domestic employment. Although inward FDI in OECD countries is mostly for technology-seeking or market-seeking, regardless of where the investor comes from or what the purpose is, expanding production facilities requires new labor.

Similarly, lagged real output growth has a favorable effect on domestic employment, which is consistent with Greenaway et al. (1999) and Jude and Silaghi (2016). After controlling for the other endogenous variable, a rise in output leads to an increase in labor input. An increase in output, on the other hand, may increase labor demand. Unfortunately, the coefficients of real unit labor costs and real domestic capital growth are not statistically significant. Moreover, there also exists heterogeneous impacts of inward FDI on different skill compositions labor demand. The results are shown in columns (2) to (4) of Table 3. First, the empirical results of the high-skilled labor subgroup show that lagged one- and two-period inward FDI variables both increase the high-skilled labor demand, and the employment effect at lag two-period tends to diminish relative to lag one-period. Inward FDI has a more significant and long-term influence on generating high-skilled labor demand than overall inward FDI. We believe that increased inward FDI will have an impact on both productive and non-productive activities. Meanwhile, inward FDI aimed at developed countries is typically "horizontal" in nature and primarily market seeking (Marelli et al., 2014). In addition to productive activities, an increase in non-productive activities, such as direct sales, marketing, and advertising, will also contribute to the increase of high-skilled labor employment.

In the medium-skilled workforce category, there is no statistically significant impact. Inward FDI, on the other hand, promotes low-skilled labor employment at a one-period lag. In other words, after integrating foreign affiliates into the local economy, inward FDI would enhance low-skilled labor employment. Inward FDI at lag one-period has a greater impact on the low-skilled labor subgroup than its coefficients in the high-skilled labor subgroup. Furthermore, we show that an increase in current real unit labor costs strengthens low-skilled labor demand, which is in line with the labor demand equation's conclusion: an increase in labor costs reduces labor demand.

Then we look at the different employment effects of inward FDI in the manufacturing and service industries. The results are presented in Table 3 - columns (5) and (6). Current inward FDI has a favorable impact on manufacturing employment, inward FDI with a one-period lag has a positive impact on both manufacturing and service industry

