국제학박사학위논문

Consequences of Outward FDI on Domestic Employment and Skill Composition

해외직접투자가 국내 고용 및 숙련구조에 미치는 영향

2023년 2월

서울대학교 국제대학원

국제학과 국제학(국제통상) 전공

유 우 식

Doctoral Dissertation

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A dissertation submitted in conformity with the requirements for the degree of Doctor of Philosophy in International Studies (International Commerce)

Woosik Yu

Graduate School of International Studies
Seoul National University

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위 원 장 이 영 섭 (인)

부 위 원 장 안 덕 근 (인)

위 원 김 영 식 (인)

위 원 안 재 빈 (인)

위 원 한 형 민 (인)

위 원 정 혁 (인)

THESIS ACCEPTANCE CERTIFICATE

The undersigned, appointed by

The Graduate School of International Studies
Seoul National University

Have examined a thesis entitled

Consequences of Outward FDI on Domestic Employment and Skill Composition

Presented by **Woosik Yu**, candidate for the degree of Doctor of Philosophy in International Studies (International Commerce) and hereby certify that the examined thesis is worthy of acceptance:

Committee Chair _____
Rhee, Yeongseop

Committee Vice Chair _____
Ahn, Dukgeun

Committee Member _____
Kim, Young Sik

Committee Member _____
Ahn, JaeBin

Committee Member _____
Han, Hyoungmin

Thesis Advisor _____
Jeong, Hyeok

Abstract

Consequences of Outward FDI on Domestic Employment and Skill Composition

National policies are often designed to reduce outward FDI, considering it is a capital flight that may negatively affect the labor market of the source economy. Since the introduction of the so-called 'Reshoring U-turn Act' in 2013, Korean government has implemented strong policies for the reshoring of multinational firms. However, promoting unconditional reshoring policies may not be an optimal strategy for job creation, and there are both theoretical and empirical studies that explore the positive effects of outward investments on parent firms' employment along with upgrading in skill composition of employment.

This paper empirically investigates the impact of outward FDI by Korean manufacturing firms on their total, skilled, and unskilled employment as well as skill composition of employees, using Statistics Korea's Survey of Business Activities firm-level dataset which contains data for all of Korean firms which have 50 employees or more and have capital stock of 300 million KRW or more in the period of 2006-2019. The results of both OLS fixed effects estimation and 2SLS estimation with instrumental variable show that the globalization of production activities of Korean manufacturing firms did not reduce total employment, rather, there is some evidence that it enhanced the growth rate of total employment. Furthermore, outward FDI was found to increase both the level and growth of employment of skilled labor and did not reduce growth of unskilled labor. However, outward FDI did reduce the level of unskilled labor. Moreover, empirical results suggest that outward investment can upgrade the skill composition of employment of parent firms as it positively affects the share of skilled labor.

These results are consistent with Feenstra and Hanson's offshoring model that

expects outward investment's positive consequences on relative demand for the skilled labor and negative consequences on that for the unskilled labor of the home country with a low relative wage for skilled workers compared to other countries. Therefore, it can also be inferred that Korea's outward FDI structure is focused on the offshoring of low-skill intensive intermediate production activities.

Keywords: Foreign Direct Investment, Reshoring, Skill Composition of Employment, Firm-level Analysis, Multinational Corporation, Korean Economy.

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1. Introduction

An outward foreign direct investment (outward FDI or OFDI) is an investment or an acquisition of whole or share of a company located in foreign territory. “The controlling (owning) firm is called the multinational parent, while the controlled firm are called the multinational affiliates” (Chapter 8, Krugman et al., 2014) or foreign subsidiaries. When a domestic firm builds a new production facility or establishes a new firm abroad, this activity is called greenfield FDI. Also, when a domestic firm purchases a share of a foreign firm through cross-border mergers and acquisitions, this activity is called brownfield FDI.

As globalization has deepened since the mid-1990s with the establishment of WTO in 1995 and appearance of China in the global market, FDI activities of multinational firms have increased at a great scale, and South Korea[1]’s FDI activities started to soar up since the mid-2000s, reaching the world average growth rate. The world’s real FDI net outflows[2] have annually grown at a rate of 2.4% for the last thirty years from 1990 to 2020[3], and have doubled. During the same period, South Korea’s real net outward FDI has increased at an average annual growth rate of 8.6% and the FDI

[1] Throughout this paper, the country ‘Korea’ means South Korea or Republic of Korea, neither North Korea nor People’s Democratic Republic of Korea.

[2] There are two different types of FDI measures, FDI flows and FDI stocks. “FDI flows are transactions recorded during the reference period … typically year or quarter … [On the other hand,] FDI stocks are the accumulated value held at the end of the reference period, typically year or quarter” (KOEMA).

[3] In constant 2015 USD basis (U.S. GDP deflator is used for the world level). The data are from the World Bank’s WDI (World Development Indicators).

volume in 2020 is 12 times greater than that of 1990. In terms of FDI to GDP share, South Korea's FDI share was 0.40 in 1990, but grew at an annual average growth rate of 5.5% during the next thirty years, and was 1.98 in 2020. It is evident that South Korean multinational firms have aggressively extended their FDI compared to the world average, and as many papers argue, not only the inward FDI, but also the outward FDI has positively contributed to the economic growth of South Korea as a result of the enhancement of productivity and international competitiveness of South Korean multinational firms (Jang and Hyun, 2012), and by stimulating their export activities (Lim and Moon, 2001; Seo and Suh, 2006).

However, reshoring has become a highly debated topic among the developed countries since the Covid 19 outbreak which has endangered the global supply chain. This is mainly because the perception of FDI has changed despite the cheaper labor costs in foreign countries, as described by Paul Krugman who pointed out that the perception that 'the world is dangerous' has spread out among the multinational firms (Kim, 2022). Firms started to seriously consider the risks of FDI that come from natural disasters and global political conflicts. For example, multinational firms who invested in China started to think of moving back the production facilities to their home countries as the Chinese government shut down manufacturing factories in order to combat the spread of Covid 19 and as the geopolitical tension had risen around southern China and Taiwan. Also, European companies who relied on the supply of natural gas from Russia suddenly experienced problems due to the Russo-Ukraine war and political conflicts between the North Atlantic Treaty Organization (NATO) and Russia. These risks have pushed

multinational firms of developed countries to consider a reshoring strategy despite having to give up the low labor costs.

According to Reshoring Initiative, "job creation [in the United States by foreign multinationals and from the reshoring of US firms] is expected to amount to 348,493 this year alone [, i.e., year 2022,] … [and] 62.9 percent of the new jobs are based on reshoring [of US multinational companies.]" (Choi, 2022). Other major firms such as "General Motors, Micron, [and] Lockhead … [also decided to] reshore amid supply chain strains" (Thomasnet, 2022). For instance, an Idaho-based American computer memory manufacturer, Micron Technology, decided to build a semiconductor factory in Kentucky, US, and plans to invest 40 billion USD for the next ten years (Kim, 2022), and another US enterprise "Ascend Elements said it would build a $1 billion lithium-ion battery materials facility [also] in Kentucky" (NAI Global, 2022).

1.1. Korea's FDI in the World

In this section, I present descriptive facts on global FDI and compare them with Korea's outward FDI data. Figure 1-1-1 below depicts the timeseries trends of net FDI outflows to GDP shares of world and South Korea.

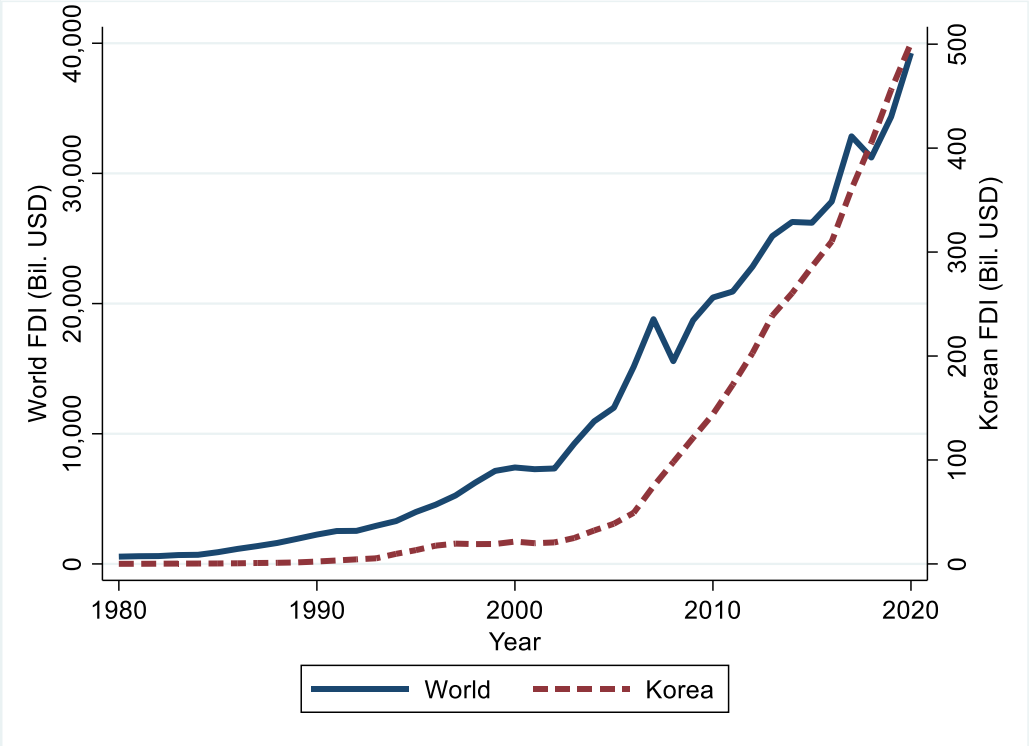
Figure 1-1-1. FDI Outflows (Net) to GDP Share: World and Korea

Source: World Development Indicators.

After peaking to the highest point in 2007, since 2008, the FDI outflow share of the world has sharply declined, and the downward trend continues. On the contrary,

that of South Korea seems to constantly increase, and neither dropped during the global financial crisis nor during the Covid-19 pandemics. This implies that outward foreign investment activities have become an integral part of Korean multinational firms.

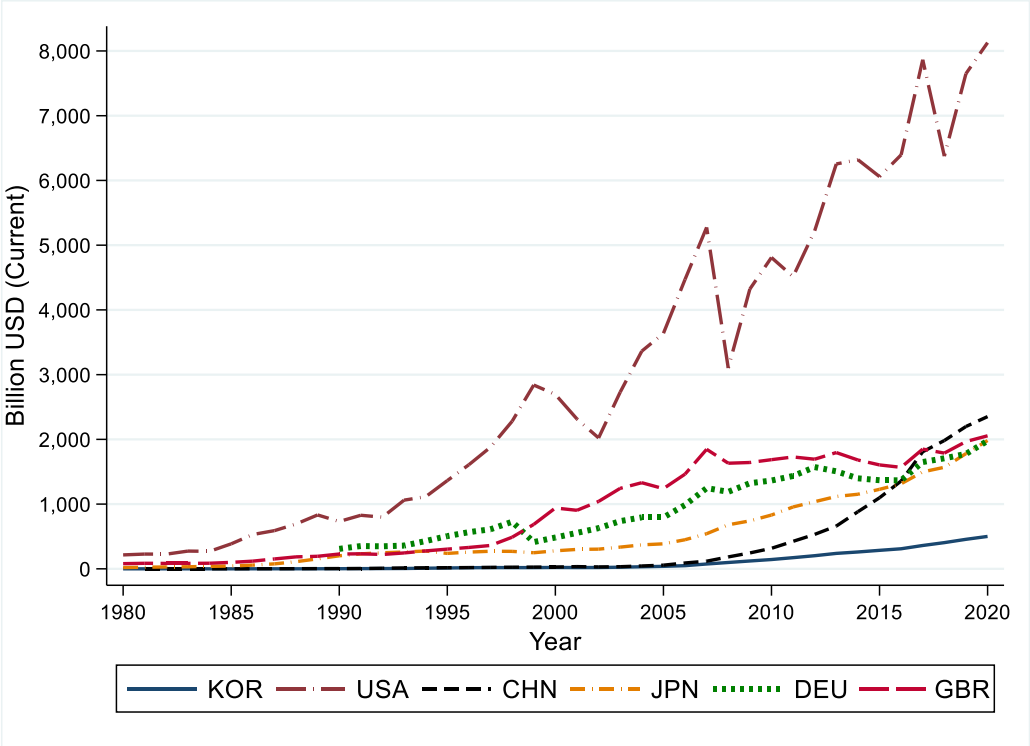
Figure 1-1-2. Outward FDI Stock: World and Korea



Source: UNCTAD STAT.

Further, in stock-term, the timeseries trends of outward FDI of both world and Korea (Figure 1-1-2) show almost exponential growth since the 1980s. However, the starting point of the 'take-off' in increase in FDI stock for Korea is during the mid-2000s, and after that, the growth rate becomes faster than that of the world average.

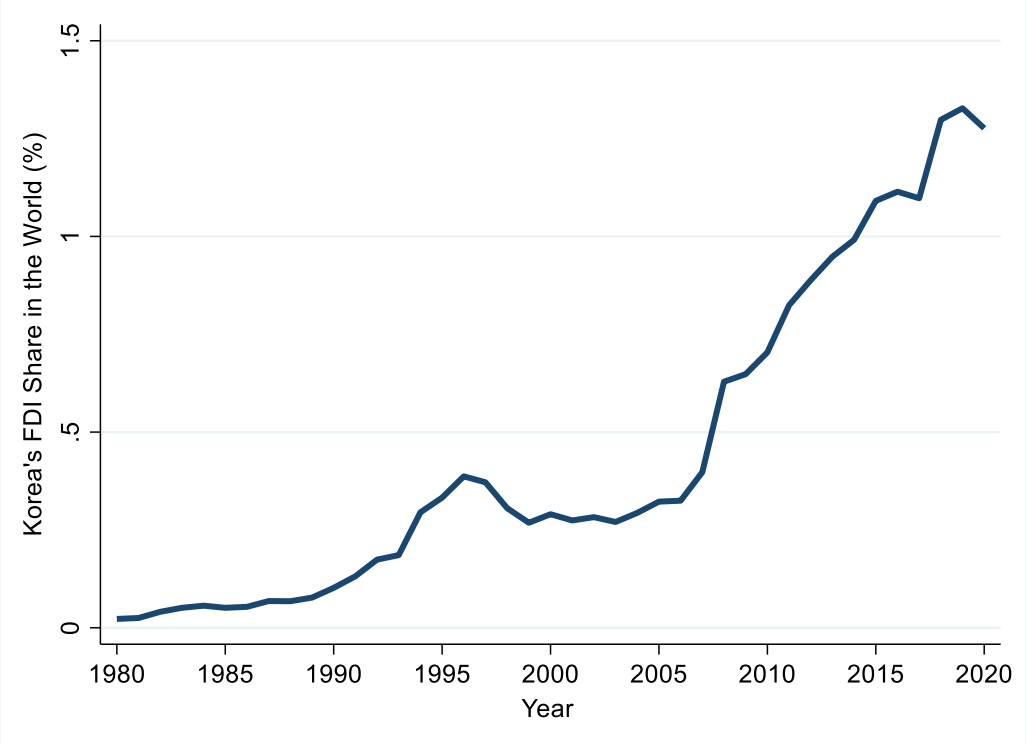
Figure 1-1-3. Outward FDI Stock: Korea and Selected Economies



Source: UNCTAD STAT.
Note: KOR: South Korea, USA: United States, CHN: China, JPN: Japan, DEU: Germany, GBR: Great Britain.