**Table 3:** The Impact of Inward FDI on Domestic Employment

| | (1) System GMM | (2) System GMM Skill3 | (3) System GMM Skill2 | (4) System GMM Skill1 | Manufacturing Employment | (5) System GMM | Service Employment | (6) System GMM |
|---|---|---|---|---|---|---|---|---|
| Emp(−1) | 0.100 (0.46) | 0.014 (0.04) | 0.049 (0.27) | 0.025 (0.14) | Manufacturing Emp(−1) | 0.530 (1.60) | Service Emp(−1) | 0.335 (1.30) |
| Emp(−2) | −0.018 (−0.12) | 0.053 (0.44) | −0.032 (−0.31) | −0.032 (−0.37) | Manufacturing Emp(−2) | −0.006 (−0.04) | Service Emp(−2) | −0.241* (−1.65) |
| Inward FDI | 0.015 (1.20) | 0.032 (0.70) | 0.018 (0.78) | 0.094 (0.63) | Service Emp | −2.828*** (−4.18) | Manufacturing Emp | −0.239*** (−3.62) |
| Inward FDI (−1) | 0.030** (1.98) | 0.063** (2.28) | 0.007 (0.29) | 0.132* (1.72) | Service Emp(−1) | 1.584 (1.52) | Manufacturing Emp(−1) | 0.076 (1.05) |
| Inward FDI (−2) | −0.012 (−1.58) | 0.039* (1.65) | −0.016 (−0.69) | −0.065 (−0.91) | Service Emp(−2) | −0.289 (−0.88) | Manufacturing Emp(−2) | −0.051 (−0.78) |
| Output | 0.057 (0.51) | 0.392** (2.00) | 0.286** (2.23) | 0.620 (1.22) | Inward FDI | 0.051* (1.70) | Inward FDI | 0.005 (0.68) |
| Output (−1) | 0.305* (1.95) | 0.021 (0.09) | −0.074 (−0.37) | 0.269 (0.26) | Inward FDI(−1) | 0.058** (2.46) | Inward FDI(−1) | 0.010*** (2.86) |
| Output (−2) | −0.072 (−1.23) | 0.361** (2.01) | −0.297 (−1.31) | −0.691 (−1.17) | Inward FDI(−2) | −0.004 (−0.21) | Inward FDI(−2) | 0.008 (1.59) |
| ULC | −0.105 (−1.44) | −0.231 (−1.28) | 0.205 (0.91) | −0.343* (−1.90) | Output | −0.066 (−0.41) | Output | −0.020 (−0.80) |
| ULC (−1) | −0.043 (−0.57) | 0.066 (0.29) | 0.350*** (3.67) | 0.210 (0.33) | Output(−1) | −0.019 (−0.13) | Output(−1) | 0.003 (0.06) |
| ULC (−2) | 0.041 (0.41) | 0.329 (1.51) | −0.251 (−1.43) | 0.276 (0.24) | Output(−2) | −0.429*** (−2.60) | Output(−2) | −0.031 (−0.89) |
| Capital | 0.071 (1.62) | −0.032 (−0.50) | 0.125* (1.78) | −0.109 (−0.41) | Capital | −0.016 (−0.41) | Capital | −0.014 (−0.85) |
| Capital (−1) | −0.010 (−0.28) | 0.007 (0.10) | 0.092 (1.07) | 0.024 (0.08) | Capital (−1) | 0.209** (2.22) | Capital (−1) | 0.015 (0.92) |
| Capital (−2) | −0.007 (−0.42) | −0.074 (−1.16) | 0.100* (1.80) | 0.224 (1.62) | Capital (−2) | 0.031 (0.96) | Capital (−2) | 0.002 (0.24) |
| Cons. | 0.288** (1.96) | 1.952 (2.98) | −0.352 (−1.18) | −0.430 (−0.60) | ULC | 0.181 (0.82) | ULC | −0.002 (−0.09) |
| AR(1) | 0.03 | 0.10 | 0.01 | 0.07 | ULC(−1) | −0.124 (−0.89) | ULC(−1) | −0.024 (−1.15) |
| | | | | | ULC(−2) | 0.022 (0.24) | ULC(−2) | −0.004 (−0.07) |
| AR(2) | 0.23 | 0.76 | 0.51 | 0.30 | Cons. | −0.398 (−0.57) | Cons. | 0.190 (1.60) |
| Hansen Test | 0.33 | 0.71 | 0.56 | 0.19 | AR(1) | 0.07 | AR(1) | 0.06 |
| Sargan Test | 0.33 | 0.70 | 0.67 | 0.45 | AR(2) | 0.62 | AR(2) | 0.98 |
| Obs. | 286 | 281 | 281 | 281 | Hansen Test | 0.36 | Hansen Test | 0.14 |
| | | | | | Sargan Test | 0.55 | Sargan Test | 0.28 |
| | | | | | Obs. | 286 | Obs. | 286 |

Notes: *Z*-statistic is reported in brackets in the system GMM. The period fixed effects are controlled in all system GMM. To avoid the over-fitting bias, the "collapse" option is used in Stata. *,**,***Significance at 10%, 5%, 1% levels, respectively.

employment. In comparison to the coefficients between the two groupings, the manufacturing industry's employment growth effect is more significant. When FDI shocks occur, the impact on manufacturing employment is much bigger than the impact on services employment, according to the empirical findings.

In the meantime, both the manufacturing employment coefficient in the service industry subgroup and the service employment coefficient in the manufacturing industry subgroup are negative. It demonstrates that they have a reciprocal substitution connection. Observing the substitution effect's magnitude makes it clear that the manufacturing industry's employment could be easier to substitute with that of the service industry.