From a global perspective, Korea's FDI share is not large as its share in the world was 1.276% in 2020. United States is the unrivaled number one in world's FDI activity, and is followed by economies such as China, Britain, Germany, and Japan which each account for 5 to 6 percent of the world FDI. The timeseries trend of Korea's outward FDI stock share in the world is depicted in Figure 1-1-4.

Figure 1-1-4. Korea's Outward FDI Stock Share in the World

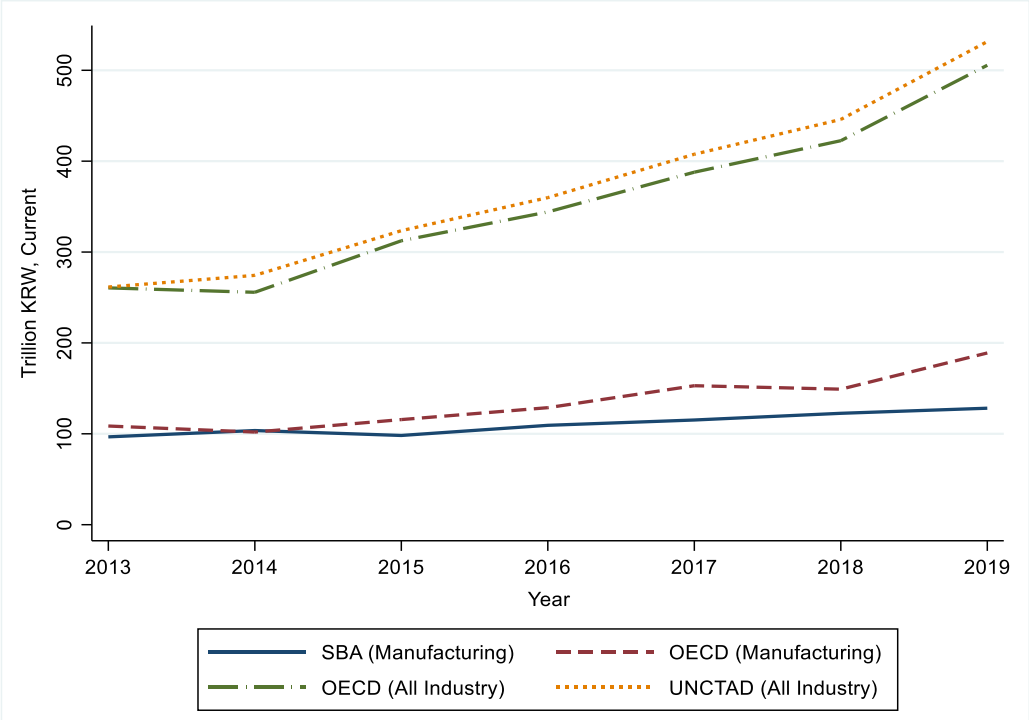


Source: UNCTAD STAT.

South Korea's outward FDI structure is mainly directed to three partner countries: China, the USA, and Vietnam. According to Statistics Korea's Survey of Business Activities data, in 2006, the country-wise share of Korean companies' foreign investment stock was the greatest in China (43.2%), and followed by the USA (14.1%), Japan (4.4%), Hong Kong (4.1%), and Vietnam (3.6%). However, the ranking changed in 2019. The first and the second ranked countries were again China (28.2%), and the U.S. (12.9%), but the share for Vietnam rose up to 11.7% from 3.6% in 2006, so that Vietnam became the third largest country for Korea's outward FDI. This shows the

increased importance of Southeast Asian countries for South Korean multinational companies, and indicates that Korea's structure of global value chain for intermediate goods shifted from China to Vietnam. Further, the outward FDI was mostly for the 'wholesale trade and commission trade', 'manufacture of electronic components, computer, radio, television and communication equipment and apparatuses', and 'manufacture of motor vehicles, trailers, and semitrailers' sectors. These sectors had consistently been in the top three throughout the 2006 to 2019 period. A more detailed data description and statistics is presented in section 3.

Figure 1-1-5. Korea's Outward FDI Stock: Manufacturing and All Industry



Source: OECD Statistics, Statistics Korea (Survey of Business Activities), Bank of Korea (exchange rate data), UNCTAD STAT.

Considering the fact that the data used in the paper are survey data that only includes manufacturing firms with more than 50 workers and with a capital stock of more than 300 million Korean Won, it was necessary to explore how much the SBA data can represent Korea's outward FDI in the manufacturing sector. OECD Statistics provides industry-level outward FDI stock data from the year 2013 onwards.

Figure 1-1-5 depicts timeseries trends of outward FDI stock of Korean firms in manufacturing industry, comparing SBA and OECD data. The OECD data which were originally in USD terms were converted to KRW, and the unit here is now in KRW. In the years 2013 and 2014, the two data seems to be similar, however, since 2015, OECD data becomes greater. The FDI stock of SBA data is 82% of that of the OECD data in 2018, and the ratio is even less in 2019 (68%). One possible explanation can be that the FDI activity of non-SBA sample firms (firms with less than fifty workers or with capital stock less than 300 million KRW) had increased. Figure 1-1-5 also shows timeseries trends of Korea's outward FDI stock, comparing manufacturing industry and all industry. The values of OECD data are slightly below the UNCTAD data, but the trends are similar. SBA data in 2014 accounts for 80% of the OECD's Korean total FDI stock. The ratio becomes 25% in 2019. The increase in the difference between the total FDI and the FDI of manufacturing industry implies that other industries, especially the service industry, have become more important in the field of FDI in Korea.

1.2. Korea's Reshoring Policy

Along with the rapid increase in South Korean outward FDI, many, including Korean government and labor unions, worry that this may result in reduction in domestic jobs and negatively affect the domestic employment rate. For example, in 2013, the Korean government introduced the so-called 'Reshoring U-turn Act'[4] (The Act on Support for Reshoring Companies). Further, since 2020, Korean government has aggressively implemented reshoring support policies. The list of implemented economic policies introduced by Korean government since 2020 is presented in Appendix 2. Not only during the Moon Jae-In administration, but also under the new president Yoon Suk-Yeol's administration, policies to promote reshoring of multinational firms are expected to be sustained, as President Yoon promised to commit to this in his political agenda during the presidential election period. The contents of the progress in support policies for 'U-turn' firms in Korea are presented in Table 1-2-1, and more reshoring policies of Korea are listed and described in appendix A3.

[4] '해외진출기업의 국내복귀 지원에 관한 법률' or '해외진출기업복귀법' in Korean.

Table 1-2-1. Progress in Support Policy for 'U-turn' Firms in Korea

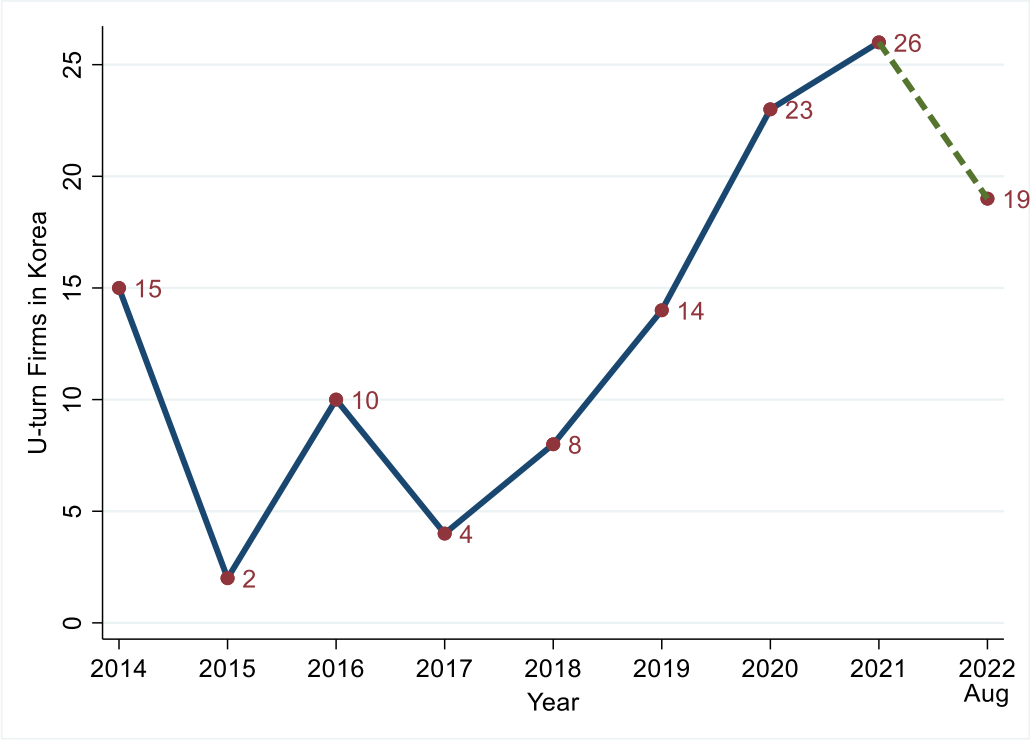
Date	Progress	Key Contents
Jun 27, 2013	Enactment of 'Reshoring U-turn Act'	Comprehensive support for tax, subsidy, location, manpower, etc.
Jun 19, 2017	Included in the '100 National Tasks'	Promoted as a detailed practical task of National Task No. 38 (recovery of industrial economic vitality by enhancing the competitiveness of key industries)
Nov 29, 2018	Establishment of comprehensive support measures for 'U-turn' firms	Expansion of U-turn companies: Expansion of target industries, expansion of production range, etc. Reinforcement of incentives: tax reduction and exemption (including large corporations), expansion of employment subsidies, expansion of location support, etc.
Aug 13, 2019	Revision of Enforcement Decree and Enforcement Rules for 'Reshoring U-turn Act'	Revision of the Enforcement Decree of the Enforcement Decree as a follow-up measure for comprehensive support measures
Aug 28, 2019	Held the groundbreaking ceremony for the first 'U-turn' factory of a large corporation (Hyundai Mobis)	Construction of a new factory in Ulsan Ihwa Industrial Complex after shutting down two parts factories in China
Nov 19, 2019	Passing of the amendment for 'Reshoring U-turn Act'	Expansion of industry within the scope of recognition, provision of special cases for use of national and public property, etc.
Feb 22, 2020	Measures to support for export after the COVID-19 outbreak (Expansion of U-turn company support package)	Tax reduction or exemption for expansion of domestic business sites, Relaxation of location standards for moving into port hinterland complexes, Establishment of 45 trillion KRW worth of facility investment support program for U-turn companies, etc.
Jun 1, 2020	Introduction of a comprehensive package to expand the attraction of 'U-turn' companies	Expansion of subsidies for investment in location facilities, priority allocation within the factory total system, abolished the requirement to reduce overseas production by more than 50% in tax reduction and exemption, and introduced reduction or exemption according to the amount of reduction, diversification of requirements for attracting R&D centers centering on high-tech industries, etc.
Jul 8, 2020	Material Parts Equipment 2.0 Strategy	Expansion of support for 'U-turn' companies in non-metropolitan areas, enhanced support for smartization and automation robots, allowing for occupancy in local complex-type foreign investment areas, etc.

Source: Kim (2020), Korean National Assembly Research Service.

The following question now arises. Is the reshoring and reduction of outward FDI helpful for increasing domestic employment? In other words, does outward FDI reduce domestic employment? People worry that the expansion of outward FDI by multinational firms would substitute for the domestic investment, production, and exporting, and can ultimately reduce domestic employment. On the other hand, it is possible that FDI can result in the enhancement of a firm's competitiveness and increase the export of capital and intermediate goods from a domestic parent firm to subsidiaries in foreign countries, which ultimately can positively affect domestic employment. (Hwang, 2017). This paper aims to answer the questions regarding these issues.

As depicted in Figure 1-2-1, the number of Korean firms who have transferred their foreign subsidiaries to Korea, or so called the 'U-turned' firms, has rapidly increased since 2017 when former president Geun-hye Park was impeached and the new Moon Jae In government came into power. The number increased from 4 in year 2017 to 26 in year 2021. This implies that the effectiveness of reshoring promotion policy has somewhat grown during the regime under the Moon administration representing the Democratic Party of Korea. However, considering that the number of Korean firms that conducts FDI is more than 2,800, the number of 'U-turned' firms does not seem to be large. Furthermore, most of the reshoring firms were Small and Medium-sized Enterprises (SMEs). During the period of 2014 to 2021, there are more than 100 'U-turned' firms, however among these, there is only one 'large firm', which is Hyundai Mobis (Kim, 2022). In order to enjoy the effect of an increase in domestic employment, large firms have to reshore, but they do not seem to have much interest in doing it.

Figure 1-2-1. Number of the ‘U-turned’ Firms in Korea



Source: Korean Ministry of Trade, Industry and Energy.

1.3. Stylized Facts on OFDI and Domestic Employment

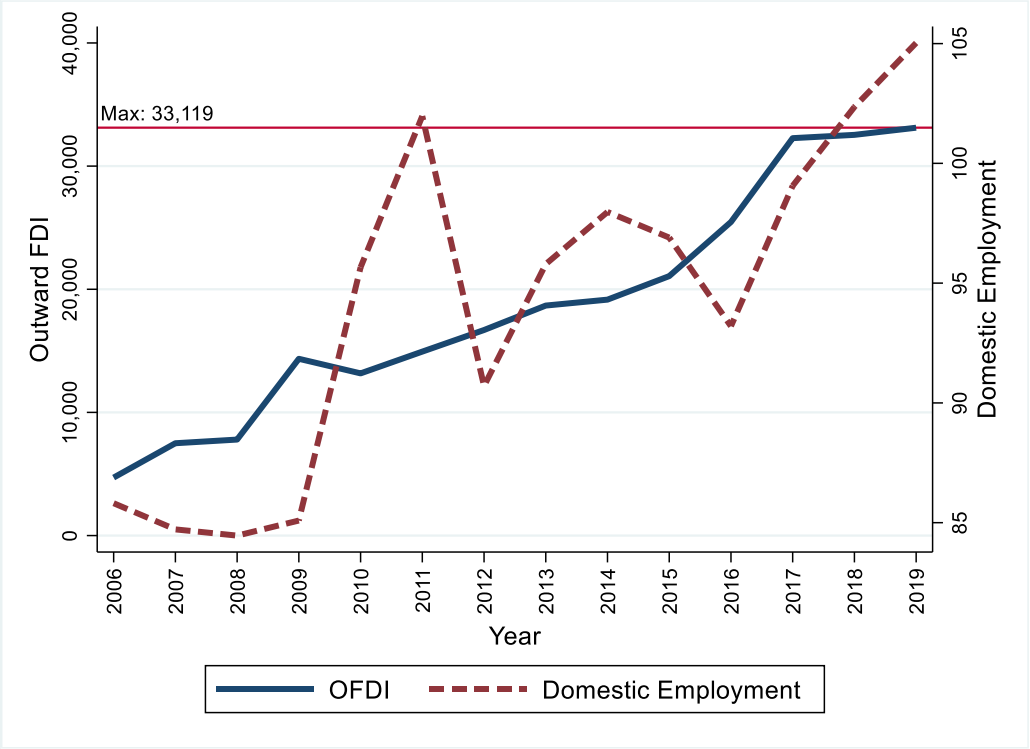
In section 1.2, I have discussed the issues regarding Korea's reshoring policy and its impact. The hypothesis is that promoting the reshoring of multinational firms results in the creation of domestic jobs and helps improve the demand for domestic workers. In other words, reshoring policy is effective as it attempts to reverse the impact of outward FDI which is hypothesized to reduce domestic employment. But is it really the case? One of the largest media newspapers in Korea once claimed that outward FDI activities of Samsung Electronics and Hyundai Motors could destroy the foundations of the domestic labor market as they hire one employee in Korea while they hire four in foreign countries. Also, it claimed that the outward FDI of large firms will cause Korea's 'growth without employment' and social conflicts (Kim, 2012).

In this section, I present facts on outward FDI and domestic employment of Korea's two most famous corporations: Samsung Electronics and Hyundai Motors for the period of 2006-2019, in order to check whether the outward FDI of the two companies is negatively associated with domestic employment.

1.3.1. Case Study 1: Samsung Electronics

Samsung Electronics Co., Ltd. is the largest Korean firm headquartered in Suwon of Gyeonggi province with more than 287,000 employees in 74 countries and revenue of 297.6, net profit of 39.9, and operating profit of 51.6 trillion KRW in the 2021 financial year (Samsung Group Website, 2022). It is one of the world's largest manufacturers of mobile phones along with Apple, Sony, and Huawei. It is also known for being the largest manufacturer of semiconductors, especially memory chips, in the world.

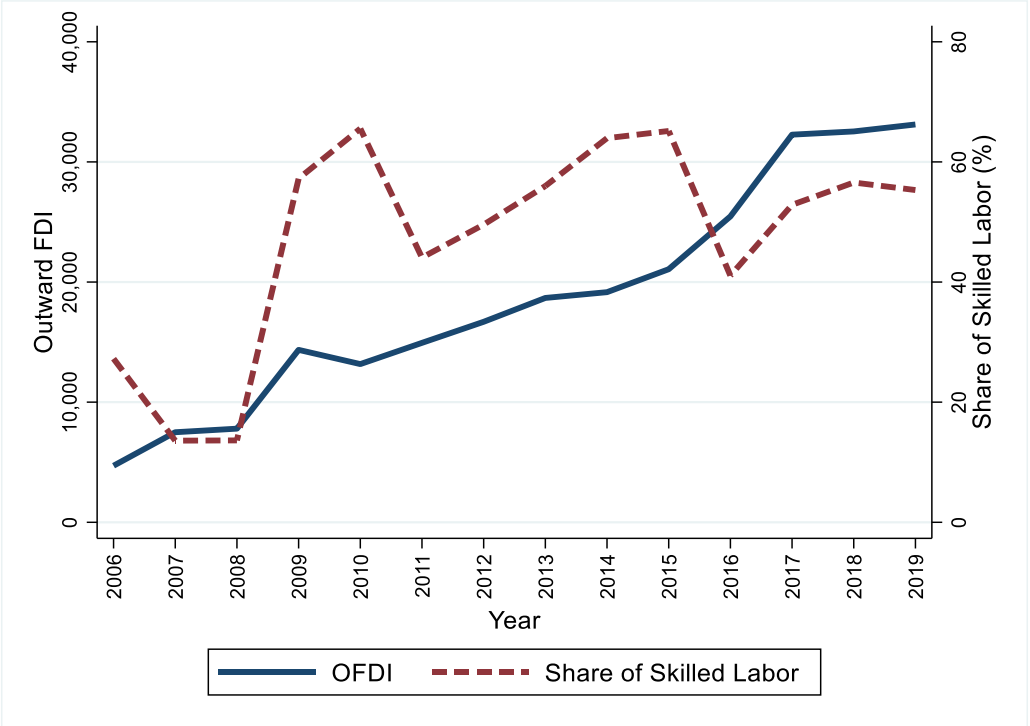
Figure 1-3-1. OFDI and Domestic Employment of *Samsung Electronics*



Source: FnGuide and Survey of Business Activities, Statistics Korea.
Note: OFDI in current billion KRW, employment in thousands.

In Figure 1-3-1, it can be seen that Samsung's outward FDI has steadily increased from 2006 to 2019, except for the downturn during the global financial crisis in 2009[5]. During the same period, the number of domestic employees in Samsung fluctuated, but nevertheless showed a clear increasing trend. Therefore, it is potentially incorrect to say that Samsung Electronics' outward FDI has resulted in a reduction in domestic employment.

Figure 1-3-2. OFDI and Share of Skilled Labor of *Samsung Electronics*



Source: FnGuide and Survey of Business Activities, Statistics Korea.

[5] Although the SBA dataset does not provide the names of the sample firms, I identified the firm name by matching the financial statement statistics in SBA and FnGuide's DataGuide database. Therefore, I hereby note that the firm names specified in this section are the ones identified through this procedure.

It is also interesting to see the trend of domestic labor's skill composition at Samsung Electronics (Figure 1-3-2). Share of skilled labor is defined as non-production workers divided by total labor. In the beginning when Samsung Electronics started to increase foreign investments during 2008-2009 when the growth rate of Outward Foreign Direct Investment (OFDI) was the highest, the share of skilled labor soared from 14% to 57%, then has slightly decreased, but does not fall below 40%.

Moon and Parc (2014) studied Samsung Electronics' FDI on mobile phone cases, and state that domestic and foreign employment are "complementary, rather than alternative" and are in "positive-sum rather than zero-sum relationship." Also, through OFDI, Samsung Electronics has expanded its business by improving cost efficiency and global competitiveness via innovation, and through this process, it has increased the size of its domestic employment.

Table 1-3-1. *Samsung Electronics'* Purposes for OFDI by Foreign Subsidiary Location

Location of Foreign Subsidiaries	Purpose
Austin, TX, USA	Semiconductor production
Milano, Italy	Design of electronic products
Vietnam, China, India, Brazil	Assembly process of home appliances and mobile phones

Source: Moon and Parc (2014).

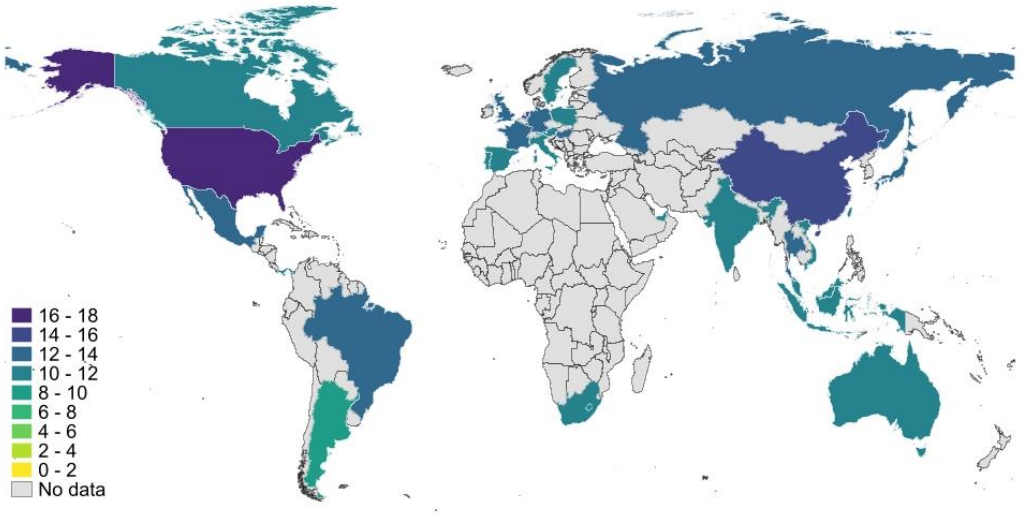
For example, Samsung Electronics has invested in building smartphone assembly factories in Vietnam as its corporate tax, import duty, and value-added tax rates

were completely exempt in Vietnam[6], whereas these rates in Korea's city of Gumi, where most of Samsung Electronics' factories are located, were 22%, 0~50%, and 10% respectively. Furthermore, the fees for electricity and water as well as rental rate of land in Vietnam were at least 30% cheaper than in Gumi, Korea. Furthermore, the wage level in Vietnam is one sixth of that in Korea as of 2014, and allowed Samsung to hire employees as temporary workers up to five years while it is impossible in Korea.

Moreover, yearly working days for a full-time worker are 302 in Vietnam whereas they are 249 in Korea. Like this example, Samsung Electronics has established subsidiaries around the world for different purposes according to the foreign location's comparative advantages, and has sought to create a global synergy in its operations by integrating the specialized comparative advantages of foreign subsidiaries.

[6] For corporate tax, it was exempted for the first four years, and to be raised to 5% for the next 12 years, and to 10% for the next 34 years.

Figure 1-3-3. *Samsung Electronics'* OFDI by its Foreign Subsidiary in 2019



Note: OFDI in current million KRW (in log).

In table 1-3-2, we can see that Samsung Electronics has operated foreign subsidiaries in 31 identifiable countries (excluding the countries denoted as "Other Europe") as of 2019, and previously in 2006, it operated foreign subsidiaries in 33 identifiable countries (excluding the countries denoted as "Other Europe" and "Other South America"). The graphical world map is presented in Figure 1-3-3. It has invested the most in the United States and in China both in the years 2006 and 2019. The country rankings of Samsung Electronics' OFDI is presented in Table 1-3-3. As it is a global company with the famous 'Galaxy' series of mobile smart phones, and other electrical devices, it has established foreign subsidiaries in all five continents: Asia, Europe, America, Oceania, and Africa.

Table 1-3-2. *Samsung Electronics'* OFDI by its Foreign Subsidiary Location in 2019

Year 2019			Year 2006		
Rank	Destination Country	OFDI	Rank	Destination Country	OFDI
1	USA	17,166,557	1	China	1,114,811
2	China	7,429,195	2	USA	773,889
3	Netherlands	2,309,031	3	Hungary	341,165
4	Singapore	981,483	4	Singapore	294,833
5	Hungary	650,157	5	UK	269,509
6	Brazil	647,620	6	Malaysia	230,953
7	UK	433,202	7	Germany	136,513
8	Russia	392,845	8	Thailand	126,900
9	Japan	370,365	9	Indonesia	122,500
10	Germany	354,846	10	Japan	122,453
11	Thailand	279,163	11	Brazil	107,891
12	France	234,115	12	Spain	93,055
13	Mexico	165,638	13	India	91,504
14	Italy	143,181	14	France	89,318
15	Spain	142,091	15	Italy	71,154
16	Malaysia	129,787	16	Australia	68,349
17	Indonesia	118,909	17	Netherlands	55,630
18	Taiwan	112,949	18	Russia	53,119
19	Australia	111,964	19	Canada	53,068
20	India	107,050	20	Hong Kong	46,932
21	Canada	90,922	21	Panama	46,286
22	Panama	86,962	22	Taiwan	38,518
23	Hong Kong	79,033	23	Philippines	35,075
24	Poland	78,267	24	Poland	31,860
25	Sweden	69,372	25	Sweden	29,623
26	Portugal	37,616	26	South Africa	23,834
27	UAE	32,836	27	Portugal	20,500
28	South Africa	32,622	28	Vietnam	15,963
29	Austria	32,162	29	UAE	14,789
30	Vietnam	28,365	30	Austria	13,109
31	Argentina	6,779	31	Argentina	4,689
-	Other Europe	263,767	32	Syria	3,356
			33	Chile	500
			-	Other Europe	130,276
			-	Other South America	38,454
	Sum	33,118,851		Sum	4,710,378

Note: OFDI in current million KRW.

When taking a look at the more detailed information on subsidiary-level data as of 2019, which are listed in Table 1-3-3, Samsung Electronics operates foreign subsidiaries that are involved in manufacturing only in eight countries: China, Hungary,

Brazil, Russia, Thailand, Malaysia, Indonesia, and India. It used to operate manufacturing subsidiaries in ten countries, but three countries: Philippines, Vietnam, and Syria were dropped from 2006 to 2019. It is evident that Samsung Electronics is choosing China as its most important production value chain partner, not Vietnam which is the third ranked partner for outward FDI[7].

Also, Samsung operates research and development functioning subsidiaries in three countries which are China, Japan, and India. Furthermore, it has invested in subsidiary firms that are financial institutions in two countries: Netherlands and Germany. The rest of the subsidiaries are for wholesale and retail trade purposes.

The corresponding table for the year 2006 is shown in Table 1-3-4. The main change from year 2006 to year 2019 is that the number of foreign subsidiaries has decreased while the amount of outward FDI has increased. Also, in year 2006, China was the number one FDI partner, however, it is USA in 2019.

[7] See Table 2-4-2 in section 2.4.