### 4.2. Outward FDI

The results of outward FDI at the overall level are shown in column (1) of Table 4. Outward FDI at lag one-period statistically significantly promotes domestic employment. In other words, outward FDI at lag one-period increases 1%, domestic employment will increase 0.035%. The result is the same as Bajo-Rubio and Diaz-Morza (2015), Kang and Whang (2018). The employment effects of inward and outward FDI are both subject to a certain time lag. As mentioned before, to maximize profits, MNEs located in these OECD countries would be willing to spin off production activities with competitive disadvantages in their home countries and transfer them to countries with comparative advantages. Then, MNEs can both achieve maximum profits and are conducive to upgrading the domestic industrial structure, thereby increasing employment. Moreover, real output growth cannot statistically significantly promote but real unit labor cost growth harms domestic employment. It is consistent with our expectations. Indeed, we cannot guarantee that reallocating the production activities process will positively affect all labor subgroups if considering that different subgroups may be subject to the heterogeneous employment impacts for outward FDI shock.

Then, from diverse skill composition subgroups, we assess the heterogeneous employment implications of outward FDI. Table 4 shows the results in columns (2) to (4). Current outward FDI affects high-skilled employment, but it shifts to a positive benefit at a two-period lag. It shows that outward FDI's demand for highly skilled labor has varying consequences depending on the stage of outward FDI promotion. Although the initial implementation of outward FDI may result in the displacement of some employment, as the domestic industrial structure is gradually upgraded, the home country's demand for highly skilled personnel will expand.

However, current outward FDI is stifling demand for low-skilled labor. Labor-intensive production activities no longer have a competitive advantage and transfer overseas through outbound FDI when wages rise and relatively sound labor rules emerge in these OECD nations. As a result, the impact on low-skilled workers would be immediate and significant. The above analysis of the employment impact of outward FDI across different skill compositions subgroups is mainly from the perspective of vertical outward FDI. Moreover, horizontal outward FDI, as a replication of domestic production activities, may also cause an initial negative employment effect.

Unlike inward FDI, outbound FDI has a positive effect on medium-skilled labor employment at a one-period lag. It confirms the importance of outbound FDI in reducing low-end capacity and increasing mid- to high-end capacity. Furthermore, we find that current real output growth favorably affects employment, whereas current real unit labor costs growth negatively affects employment, as expected.

Finally, in Table 4, columns (5) and (6) demonstrate the effects of outbound FDI on employment in the manufacturing and service industries, respectively. Outward FDI is positively related to employment in manufacturing and service industries at lag two period. As well, there is a mutual substitution link between two industries to some extent. Outward FDI also has a greater positive employment impact on the manufacturing industry than it does on the service industry, which is consistent with our earlier research on inbound FDI. It once again demonstrates that FDI shock has a greater impact on manufacturing employment.

## 5. Conclusion

Considering the scarcity of research on the relationship between FDI and employment at the macro level, our study may be more advantageous to provide policy recommendations than the micro-level studies. Our research aims to see if FDI has a varied employment effect in different industries and skill composition subgroups in OECD nations by doing a more extensive macro analysis. The goal of our research is to see if (1) FDI has an overall influence on domestic employment, and (2) if there are any heterogeneity impacts among different industries or skill composition subgroups.

The following conclusions can be drawn from the findings: First, both inward and outward FDI have a significant positive effect on domestic employment when lagged one period. Jude and Silaghi (2016), Marelli et al. (2014), Kang and Whang (2018) also found comparable results. Note that the favorable employment effects have time lags. We conjecture that both FDI and project execution and integration may take a certain amount of time, resulting in a time lag. Furthermore, FDI has externalities, such as externalities on imports and exports, which affect domestic employment; or externalities on the degree of