Table 1-3-3. *Samsung Electronics'* OFDI by its Foreign Subsidiary in 2019

Location	OFDI by Subsidiary	OFDI by Country	Owner-ship (%)	KSIC Code	Sector
USA	17,166,557	17,166,556	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
China	5,275,760	7,429,195	100	26	Manufacture of Electronic Components, Computer, TV and etc.
	640,452		100	46	Wholesale Trade and Commission Trade, Except of Vehicles
	504,313		100	26	Manufacture of Electronic Components, Computer, TV and etc.
	260,092		90	26	Manufacture of Electronic Components, Computer, TV and etc.
	255,535		90	26	Manufacture of Electronic Components, Computer, TV and etc.
	138,101		48	26	Manufacture of Electronic Components, Computer, TV and etc.
	130,551		69	26	Manufacture of Electronic Components, Computer, TV and etc.
	119,519		100	26	Manufacture of Electronic Components, Computer, TV and etc.
	41,182		100	26	Manufacture of Electronic Components, Computer, TV and etc.
	34,028		74	26	Manufacture of Electronic Components, Computer, TV and etc.
	19,189		100	46	Wholesale Trade and Commission Trade, Except of Vehicles
	9,332		100	70	**Research and Development**
	1,141		100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Netherlands	1,369,992	2,309,031	100	64	**Financial Institutions**, Except Insurance and Pension Funding
	914,751		100	46	Wholesale Trade and Commission Trade, Except of Vehicles
	24,288		100	52	Storage and Support Activities for Transportation
Singapore	981,483	981,483	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Hungary	650,157	650,157	100	26	Manufacture of Electronic Components, Computer, TV and etc.
Brazil	647,620	647,620	87	26	Manufacture of Electronic Components, Computer, TV and etc.
UK	433,202	433,202	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Russia	204,555	392,845	100	26	Manufacture of Electronic Components, Computer, TV and etc.
	188,290		100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Japan	253,108	370,365	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
	117,257		100	70	**Research and Development**
Germany	354,846	354,846	100	64	**Financial Institutions**, Except Insurance and Pension Funding
Thailand	279,163	279,163	92	26	Manufacture of Electronic Components, Computer, TV and etc.
France	234,115	234,115	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Mexico	165,638	165,638	64	46	Wholesale Trade and Commission Trade, Except of Vehicles
Italy	143,181	143,181	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Spain	142,091	142,091	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Malaysia	103,402	129,787	100	26	Manufacture of Electronic Components, Computer, TV and etc.
	18,741		75	26	Manufacture of Electronic Components, Computer, TV and etc.
	7,644		100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Indonesia	118,909	118,909	100	26	Manufacture of Electronic Components, Computer, TV and etc.
Taiwan	112,949	112,949	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Australia	111,964	111,964	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
India	75,263	107,050	100	26	Manufacture of Electronic Components, Computer, TV and etc.
	31,787		100	70	**Research and Development**
Canada	90,922	90,922	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Panama	86,962	86,962	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Hong Kong	79,033	79,033	100	46	Wholesale Trade and Commission Trade, Except of Vehicles

Poland	78,267	78,267	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Sweden	69,372	69,372	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Portugal	37,616	37,616	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
UAE	32,836	32,836	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
South Africa	32,622	32,622	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Austria	32,162	32,162	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Vietnam	28,365	28,365	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Argentina	6,779	6,779	98	71	Professional Services
Other Europe		263,767	56	26	Manufacture of Electronic Components, Computer, TV and etc.
Sum		33,118,850			

Notes: 1) OFDI in current million KRW.

2) The blue-colored rows represent having subsidiaries with a manufacturing function.

Table 1-3-4. *Samsung Electronics'* OFDI by its Foreign Subsidiary in 2006

Location	OFDI by Subsidiary	OFDI by Country	Owner-ship (%)	KSIC Code	Sector
China	280,459	1,114,811	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
	187,694		100	26	Manufacture of Electronic Components, Computer, TV and etc.
	151,736		100	26	Manufacture of Electronic Components, Computer, TV and etc.
	142,120		90	26	Manufacture of Electronic Components, Computer, TV and etc.
	97,843		81	26	Manufacture of Electronic Components, Computer, TV and etc.
	60,361		88	26	Manufacture of Electronic Components, Computer, TV and etc.
	55,046		78	28	Manufacture of Electrical Equipment
	37,784		90	26	Manufacture of Electronic Components, Computer, TV and etc.
	37,635		100	23	Manufacture of Other Non-metallic Mineral Products
	20,758		55	26	Manufacture of Electronic Components, Computer, TV and etc.
	18,516		42	26	Manufacture of Electronic Components, Computer, TV and etc.
	6,488		22	26	Manufacture of Electronic Components, Computer, TV and etc.
	4,236		60	26	Manufacture of Electronic Components, Computer, TV and etc.
	3,851		70	70	**Research and Development**
	3,678		100	70	**Research and Development**
	3,373		100	46	Wholesale Trade and Commission Trade, Except of Vehicles
	3,233		49	63	Information Service Activities
USA	771,889	773,889	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
	2,000		100	75	Business Support Services
Hungary	341,165	341,165	100	26	Manufacture of Electronic Components, Computer, TV and etc.
Singapore	217,075	294,833	70	46	Wholesale Trade and Commission Trade, Except of Vehicles
	77,758		100	75	Business Support Services
UK	269,509	269,509	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Malaysia	126,731	230,953	75	26	Manufacture of Electronic Components, Computer, TV and etc.
	99,425		100	28	Manufacture of Electrical Equipment
	4,797		100	28	Manufacture of Electrical Equipment
Germany	136,513	136,513	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Thailand	126,900	126,900	92	26	Manufacture of Electronic Components, Computer, TV and etc.
Indonesia	122,500	122,500	100	26	Manufacture of Electronic Components, Computer, TV and etc.
Japan	50,518	122,453	49	46	Wholesale Trade and Commission Trade, Except of Vehicles
	49,724		100	70	**Research and Development**
	21,873		51	46	Wholesale Trade and Commission Trade, Except of Vehicles
	338		29	26	Manufacture of Electronic Components, Computer, TV and etc.
Brazil	107,891	107,891	100	26	Manufacture of Electronic Components, Computer, TV and etc.
Spain	93,055	93,055	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
India	70,501	91,504	100	26	Manufacture of Electronic Components, Computer, TV and etc.
	11,089		100	58	Publishing Activities
	9,914		100	26	Manufacture of Electronic Components, Computer, TV and etc.
France	89,318	89,318	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Italy	71,154	71,154	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Australia	68,349	68,349	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Netherlands	50,443	55,630	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
	5,067		100	46	Wholesale Trade and Commission Trade, Except of Vehicles

	120		100	46	Wholesale Trade and Commission Trade, Except of Vehicles
	46,242		100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Russia	6,377	53,119	100	95	Maintenance and Repair Services
	500		67	46	Wholesale Trade and Commission Trade, Except of Vehicles
Canada	53,068	53,068	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Hong Kong	46,932	46,932	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Panama	46,286	46,286	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Taiwan	38,518	38,518	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Philippines	35,075	35,075	100	26	Manufacture of Electronic Components, Computer, TV and etc.
Poland	31,860	31,860	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Sweden	29,623	29,623	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
South Africa	23,834	23,834	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Portugal	20,500	20,500	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Vietnam	15,963	15,963	80	26	Manufacture of Electronic Components, Computer, TV and etc.
UAE	14,789	14,789	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Austria	13,109	13,109	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Argentina	4,689	4,689	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Syria	3,356	3,356	49	26	Manufacture of Electronic Components, Computer, TV and etc.
Chile	500	500	100	46	Wholesale Trade and Commission Trade, Except of Vehicles
Other Europe		130,276	56	26	Manufacture of Electronic Components, Computer, TV and etc.
Other South America		38,454	100	28	Manufacture of Electrical Equipment
Sum		4,710,378			

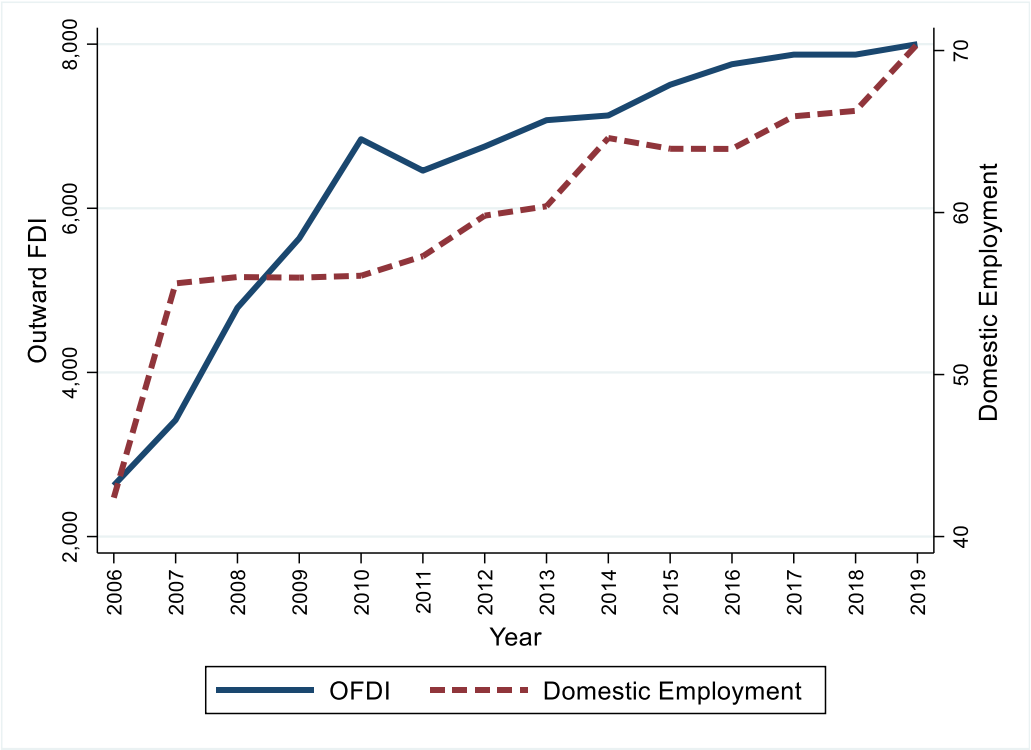
Notes: 1) OFDI in current million KRW.

2) The blue-colored rows represent having subsidiaries with a manufacturing function.

1.3.2. Case Study 2: Hyundai Motors

Hyundai Motor Group is the largest automobile corporation in Korea. It has a global network of 437 offices in 43 countries, as of 2020 (Hyundai Motor Group official website). The number of its employees is 278,735, as of 2020, with group sales of 271,758 billion KRW and with a net annual profit of 5,774 billion KRW in 2020. The group consists of Hyundai Motors and KIA Motors. In this section, I focus on Hyundai Motors.

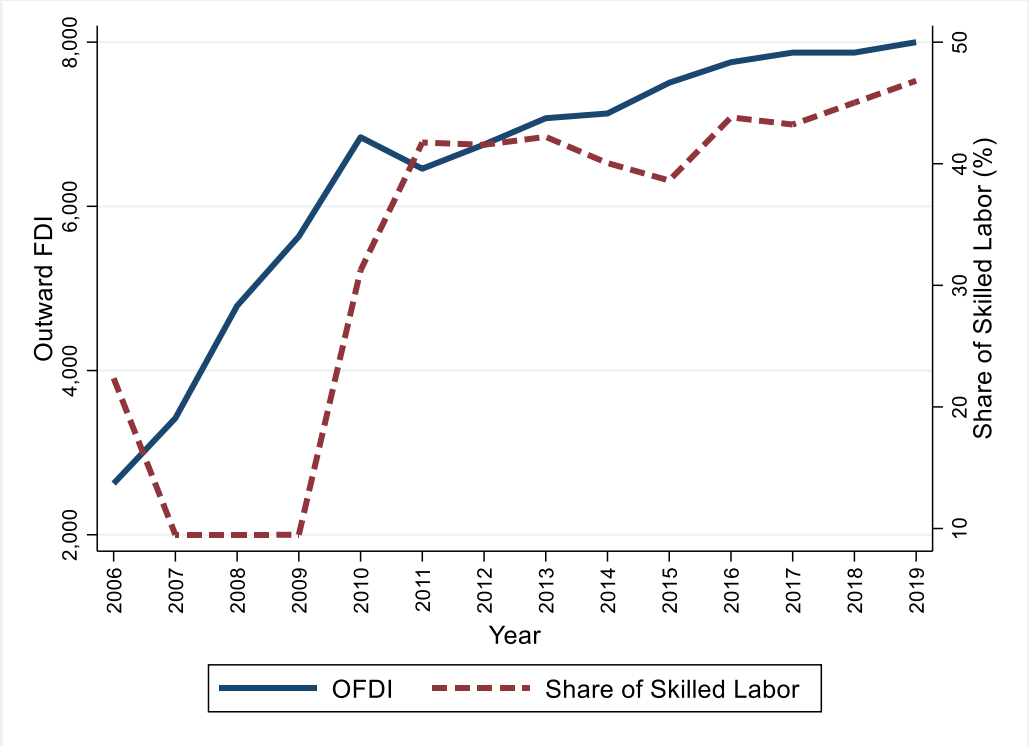
Figure 1-3-4. OFDI and Domestic Employment of *Hyundai Motors*



Source: FnGuide and Survey of Business Activities, Statistics Korea.
Note: OFDI in current billion KRW, employment in thousands.

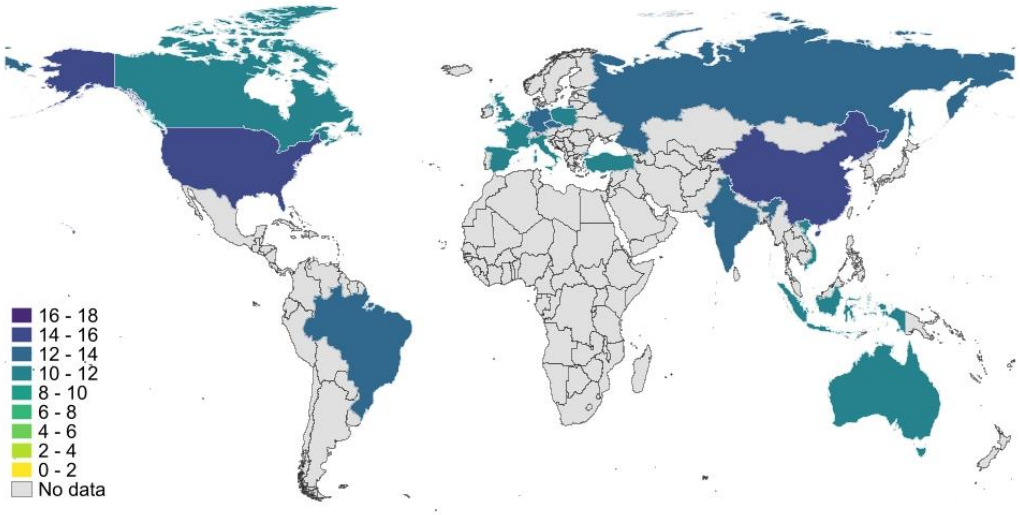
As illustrated in Figure 1-3-4, the trends of both Hyundai Motors' outward FDI and the percentage of Hyundai's employees who are located in Korea are increasing. The OFDI increased by three times and domestic employment increased by approximately 1.6 times from 2006 to 2019. This implies that domestic employment did not decrease, but rather increased as OFDI increased. The trend for share of skilled labor is also increasing since 2007, except for the period in which it decreased during 2013-2015. This is illustrated in Figure 1-3-5.

Figure 1-3-5. OFDI and Share of Skilled Labor of *Hyundai Motors*



Source: FnGuide and Survey of Business Activities, Statistics Korea.
Note: OFDI in current billion KRW, employment in thousands.

Figure 1-3-6. *Hyundai Motors'* OFDI by its Foreign Subsidiary in 2019



Note: OFDI in current million KRW.

Hyundai Motors has operated foreign subsidiaries in more than 18 countries, as of 2019, and previously in 2006, it operated foreign subsidiaries in more than 12 countries. The graphical world map is presented in Figure 1-3-6. In a similarly way to Samsung Electronics, it has invested the most in the United States and in China both in the years 2006 and 2019. The country rankings of Hyundai Motors' OFDI amount are presented in Table 1-3-5. As it is a global company with famous automobiles such as 'Genesis series', 'Azera', 'Santa Fe', and other small and SUV cars, it has established foreign subsidiaries in all five continents: Asia, Europe, America, and Oceania.

Table 1-3-5. *Hyundai Motors'* OFDI by its Foreign Subsidiary Location in 2019

Year 2006			Year 2019		
Rank	Destination Country	OFDI	Rank	Destination Country	OFDI
1	USA	1,354,468	1	USA	2,737,180
2	China	570,318	2	China	1,879,146
3	India	244,017	3	India	754,436
4	Czech	194,026	4	Czech	573,875
5	Germany	95,715	5	Brazil	469,269
6	Japan	44,090	6	Germany	287,782
7	Australia	42,183	7	Russia	287,337
8	Ukraine	36,681	8	Turkey	159,784
9	Poland	29,815	9	France	143,558
10	Norway	5,754	10	Canada	115,150
11	Slovenia	3,959	11	UK	103,280
12	Hungary	2,283	12	Netherlands	98,636
			13	Spain	86,589
			14	Indonesia	84,389
			15	Italy	73,890
			16	Australia	59,552
			17	Poland	53,052
			18	Vietnam	32,609
	Sum	2,623,309		Sum	7,999,514

Note: OFDI in current million KRW.

When taking a look at the more detailed information on subsidiary-level data as of 2019, which are listed in Table 1-3-6, Hyundai Motors operates foreign subsidiaries that are involved in manufacturing functions only in nine countries: USA, China, India, Czech Republic, Brazil, Russia, Turkey, Indonesia, and Vietnam. In 2006, it used to operate manufacturing subsidiaries only in three countries: USA, China, and India, as shown in Table 1-3-7, but six countries: Czech Republic, Brazil, Russia, Turkey, Indonesia, and Vietnam were added from 2006 to 2019. In contrast to the case of Samsung Electronics, it is clear that Hyundai is expanding its manufacturing sites around the globe.

Also, it operates research and development functioning subsidiaries in two

countries which are the USA and Germany. Furthermore, it has invested in subsidiary firms that are financial institutions in four countries: China, Canada, UK, and Netherlands. The rest of the subsidiaries are for sales purposes.

Table 1-3-6. *Hyundai Motor's* OFDI by its Foreign Subsidiary in 2019

Location	OFDI by Subsidiary	OFDI by Country	Owner-ship (%)	KSIC Code	Sector
USA	2,554,958	2,737,180	100	45	Sale of Motor Vehicles and Parts
	144,440		100	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
	37,782		100	70	**Research and Development**
China	1,564,859	1,879,146	50	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
	120,834		50	64	**Financial Institutions**, Except Insurance and Pension Funding
	92,959		22	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
	52,694		30	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
	47,800		24	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
India	754,436	754,436	100	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
Czech	573,875	573,875	100	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
Brazil	469,269	469,269	100	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
Germany	140,922	287,782	100	45	Sale of Motor Vehicles and Parts
	72,447		100	70	**Research and Development**
	41,631		100	45	Sale of Motor Vehicles and Parts
	32,782		100	45	Sale of Motor Vehicles and Parts
Russia	287,337	287,337	70	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
Turkey	159,784	159,784	70	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
France	143,558	143,558	100	45	Sale of Motor Vehicles and Parts
Canada	115,150	115,150	50	64	**Financial Institutions**, Except Insurance and Pension Funding
UK	65,067	103,280	60	64	**Financial Institutions**, Except Insurance and Pension Funding
	38,213		100	45	Sale of Motor Vehicles and Parts
Netherlands	68,041	98,636	98	64	**Financial Institutions**, Except Insurance and Pension Funding
	30,595		100	45	Sale of Motor Vehicles and Parts
Spain	86,589	86,589	100	45	Sale of Motor Vehicles and Parts
Indonesia	84,389	84,389	100	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
Italy	73,890	73,890	100	45	Sale of Motor Vehicles and Parts
Australia	59,552	59,552	100	45	Sale of Motor Vehicles and Parts
Poland	53,052	53,052	100	45	Sale of Motor Vehicles and Parts
Vietnam	32,609	32,609	50	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
Sum		7,999,514			

Notes: 1) OFDI in current million KRW.

2) The blue-colored rows represent having subsidiaries with a manufacturing function.

Table 1-3-7. *Hyundai Motors'* OFDI by its Foreign Subsidiary in 2006

Location	OFDI by Subsidiary	OFDI by Country	Owner-ship (%)	KSIC Code	Sector
USA	1,227,466	1,354,468	100	45	Sale of Motor Vehicles and Parts
	107,664		100	45	Sale of Motor Vehicles and Parts
	17,338		100	70	**Research and Development**
	2,000		75	28	Manufacture of Electrical Equipment
China	371,464	570,318	50	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
	91,315		70	45	Sale of Motor Vehicles and Parts
	53,494		60	64	**Financial Institutions**, Except Insurance and Pension Funding
	26,411		24	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
	14,266		50	64	**Financial Institutions**, Except Insurance and Pension Funding
	10,298		22	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
	3,070		92	64	**Financial Institutions**, Except Insurance and Pension Funding
India	244,017	244,017	100	30	Manufacture of Motor Vehicles, Trailers and Semitrailers
Czech Republic	194,026	194,026	100	45	Sale of Motor Vehicles and Parts
Germany	51,514	95,715	100	70	**Research and Development**
	24,984		100	45	Sale of Motor Vehicles and Parts
	19,217		30	45	Sale of Motor Vehicles and Parts
Japan	42,292	44,090	100	45	Sale of Motor Vehicles and Parts
	1,798		100	45	Sale of Motor Vehicles and Parts
Australia	42,183	42,183	100	45	Sale of Motor Vehicles and Parts
Ukraine	36,681	36,681	100	45	Sale of Motor Vehicles and Parts
Poland	29,815	29,815	100	45	Sale of Motor Vehicles and Parts
Norway	5,754	5,754	100	45	Sale of Motor Vehicles and Parts
Slovenia	3,959	3,959	80	45	Sale of Motor Vehicles and Parts
Hungary	2,283	2,283	100	45	Sale of Motor Vehicles and Parts
Sum		2,623,309			

Notes: 1) OFDI in current million KRW.

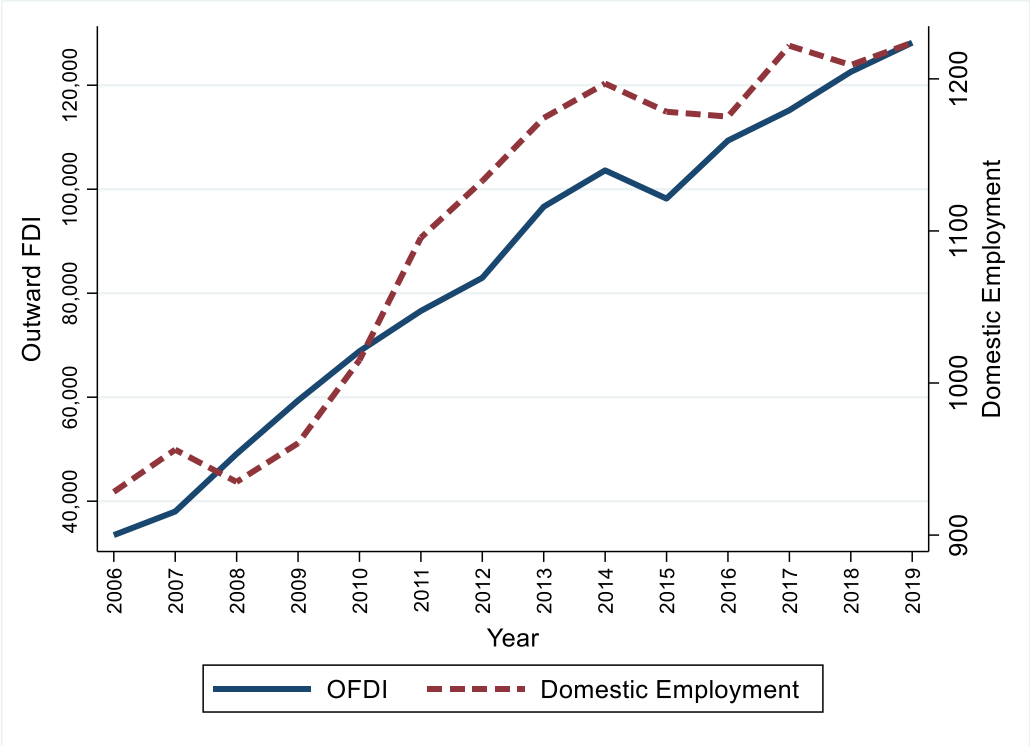
2) The blue-colored rows represent having subsidiaries with a manufacturing function.

1.3.3. Overall Trends in Korean Manufacturing Industry

In general, the total OFDI and the number of domestic employments of Korean manufacturing firms both have consistently risen in recent years, as depicted in Figure 1-3-7. However, the growth of domestic employment has considerably slowed since the year 2014, and has occasionally moved in different directions to the trend of OFDI at the same time. The broadly increasing trend is evident for the share of skilled labor in Figure 1-3-8. In the figures, I adjusted the monetary values with the producer price index (PPI) in the manufacturing sector[8] to convert to the constant terms by accounting for the changes in the price level.

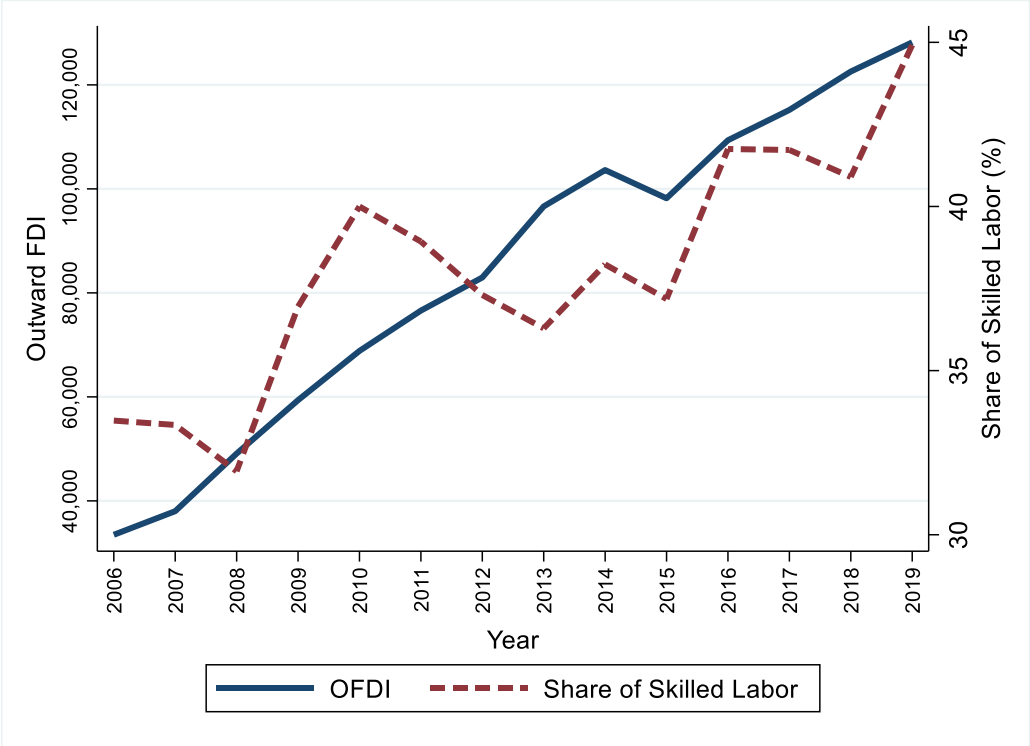
[8] Th producer price index for manufacturing sector of Korea with base year in 2016, is retrieved from Statistics Korea (original source: Bank of Korea).

Figure 1-3-7. Total OFDI and Domestic Employment of Korean Manufacturing Firms



Source: FnGuide and Survey of Business Activities, Statistics Korea.
Note: OFDI in constant billion KRW adjusted with 2016 PPI and employment in thousands.

Figure 1-3-8. Total OFDI and Share of Skilled Labor of Korean Manufacturing



Source: FnGuide and Survey of Business Activities, Statistics Korea.
Note: OFDI in constant billion KRW adjusted with 2016 PPI.

In summary, from the OFDI, domestic employment, and share of skilled labor trend graphs of Korea's two largest manufacturing companies, Samsung Electronics and Hyundai Motors, as well as for the overall Korean manufacturing industry, it is hard to conclude that OFDI and domestic employment move in different directions. OFDI, employment, and share of skilled labor all show increasing trends for Korean manufacturing firms in general.

1.4. Literature Review

It has been claimed by a myriad of researchers that outward investments can deteriorate the domestic labor market, as it could "put downward pressure on domestic wages by the opening up alternative sources of labor supply" (Harrison and McMillan, 2006), as well as result in a reduction in domestic employment. However, others such as Grossman and Rossi-Hansberg (2006) claimed that the productivity gains from offshoring could offset its negative impacts on the domestic labor market.

There have been numerous studies that have explored the effect of outward FDI on domestic employment using firm-level data. Desai et al. (2009) and Kovak et al. (2021) used US firm-level data and showed positive effects of outward FDI on parent firms' domestic employment level. On the other hand, Hong (2012) used Korean electronics and automobile industry firm-level data and found that in general, FDI had a negative impact on the total employment of parent firms. Studies such as Brainard and Ricker (1997a, 1996b) and Cuyvers et al. (2005) also support the claim for negative effects of outward FDI on domestic employment. In addition, Masso et al (2008) argued that there was a negative association between outward FDI and domestic employment, especially for the service sector. Furthermore, Barba Navaretti and Castellani (2004) and Castellani et al. (2008) found no significant impact of outward FDI on domestic employment in either direction.