**Table 4:** The Impact of Outward FDI On Domestic Employment

| | (1) System GMM | (2) System GMM Skill3 | (3) System GMM Skill2 | (4) System GMM Skill1 | Manufacturing Employment | (5) System GMM | Service Employment | (6) System GMM |
|---|---|---|---|---|---|---|---|---|
| Emp(−1) | 0.397 (1.64) | 0.275 (1.27) | 0.063 (0.21) | 0.008 (0.07) | Manufacturing Emp(−1) | 0.019 (0.08) | Service Emp(−1) | 0.243 (0.85) |
| Emp(−2) | 0.072 (0.12) | 0.055 (0.71) | −0.038 (−0.36) | 0.037 (0.63) | Manufacturing Emp(−2) | −0.262* (−1.86) | Service Emp(−2) | −0.203 (−1.02) |
| Outward FDI | −0.004 (−0.38) | −0.046** (−2.31) | 0.066 (1.31) | −0.134** (−2.29) | Service Emp | −2.976*** (−4.56) | Manufacturing Emp | −0.272*** (−4.49) |
| Outward FDI (−1) | 0.035*** (3.06) | 0.035 (1.25) | 0.068** (2.23) | 0.000 (0.01) | Service Emp(−1) | 0.252 (0.37) | Manufacturing Emp(−1) | −0.020 (−0.22) |
| Outward FDI (−2) | −0.016 (−1.20) | 0.034* (1.71) | −0.018 (−0.50) | 0.020 (1.12) | Service Emp(−2) | −0.786*** (−3.04) | Manufacturing Emp(−2) | −0.003 (−0.03) |
| Output | 0.112 (0.60) | 0.202 (1.55) | 0.548* (1.84) | 0.248 (1.27) | Outward FDI | 0.006 (0.13) | Outward FDI | −0.008 (−0.89) |
| Output (−1) | 0.389 (1.14) | 0.150 (0.56) | 0.231 (−.78) | 1.186 (1.13) | Outward FDI(−1) | 0.016 (0.68) | Outward FDI(−1) | −0.000 (−0.07) |
| Output (−2) | −0.098 (−0.92) | 0.810** (2.55) | −0.231 (−0.69) | 0.050 (0.21) | Outward FDI(−2) | 0.032* (1.94) | Outward FDI(−2) | 0.012** (2.03) |
| ULC | −0.112** (−2.08) | −0.086 (−0.48) | −0.154** (−2.51) | 0.036 (0.08) | Output | 0.019 (0.27) | Output | −0.037 (−1.34) |
| ULC (−1) | −0.133 (−0.48) | 0.243 (0.98) | 0.401 (0.94) | −0.130 (−0.64) | Output(−1) | 0.039 (0.30) | Output(−1) | 0.020 (0.48) |
| ULC (−2) | 0.161 (0.38) | 0.655** (2.08) | −0.247 (−0.85) | 1.400*** (2.99) | Output(−2) | 0.000 (0.00) | Output(−2) | −0.021 (−0.35) |
| Capital | 0.003 (0.06) | 0.043 (0.79) | 0.003 (0.06) | 0.027 (0.22) | Capital | −0.007 (−0.10) | Capital | −0.006 (−0.34) |
| Capital (−1) | −0.055 (−0.51) | −0.196* (−1.92) | 0.008 (0.06) | −0.546 (−1.48) | Capital (−1) | 0.023 (0.70) | Capital (−1) | 0.032 (1.11) |
| Capital (−2) | −0.054 (−0.31) | −0.114* (−1.94) | 0.045 (0.77) | 0.169* (1.94) | Capital (−2) | 0.041* (1.73) | Capital (−2) | 0.003 (0.25) |
| Cons. | 0.404* (1.84) | 1.879*** (4.56) | −0.033 (−0.08) | 1.084 (1.51) | ULC | 0.034 (0.27) | ULC | 0.038 (0.56) |
| AR(1) | 0.06 | 0.03 | 0.08 | 0.00 | ULC(−1) | −0.066 (−0.61) | ULC(−1) | −0.023 (−1.20) |
| | | | | | ULC(−2) | −0.005 (−0.08) | ULC(−2) | −0.004 (−0.18) |
| AR(2) | 0.57 | 0.71 | 0.70 | 0.39 | Cons. | 0.268 (0.88) | Cons. | 0.152 (1.02) |
| Hansen Test | 0.12 | 0.99 | 0.14 | 0.42 | AR(1) | 0.05 | AR(1) | 0.07 |
| Sargan Test | 0.11 | 0.95 | 0.43 | 0.96 | AR(2) | 0.61 | AR(2) | 0.52 |
| Obs. | 286 | 281 | 281 | 281 | Hansen Test | 0.11 | Hansen Test | 0.50 |
| | | | | | Sargan Test | 0.42 | Sargan Test | 0.75 |
| | | | | | Obs. | 286 | Obs. | 286 |