Furthermore, there are studies that show, depending on the types of FDI, its consequences on domestic labor market can be different. Harrison and McMillan (2006)

found the effect of outward FDI on domestic employment was negative for FDI originating from high-income countries, but positive for FDI originating from low-income countries. Similarly, Braconier and Ekholm (2000), Becker et al. (2005), and Konings and Murphy (2006) showed the effect is negative for horizontal FDI, but found no significant effects for vertical FDI. On the contrary, Mariotti et al. (2003) estimated a negative effect of vertical FDI on domestic employment. Also, Hong and Moon (2017) analyzed South Korean multinational firms, and found that the magnitude of decrease in employment was the most severe for vertical FDIs. However, they observed that vertical FDI that accompanied intra-firm trade could increase domestic employment. They stated that the reason for this increase in domestic employment could be due to the productivity enhancement that came from replacing inter-firm trade to intra-firm trade as a consequence of vertical FDI activity, which could result in expansion of the business and hiring more labor. Furthermore, Hayakawa et al. (2013) found that Japanese multinational companies' FDI in both low- and high-income counties increased their net domestic employment.

The effects also differ depending on the destination of the FDI. Debaere et al. (2010) used a difference-in-difference approach and concluded that FDI directed to less-advanced countries decreased the parent firm's employment, while FDI directed to more-advanced countries did not affect the employment level in any significant way. Blomström et al. (1997) analyzed US and Swedish multinational firms and found that US firms, which focused their FDI on developing countries, decreased domestic employment, while Swedish firms, which focused their FDI on developed countries,

increased domestic employment. In addition, the effects differ according to the industry being labor- or capital-intensive. Mariotti et al. (2003) found that the FDI of firms in labor-intensive industries, directed towards to developing countries, negatively affected the domestic labor, while FDI of firms in capital-intensive industries directed to developed countries, increased domestic employment.

Table 1-4-1. List of Literature on OFDI and Domestic Employment

Previous Literature	Effects of Outward FDI
Barba Navaretti & Castellani (2004) Castellani et al. (2008)	No evidence of reduction in domestic employment, positive effects on share of skilled workers.
Brainard & Riker (1997) Cuyvers et al. (2005)	Negative effects on domestic employment
Ni et al. (2022)	Positive effects of FDI to Asia, Europe and North America on domestic employment
Harrison & McMillan (2006)	Negative effects for FDI to high-income countries, but positive effects on domestic employment for FDI to low-income countries.
Braconier & Ekholm (2000) Becker et al. (2005) Konings & Murphy (2006)	Negative effects for horizontal FDI, but no effects on domestic employment for vertical FDI
Mariotti, et al. (2003)	Negative effects on domestic employment for vertical FDI
Blomström et al. (1997)	Negative effects of FDI to developing countries and positive effects of FDI to developed countries on domestic employment
Debaere et al. (2010)	Negative effects of FDI to developing countries, but no effects of FDI to developed countries on domestic employment

Lipsey et al. (2000) Head & Ries (2001) Hijzen et al. (2004) Hansson (2005) Becker et al. (2013) Becker & Muendler (2008) Driffield et al. (2009) Hong and Moon (2017)	Positive effects on domestic employment for skilled, highly educated, or non-production side workers and / or Negative effects on domestic employment for unskilled, less-educated, or production side workers.
Masso et al. (2008)	Negative effects on domestic employment, especially for service sector

Source: Original version obtained from Hyun et al. (2010), modified and updated by the author.

Moreover, Hansson (2005) found positive effects of FDI on domestic employment of non-production labor, from an analysis of Swedish multinational firms. Similarly, Hong and Moon (2017) also showed that although FDI, in general, decreased domestic employment of production workers, it also increased the domestic employment of non-production workers. Similarly, Lipsey et al. (2000), Becker and Muendler (2008), Hijzen et al. (2004), and Driffield et al. (2009) all concluded that there was a positive effect of outward FDI on domestic employment for skilled, highly educated, or non-production workers, but negative effect for unskilled, less-educated, or production side workers. Feenstra and Hanson (1996) and Feenstra (2016) also described theoretical models that supported the idea of outward investments having heterogenous effects on domestic employment, depending on employment type (skilled and unskilled).

1.5. Skilled and Unskilled Labors

1.5.1. Implications of Differentiating by Labor Type

This study attempts to estimate the effects of outward FDI not only on total employment size, but also on the size of skilled and unskilled employments of parent firms. Comparative analysis which differentiates the total employment by employment types, i.e., skilled and unskilled workers, has been conducted in many literatures in the fields of international, development, and labor economics (Lipsey et al., 2000; Hijzen et al., 2004; Hansson, 2005; Becker & Muendler, 2008; Driffield et al., 2009). For example, Head and Ries (2001) and Becker et al. (2013) explored the effects of outward FDI (or offshoring) on employment structure of parent firms by estimating the wage-bill and employment share of unskilled workers (more specifically, 'routine workers'). I follow the method of Hong and Moon (2017), which directly estimates the effects of outward FDI on the number of production and non-production workers in labor demand equation, however, instead of referring to production side workers, I use the term 'unskilled' workers, and correspondingly, I used the term 'skilled' workers instead of non-production side workers.

Unskilled workers may be more vulnerable to their firms' FDI activities as they can be more easily replaced by other cheap labor in foreign countries. On the other hand, skilled workers are less easily found and more difficult to be replaced. Therefore, it can be important to analyze the employment types separately when estimating the effects of

outward FDI, as the results for them can be different and depending on the results, the policy suggestions for reshoring and FDI can be different.

1.5.2. Proxies for Skilled and Unskilled Labors

There are various ways to define skilled and unskilled workers. For example, OECD's 'World Indicators of Skills for Employment' defines the 'high skilled' as the workers with educational attainments of tertiary level (ISCED 5-6), and the 'low skilled' as the workers with educational attainments of below upper secondary (ISCED 0-2).

Also, more commonly, there are numerous studies which use non-production and production workers to construct proxies for skilled and unskilled labors (Amiti and Cameron, 2013; Bernard and Jensen, 1997; Feenstra and Hanson, 1996, 1997, 1999; Feenstra, 2016; Harrison and Hanson, 1999; Kasahara et al., 2016; Pavcnik, 2003; Pryor, 1999;). In Feenstra and Hanson (1996, 1997, 1999) and Feenstra (2016), the number of non-production and production workers are used to measure the relative wage and relative demand for skilled and unskilled labor. Pryor (1999) also uses this approximation, stating that "most investigators have used as a proxy of unskilled to skilled labor in a given industry the ratio of production workers to nonproduction workers." However, at the same time, the paper points out the limitations of this approximation by stating that "many of those skeptical of the relationship between trade and unemployment find this proxy an imperfect solution, especially because many production workers are considerably more skilled and educated than office clerks classified as nonproduction workers."

Although the author is acknowledging the various issues and dangers of defining skilled and unskilled workers as discussed in Cepla and Dempster (2021), since

the ground base for this paper's empirical analyses are from Feenstra and Hanson (1996), the same proxies, considering non-production workers as the unskilled and production workers as the skilled, are used.

1.6. Research Contribution

First, I analyze the complete set of Survey of Business Activities (SBA)'s firm-level microdata, which is a novel contribution. Statistics Korea only permits the public to have access to limited number of observations, and information on approximately 300 firms per year are not publicly provided, and these can be important and large firms, so that their share may not be small in the total FDI of Korea. The SBA data is a novel dataset and requires research proposal and approval procedures from Statistics Korea for full-access. I submitted a research proposal to gain access and it was reviewed by Statistics Korea, and after rounds of evaluation process, I was provided with the complete dataset. Third, I explored the SBA data thoroughly to summarize Korean firms' FDI activities during the period of 2006 to 2019. Reading section 2 of this paper will allow the readers to have a grasp of Korean firm-level microdata and the dynamics, evolution, and geographical descriptions of Korean firms' FDI activities.

Second, attempting to interpret the empirical results with Fenestra and Hanson (1996) offshoring model is another contribution. This paper shows how the effects of Korean manufacturing firms' outward FDI on skilled and unskilled labor composition follow the expected patterns of the model, and validates the model and its predictions. Another contribution is that this paper examines the employment growth effects of outward FDI, not only examining the level effects.

Third, the empirical strategy involves the use of instrumental variable to mitigate possible endogeneity issues, and this instrument used in this paper is not yet

discussed in any other previous research.

2. Model

2.1. Offshoring Model of Feenstra and Hanson (1996)

I provide a simple model that can portray a sketch of the hypothesis described in section 1. The model describes the changes in relative demands for skilled and unskilled labor in home country as a consequence of offshoring, and is developed by Feenstra and Hanson (1996). The model is later elaborated in Feenstra (2016) by introducing the home to foreign relative cost function to explain the location choice of a firm to carry out a set of production processes.

There are several assumptions in the model setting. There are two countries, 'Home' and 'Foreign', and the final good is produced through the production of a continuum of intermediate production processes, and these processes are indexed by $z \in [0,1]$. Here, the list of z is increasing by the skill-intensity of the corresponding production process. I note that the rank of z is not ordered by production, but ordered by technological skill-intensity. For instance, although the general production process starts from R&D and is followed by components production, assembly, and marketing and sales, the technological skill-intensity ordering from low to high starts from assembly, and is followed by components production, marketing and sales, and is highest for R&D. Therefore, components productions or assembly works have relatively low z while marketing or R&D works are assigned a relatively high z. Also, there are three factors of production; skilled labor, denoted by H who are paid a wage q, unskilled

labor, denoted by L and are paid a wage w, and capital, denoted by K with a rental rate of r. Further, the labor requirement for skilled workers to carry out a production process z is $a_H(z)$, and similarly, the labor requirement for unskilled workers to carry out a production process z is $a_L(z)$. All factors are assumed to be perfectly mobile across production processes, and are assumed to be immobile across countries. Moreover, is it assumed that $a_H(z)/a_L(z)$ is increasing in z, which means that the production process, where a higher skill-intensity is involved, requires relatively higher number of skilled labor and relatively lower number of unskilled labor.

It follows a Cobb-Douglas production function of

$$x(z) = A\left[min\left\{\frac{H(z)}{a_H(z)}, \frac{L(z)}{a_L(z)}\right\}\right]^{\theta} K(z)^{1-\theta} \tag{2-1-1}$$

where $a_H(z)$ and $a_L(z)$ denote for the total usage of skilled and unskilled workers to carry out a production process z, and θ is the labor share of the production function. Then, the final good Y is costlessly assembled according to the function:

$$\ln Y = \int_0^1 \alpha(z) \ln x\,(z) dz \tag{2-1-2}$$

with

$$\int_0^1 x(z) dz = 1 \tag{2-1-3}$$

Also, the cost function is given as:

$$c(z,w,q,r) = B(qa_H(z) + wa_L(z))^{\theta} r^{1-\theta} \tag{2-1-4}$$

where

$$B = \theta^{-\theta}(1-\theta)^{-(1-\theta)}A^{-1} \tag{2-1-5}$$

Here, it is assumed that technologies are identical across countries, however, the factor prices can be different, and thus, the relative wages for the skilled and the unskilled can also be different, i.e., $\frac{q}{w} \neq \frac{q^*}{w^*}$, and also, the rental rates for borrowing capital can be different, i.e., $r \neq r^*$, where the star notation (*) implies that the component is for the foreign country.

Here, the main interest is to determine the location of production, whether it is produced at home or abroad, for each intermediate production process z. This can be inferred by comparing the production costs between home and foreign country. If the relative cost between home and foreign, $\frac{c(z,q,w,r)}{c^*(z,q^*,w^*,r^*)}$ is greater than one, the intermediate production process is offshored to be carried out in foreign country, if it is smaller than one, the production process is carried out at home, and if it is equal to one, then the firm is indifferent between the two possible locations of production. Thus, it is necessary to determine the schedule of relative cost function, and determine whether it is increasing or decreasing in z. The relative cost function is defined as:

$$\frac{c(z)}{c^*(z)} = \frac{B(wa_L(z) + qa_H(z))^\theta r^{1-\theta}}{B^*(w^*a_L(z) + q^*a_H(z))^\theta r^{*1-\theta}} \tag{2-1-6}$$

and this can be reformulated as

$$\left(\frac{B}{B^*}\right)\left(\frac{wa_L(z) + qa_H(z)}{w^*a_L(z) + q^*a_H(z)}\right)^\theta \left(\frac{r}{r^*}\right)^{1-\theta}$$

$$= \left(\frac{B}{B^*}\right)\left(\frac{w + q\frac{a_H(z)}{a_L(z)}}{w^* + q^*\frac{a_H(z)}{a_L(z)}}\right)^\theta \left(\frac{r}{r^*}\right)^{1-\theta} \tag{2-1-7}$$

Since $\left(\frac{B}{B^*}\right) > 0$ and $\left(\frac{r}{r^*}\right)^{1-\theta} > 0$, the sign of derivative of $\left(\frac{w+q\frac{a_H(z)}{a_L(z)}}{w^*+q^*\frac{a_H(z)}{a_L(z)}}\right)^\theta$ determines the sign of $\partial\frac{c(z)}{c^*(z)}\Big/\partial z$. Using the quotient rule, it can be derived that:

$$\frac{\partial}{\partial z}\left(\frac{w + q\frac{a_H(z)}{a_L(z)}}{w^* + q^*\frac{a_H(z)}{a_L(z)}}\right) =$$

$$\frac{\left(qw^* + qq^*\frac{a_H(z)}{a_L(z)} - wq^* - qq^*\frac{a_H(z)}{a_L(z)}\right)\partial\frac{a_H(z)}{a_L(z)}\Big/\partial z}{\left(w^* + q^*\frac{a_H(z)}{a_L(z)}\right)^2} =$$

$$\frac{(qw^* - wq^*)\,\partial \frac{a_H(z)}{a_L(z)} \Big/ \partial z}{\left(w^* + q^* \frac{a_H(z)}{a_L(z)}\right)^2} \tag{2-1-8}$$

Here, it was assumed that $\frac{a_H(z)}{a_L(z)}$ was strictly increasing in z, and since the denominator $\left(w^* + q^* \frac{a_H(z)}{a_L(z)}\right)^2 > 0$, the sign of $(qw^* - wq^*)$ determines whether the relative cost between home and foreign is increasing or decreasing in z. Since $(qw^* - wq^*) = w^* w \left(\frac{q}{w} - \frac{q^*}{w^*}\right)$, the sign of $\partial \frac{c(z)}{c^*(z)} \Big/ \partial z$ is determined by the sign of $\frac{q}{w} - \frac{q^*}{w^*}$, the difference between relative wages of home and foreign workers.

2.2. Applying the Model to Case of South Korea

If we consider South Korea as the home country and her global offshoring partners as the foreign country, what will be the sign of the derivative of the relative cost function on z? To answer the question, it is necessary to estimate the structure of relative wages of South Korea. To investigate the relative level of South Korea's ratio of skilled to unskilled wages in the world, I used various global databases.

First, relative wages can be calculated using the earnings data for high-skilled and low-skilled employments from 'World Indicators of Skills for Employment' dataset from OECD Statistics. The variable 'Earnings: high skilled' is defined by the average hourly earnings by educational attainments of tertiary (ISCED[9] 5-6), and 'Earnings: low skilled' is defined by the average hourly earnings by educational attainments of below upper secondary (ISCED 0-2). The data are available by gender. Relative wages are calculated by dividing the high-skilled earnings by low-skilled earnings.

[9] 1997 International Standard Classification of Education (ISCED).

Table 2-2-1. Skilled to Unskilled Relative Wage by Country

	Male		Female	
Rank	Country	Relative Wage	Country	Relative Wage
1	SWE	1.393	SWE	1.247
2	FIN	1.493	DNK	1.382
3	DNK	1.589	FIN	1.414
4	NZL	1.604	NOR	1.423
5	NOR	1.614	ISL	1.439
6	GRC	1.629	FRA	1.505
7	GBR	1.661	GBR	1.563
8	ISL	1.665	NZL	1.567
9	ESP	1.685	GRC	1.705
10	IRL	1.721	IRL	1.717
11	FRA	1.765	BEL	1.775
12	AUS	1.770	MLT	1.807
13	BEL	1.823	ESP	1.818
14	MLT	1.880	AUS	1.869
15	**KOR**	**1.907**	NLD	1.899
16	JPN	1.951	**KOR**	**1.939**
17	CAN	1.988	LUX	1.961
18	LTU	2.022	CHE	1.982
19	NLD	2.036	AUT(OECD Avg)	2.116
20	CYP	2.038	LTU	2.119
21	CHE	2.092	CZE	2.140
22	EST	2.135	ITA	2.147
23	MKD	2.145	EST	2.148
24	LVA	2.207	LVA	2.195
25	LUX	2.213	JPN	2.199
26	ITA(OECD Avg)	2.230	CAN	2.245
27	ISR	2.340	SVK	2.247
28	BGR	2.412	MKD	2.278
29	HRV	2.450	ISR	2.316
30	POL	2.463	BGR	2.323
31	AUT	2.495	HRV	2.353
32	CZE	2.558	HUN	2.383
33	SVN	2.593	DEU	2.455
34	SVK	2.736	SVN	2.491
35	PRT	2.866	CYP	2.551
36	ROU	2.906	POL	2.729
37	DEU	2.967	ROU	2.823
38	HUN	3.101	PRT	2.992
39	USA	3.179	TUR	3.309
40	CHL	4.226	USA	3.344
41	TUR	4.232	CHL	4.024
42	BRA	4.838	BRA	5.176

Source: World Indicators of Skills for Employment, OECD.

Notes: 1) OECD average for male is 2.227 and that for female is 2.109.

2) Reference year of the data ranges from 2010 to 2014.

Second, similarly, relative wages of the people who attained tertiary education data of 'OECD Education at a Glance 2022' can be used. This data is a relative term where the wage level of those who attained upper secondary education is set to be 100.

Table 2-2-2. Relative Wages between the Tertiary Education Group and the Upper Secondary Education Group by Country

Rank	Country	Relative Wage	Rank	Country	Relative Wage
1	NOR	119.4	16	SVK (OECD Avg)	154.2
2	DNK	124.3	17	POL	157.1
3	SWE	125.8	18	MEX	158.3
4	NZL	126.6	19	CZE	158.6
5	EST	126.6	20	ISR	160.0
6	FIN	133.6	21	IRL	160.7
7	**KOR**	**135.1**	22	DEU	162.4
8	AUS	135.3	23	LUX	163.5
9	CAN	136.6	24	SVN	165.0
10	GRC	138.4	25	PRT	169.7
11	BEL	138.8	26	USA	171.0
12	ESP	141.2	27	HUN	173.2
13	LVA	147.0	28	LTU	179.7
14	AUT	148.5	29	CRI	208.0
15	NLD	149.1	30	CHL	241.4

Source: Education at a Glance, OECD.

Notes: 1) OECD average is 153.6.

2) Reference year of the data ranges from 2017 to 2022 and the most recent available data are presented.

From Table 2-2-1 and Table 2-2-2, it can be estimated that Korea's relative wage between tertiary-education and lower-education groups is relatively low compared to the OECD average. It suggests that Korea's college premium in labor market is low, and it can be inferred that the skilled to unskilled relative wage is not high in Korea.

Third, the labor protection level such as making it difficult to dismiss regular workers, can be a signal for higher relative wage of unskilled workers, since currently

employed unskilled workers benefit more from the labor protection policies than the skilled workers. According to OECD statistics, South Korea's labor protection is the 13th highest among 34 OECD countries, and the level is close to Sweden.

Table 2-2-3. Level of Labor Protection by Country

Rank	Country	Labor Protection	Rank	Country	Labor Protection
1	PRT	3.694	20	MEX	2.238
2	CZE	3.330	21	ESP	2.146
3	NLD	3.323	22	LUX	2.136
4	LVA	3.020	23	FIN(OECD Avg)	2.065
5	TUR	2.976	24	EST	1.965
6	ITA	2.849	25	BEL	1.853
7	GRC	2.703	26	HUN	1.796
8	CHL	2.675	27	NZL	1.714
9	SVK	2.662	28	ISL	1.550
10	DEU	2.595	29	AUS	1.542
11	FRA	2.541	30	COL	1.540
12	LTU	2.460	31	DNK	1.509
13	SWE	2.446	32	GBR	1.429
14	**KOR**	**2.417**	33	CHE	1.429
15	ISR	2.369	34	JPN	1.393
16	SVN	2.351	35	IRL	1.176
17	NOR	2.333	36	CRI	0.683
18	POL	2.325	37	CAN	0.587
19	AUT	2.286	38	USA	0.093

Source: Indicators of Employment Protection, OECD.
Notes: 1) OECD average is 2.060.
2) The data presented are 2006 to 2019 averages.

Fourth, the enrollment rate in tertiary education (college or university) can indicate the relative abundance of skilled labor in a country. The OECD's Education at a Glance dataset provides population share with tertiary education.

Table 2-2-4. 25-34-year-olds' Population Share with Tertiary Education

Rank	Country	Percentage	Rank	Country	Percentage
1	**KOR**	**69.8**	23	EST	42.8
2	CAN	63.0	24	GRC	42.4
3	JPN	61.5	25	ISL	42.2
4	IRL	55.4	26	FIN	41.8
5	LTU	55.2	27	AUT	41.6
6	LUX	55.0	28	SVK	39.2
7	CHE	52.7	29	G20	38.0
8	AUS	52.5	30	PRT	37.4
9	GBR	51.8	31	TUR	35.3
10	USA	50.4	32	DEU	33.3
11	NLD	49.1	33	CZE	32.6
12	NOR	48.7	34	CRI	31.3
13	SWE	48.4	35	HUN	30.6
14	FRA	48.1	36	COL	29.9
15	BEL	47.3	37	ITA	27.9
16	DNK	47.1	38	MEX	23.6
17	ISR	47.0	39	BRA	21.0
18	ESP	46.5	40	IND	19.5
19	SVN(OECD Avg)	44.1	41	ARG	18.9
20	LVA	43.8	42	IDN	17.5
21	NZL	43.8	43	ZAF	14.5
22	POL	43.5			

Source: Education at a Glance, OECD.

Notes: 1) OECD average is 44.8.

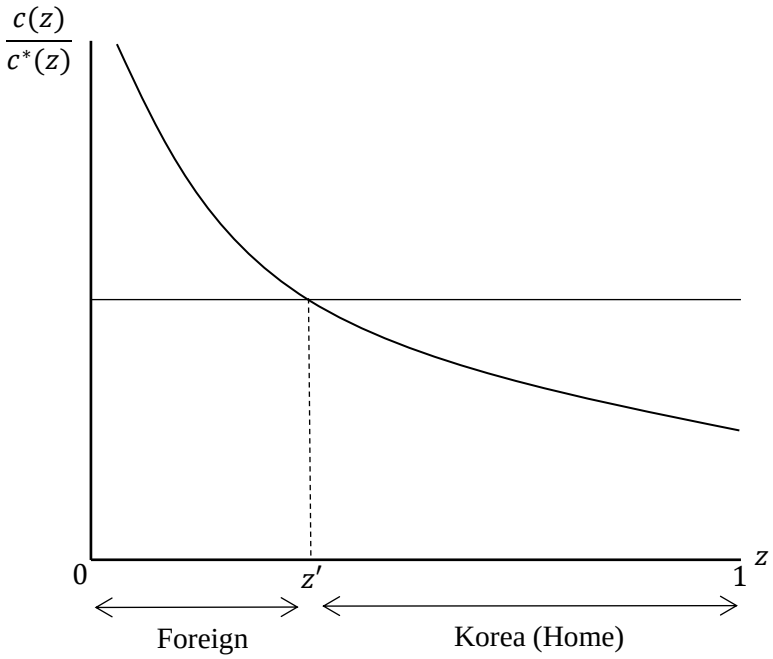
2) The reference year for the data presented is 2019.

South Korea's 25-to-34-year-old population share with tertiary education has been the highest among the OECD countries for more than 10 years. This suggest that South Korea is a skilled-labor-abundant country that is likely to offshore the low-skilled tasks to foreign countries.

In summary, it can be concluded that South Korea has a comparably low skilled to unskilled relative wage in the world. South Korea's skilled to unskilled relative wage is below OECD average, suggesting a low $\frac{q}{w}$, South Korea's relative wage between the high-educated and the low-educated is below the OECD average, also suggesting a low

$\frac{q}{w}$, South Korea's labor protection level is high and close to that of Sweden, implying a high w, and South Korea is abundant with skilled labor, implying for her tendency to offshore for the low-skilled z. Therefore, globally, South Korea's case is likely to be the case of $\frac{q}{w} < \frac{q^*}{w^*}$, and therefore, her relative cost curve, in general, is likely to be a decreasing function of z. Thus, the relative cost schedule for south Korea can be depicted as in Figure 2-2-1.

Figure 2-2-1. South Korea's Relative Wage Curve



Ultimately, intermediate production processes from z' to 1 are tasked domestically as their cost of production in Korea is cheaper, and the production processes from 0 to z' are offshored in foreign countries because their costs of

production are cheaper abroad than in Korea.

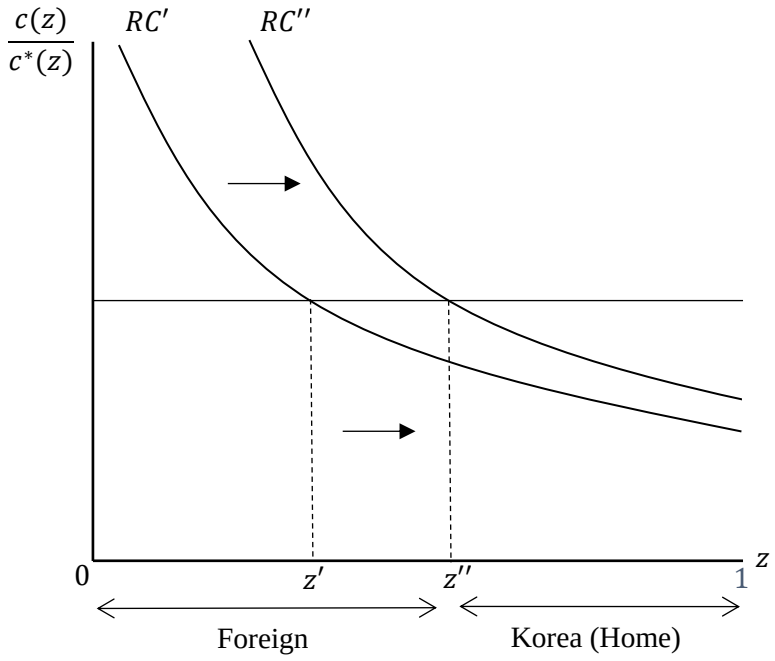
2.3. Consequences of Outward FDI

At status quo, home country is offshoring a certain range of production processes from 0 to z' due to the cost differences. Then, what will happen if the home country invests capital, i.e., outward FDI, in the foreign country? This capital flow from home to foreign will reduce the rental rate abroad, as there are more capital available in the foreign country, and will increase the rental rate at home because the domestic firm now have less capital available and have increased demand for borrowing capital. Recall that

$$\frac{c(z)}{c^*(z)} = \frac{B(wa_L(z) + qa_H(z))^{\theta} r^{1-\theta}}{B^*(w^*a_L(z) + q^*a_H(z))^{\theta} r^{*1-\theta}} \tag{2-3-1}$$

When the rental rate at home, r, increases and that in the foreign country, r^*, decreases, the relative cost, $\frac{c(z)}{c^*(z)}$, increases permanently, and the relative cost curve shifts upwards as in Figure 2-3-1.

Figure 2-3-1. Consequences of Outward FDI



When outward FDI from home increases, the relative cost curve moves from, RC' to RC'', and as a result, the borderline intermediate production process changes from z' to z'', implying that the range of offshoring is also increased. The production process conducted domestically has become more skill-intensive as the list of intermediate production process narrowed down from $[z', 1]$ to $[z'', 1]$. As a consequence, the relative demand for skilled labor at home increases, and relative demand for unskilled labor at home decreases. In summary, an increase in outward FDI reduces firms' relative demand for unskilled labor and increases the relative demand for skilled labor. This idea of capital flow increasing z' even with factor prices changing

endogenously is elaborated in the study of Feenstra & Hanson (1996), and it states the corollary that the "pattern of … employment changes … hold for any increase in the [foreign] capital stock relative to that in the [home country], or any increase in the technology parameter A^* relative to A."[10]

[10] Not only the capital flows (outward FDI) from home to foreign country, but also the exogenous shocks that increase A^* relative to A also increases z'. For instance, these exogenous shocks can happen when there is a neutral technological progress abroad but exceeding such progress at home, when tax rate at home increases, when subsidy decreases, when labor union power at home is strengthened, etc.

2.4. Model Implications and Hypothesis

The model's main implication is that the capital movement (outward FDI) from home country, of which the skilled to unskilled relative wage is relatively low and which is abundant with skilled labor, to foreign countries leads to an increase in skill-intensity of domestic production process, and this again leads to a relative increase in domestic skilled employment and relative decrease in domestic unskilled employment. Even though the model is only describing the relative changes in the composition of skilled and unskilled domestic employment, it can imply that outward FDI has a negative impact on unskilled employment and positive impact on skilled employment.