Notes: *Z*-statistic is reported in brackets in the system GMM. The period fixed effects are controlled in all system GMM. To avoid the over-fitting bias, the "collapse" option is used in Stata. *,**,***Significance at 10%, 5%, 1% levels, respectively.

financial development, which affects domestic employment. Unfortunately, we have not been able to consider this step in a comprehensive way here.

Second, lagged inward FDI can significantly increase high- and low-skilled labor demand, with a more persistent positive effect on high-skilled labor; there is no statistically significant employment effect in the medium-skilled labor subgroup. Outward FDI, on the other hand, initially harms both high-skilled and low-skilled labor demand, with the negative impact being greater in the low-skilled labor subgroup. Elia et al. (2009) and Kang and Whang (2018) found similar results. Only after a two-period lag does outbound FDI begin to have a positive impact on high-skilled labor demand. Outward FDI with a one-year lag enhances the employment of medium-skilled workers. Outward FDI boosts the demand for medium- and high-skilled labor in OECD nations, but it also transfers some low-skilled labor employment to recipient countries. It is important to note that these impacts do not occur at the same time and have a time difference.

Third, FDI variables differ marginally in their lagged time points, meanwhile, only the lagged FDI variables significantly enhance manufacturing and services employment. Furthermore, the positive effects on manufacturing jobs are higher. To some extent, there is a mutual substitution relationship between employment in the service industry and employment in the manufacturing business. Manufacturing employment changes are greater than service industry employment changes during FDI shocks. Although the positive employment impacts of outward and inward FDI are confirmed to exist at the overall level, a heterogeneous impact does exist across different industries and skill compositions subgroups. The following policy recommendations are provided accordingly.

First, considering the positive effects of inward FDI on either the overall employment or different skill composition subgroups, the government should provide effective incentive policies to encourage inward FDI. Second, the stability and future potential of economic development are critical for attracting inward FDI, as seen by the changing trend of FDI during the economic crisis. To attract FDI, it is critical to build a stable economic climate and maintain stable economic growth. Third, the government should provide policy support for low-skilled labor to avoid them from being traumatized by the early negative employment impact of outward FDI, given the diverse employment consequences of outward FDI in different skill composition labor groupings. For instance, through providing re-employment training opportunities to help the re-employ or granting short-term unemployment subsidies.

Last, one of the limitations of this study is that it does not consider the various indirect effects that may occur with FDI. That is, FDI indirectly affects domestic employment through many other variables, such as institutional variables, exports, imports, etc. These factors can be included in future research. Likewise, there may be a so-called crowding-out effect between FDI and domestic investment, thus affecting employment, which is a topic we did not delve into. Indeed, FDI from different recipient or source countries or FDI with different purposes may have different effects on employment. We cannot capture that in this study due to the lack of complete data. The most important part is that OECD countries have relatively special country characteristics, so the conclusions drawn here are difficult to generalize to other countries. In future research, we can consider these limitations and make supplements and improvements.

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## Endnote

[1]The country name list is Austria, Belgium, Czech Republic, Germany, Denmark, Spain, Estonia, Finland, France, the U.K., Greece, Hungary, Ireland, Iceland, Italy, Lithuania, Luxembourg, Latvia, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Sweden, Switzerland.