I argue that this theory and phenomenon are applicable to the case of South Korean firm dynamics of outward FDI and domestic employment, of which the supporting statistics are discussed in section 2.2. Therefore, I hypothesize that first, Korean manufacturing firms' FDI will increase the domestic proportion of skilled employment and decrease the domestic proportion of unskilled labor. Second, since the outward FDI changes the industrial structure of South Korea towards a more skill-intensive structure, Korean manufacturing firms' FDI will not only increase the domestic proportion of skilled employment, but also will increase the absolute magnitude and growth rate of domestic skilled employment. Conversely, Korean manufacturing firms' FDI will not only decrease the domestic proportion of unskilled employment, but will also increase the absolute magnitude and growth rate of domestic unskilled employment.

3. Data

3.1. Introduction to SBA Data

SBA, the Survey of Business Activities[11] panel data is constructed by, and can be acquired from Statistics Korea. It contains firm-level data of firms with equal to or more than fifty full-time workers and which have capital stock of more than 300 million Korean Won. It also contains the following information on the parent firms' foreign subsidiaries: the location of the subsidiary and the amount of investment. In the SBA panel dataset from the years 2006 to 2019, there are 166,682 observations in total, and out of these, 83,253 observations are data of manufacturing firms. The FDI data in SBA is defined as the amount of investment to subsidiaries located abroad. It is not in flow, but in the stock term. It its thus the same as the outward FDI in stock. Also, the SBA provides subsidiary data which include the location of subsidiary, the amount of investment stock, and the business industry of the subsidiary.

The data consists of the characteristics of 21,408 companies during 2006-2019 period. Also, approximately 200 variables are available, but the number varies by year. The variables include industry, employment (production worker and non-production worker), export and import (intra-firm[12] and inter-firm), number of patents granted, and

[11] 기업활동조사 in Korean

[12] Within-firm (parent firm and its subsidiaries) trade data are available.

basic financial balance sheet such as revenue, operating expense, wage cost, assets (tangible and non-tangible), equity, debt, etc. Furthermore, the data includes large- and middle-level industry classifications. The classification is in accordance with the 9th KSIC industry classification[13]. There are 19 large-level classifications and 73 middle-level classifications in the data.[14]

Moreover, Statistics Korea provides a dataset for subsidiaries of SBA sample firms (which are known as SBA Affiliates), which contains information on investments of foreign and domestic subsidiaries of the SBA sample firms. Subsidiary firm data includes variables on the amount of investment, location of the subsidiary (region in Korea or foreign country name), the share of ownership of the subsidiary, the industry of business operation, the parent firm's firm-specific ID code, and year. The ownership lies between 10 to 100 percent.

Throughout this section, the monetary data are in 'current' terms as in the raw data, and to be consistent with the raw data. However, in the empirical analysis, I adjust the monetary values with the producer price index in the manufacturing sector to convert to the constant terms by accounting for the changes in the price level.

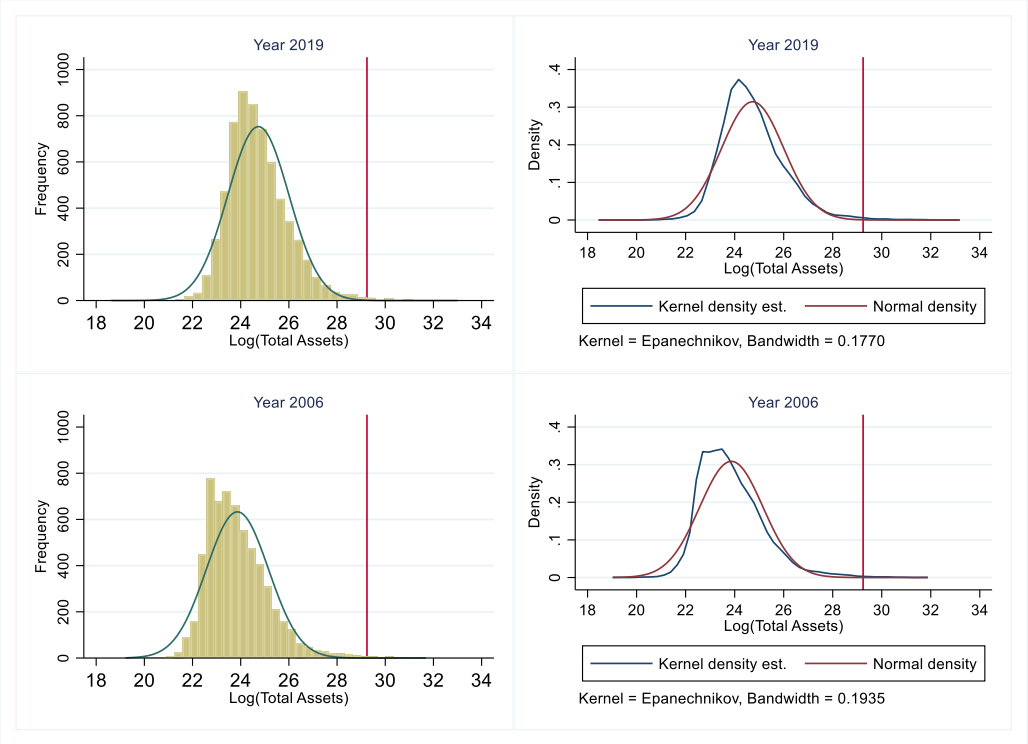
The threshold of total assets for large firms is 5 trillion KRW and that for SMEs is 500 billion KRW. Here, we explore the distribution of SBA manufacturing firms by

[13] The 9th Korean Standard Industry Classification ('제9차 한국표준산업분류' in Korean).

[14] See Appendix 1 for the fully detailed industry descriptions.

the size of the total assets.

Figure 3-1-1. Histogram and Kernel Density Estimates: Total Assets

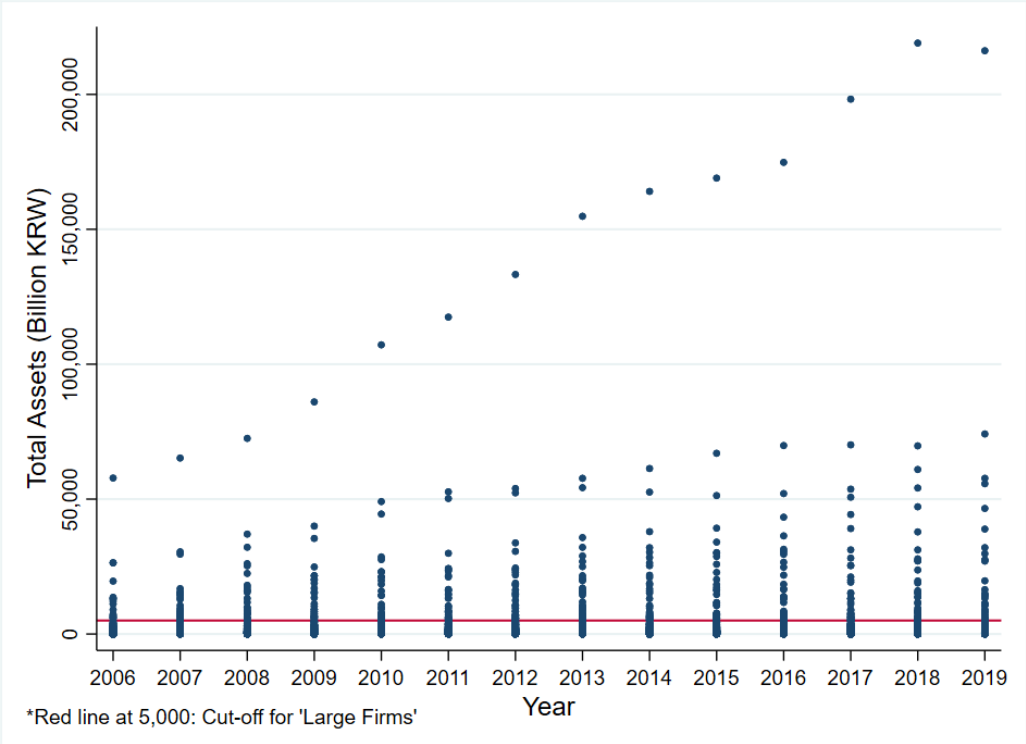


Source: Calculated by the author with data from Survey of Business Activities, Statistics Korea.
Note: 1) Total assets data are adjusted by the 2016 producer price index.
2) Red reference lines denote threshold for the 'large firms' (log of 5 trillion KRW=29.24).

When looking at the density estimates of total assets of Korean manufacturing firms in Figure 3-1-1, the cut-off for large firms (log of 5 trillion KRW) is located at far most right-side of the mean of the density functions. Furthermore, the Kernel density estimates suggest that the asset sizes are left skewed compared to the normal distribution, implying that in the industrial structure of Korea, a small number of firms hold a large

amount of assets.

Figure 3-1-2. Scatter Plot: Total Assets by Year



Source: Calculated by the author using data from Survey of Business Activities, Statistics Korea.

The demonstration of left skewedness in corporate assets of Korea's industrial structure is also shown in the scatter plot of Figure 3-1-2. The cut-off threshold for large firms (5 trillion or 5000 billion) seems to be located at a very low position, indicating a large difference in asset sizes between the SMEs and large firms.

The number of sample companies and yearly amount of FDI vary, but lies between 10,748 (2007) and 13,255 (2019) for the number of firms, and between 40,179

(2006) and 184,071 (2019) for the FDI amount, as portrayed in Table 3-1-1 and 3-1-2, respectively. The values decreased during the global financial crisis period, but both have monotonically increased since then.

Table 3-1-1. Number of SBA Sample Firms by Year

Year	2006	2007	2008	2009	2010	2011	2012
A: All	10,786	10,748	10,928	10,884	11,045	11,722	12,011
B: Manufacturing	6,082	5,927	5,868	5,567	5,409	5,833	6,163
B/A (%)	56.4	55.1	53.7	51.1	49.0	49.8	51.3
Year	2013	2014	2015	2016	2017	2018	2019
A: All	12,232	12,417	12,460	12,471	12,579	13,144	13,255
B: Manufacturing	6,091	5,949	5,816	6,017	6,113	6,288	6,330
B/A (%)	49.8	47.9	46.7	48.2	48.6	47.8	47.8

Source: Calculated by the author using data from Survey of Business Activities, Statistics Korea.

While the number of total firms has increased by 22.9%, the number of manufacturing firms has only increased slightly, rising from 6,082 in 2006 to 6,330 in 2019. This implies that firms in other industries such as the service sector have been the main source of the increase in the overall number of firms in Korea.

Table 3-1-2. FDI Amount of SBA Sample Firms by Year

Year	2006	2007	2008	2009	2010	2011	2012
A: All	40,177	46,685	65,079	74,501	89,803	102,601	111,413
B: Manufacturing	33,487	38,024	49,096	59,369	68,992	76,595	82,960
B/A (%)	83.3	81.4	75.4	79.7	76.8	74.7	74.5
Year	2013	2014	2015	2016	2017	2018	2019
A: All	125,489	136,251	136,870	150,293	154,869	171,149	184,070
B: Manufacturing	96,638	103,623	98,190	109,354	115,191	122,567	128,186
B/A (%)	77.0	76.1	71.7	72.8	74.4	71.6	69.6

Source: Calculated by the author using data from Survey of Business Activities, Statistics Korea.
Note: Unit of FDI is in current billion KRW.

While the number of firms in the manufacturing industry has not grown much, the FDI amount in the manufacturing industry has increased substantially since 2006.

Next, there are subsidiaries for various purposes. SBA dataset provides the information of subsidiary firms' industry as deep as in the middle-level KSIC classification. The subsidiaries that are classified as manufacturing firms may be more important in analyzing horizontal and vertical FDI cases in the perspective of global value chains. Therefore, I created two kinds of FDI dataset: 1) the first is the FDI of the subsidiaries of all industries, which I will call the 'all-purpose FDI', and 2) the second is the FDI of subsidiaries that are in the manufacturing sector, which I will call the 'manufacturing-purpose FDI'. The FDI amounts for these two types are presented in Table 3-1-3.

Table 3-1-3. FDI Amount of SBA Manufacturing Firms by Year and Purpose of FDI

Year	2006	2007	2008	2009	2010	2011	2012
A: All-purpose FDI	33,487	38,024	49,096	59,369	68,840	76,595	82,960
B: Manufacturing-purpose FDI	23,934	24,444	28,468	33,432	37,880	41,541	45,685
B/A (%)	71.5	64.3	58.0	56.3	55.0	54.2	55.1
Year	2013	2014	2015	2016	2017	2018	2019
A: All-purpose FDI	96,638	103,485	98,190	109,354	115,191	122,567	128,186
B: Manufacturing-purpose FDI	54,712	66,938	60,218	59,318	68,350	72,678	76,234
B/A (%)	56.6	64.7	61.3	54.2	59.3	59.3	59.5

Source: Calculated by the author with data from Survey of Business Activities, Statistics Korea.
Note: Unit of FDI is in current billion KRW.

The sum of FDI amount of manufacturing-purpose FDI takes up around 60~70% of the total FDI of all-purpose FDI, far exceeding the half of the total FDI of manufacturing firms. Thus, it can be said that Korean manufacturing firms' purpose of FDI is to establish subsidiary firms that are involved in manufacturing processes.

Furthermore, the number of SBA sample firms that conduct FDI is slowly increasing throughout the period of 2006 to 2019, for all industry and manufacturing firms as shown in 3-1-4.

Table 3-1-4. Number of SBA Sample Firms That Conduct FDI by Year

Year	2006	2007	2008	2009	2010	2011	2012
A: All	2,170	2,269	2,201	2,207	2,222	2,308	2,451
B: Manufacturing	1,659	1,717	1,656	1,631	1,629	1,687	1,758
B/A (%)	76.5	75.7	75.2	73.9	73.3	73.1	71.7
Year	2013	2014	2015	2016	2017	2018	2019
A: All	2,560	2,608	2,609	2,576	2,797	2,871	2,874
B: Manufacturing	1,835	1,837	1,804	1,796	1,958	1,961	1,947
B/A (%)	71.7	70.4	69.1	69.7	70.0	68.3	67.7

Source: Calculated by the author using data from Survey of Business Activities, Statistics Korea.

Also, as described in Table 3-1-5, the number of foreign subsidies has almost doubled from 5,175 in 2006 to 9,295 in 2019 and almost monotonically increased.

Table 3-1-5. Number of SBA Sample Firms' Foreign Subsidiaries by Year

Year	2006	2007	2008	2009	2010	2011	2012
A: All	5,175	5,574	5,435	5,942	6,359	6,757	7,205
B: Manufacturing	3,781	4,046	3,833	4,205	4,423	4,651	4,849
B/A (%)	73.1	72.6	70.5	70.8	69.6	68.8	67.3
Year	2013	2014	2015	2016	2017	2018	2019
A: All	7,684	7,963	8,208	8,125	8,717	9,156	9,295
B: Manufacturing	5,184	5,282	5,348	5,424	5,796	5,938	5,954
B/A (%)	67.5	66.3	65.2	66.8	66.5	64.9	64.1

Source: Calculated by the author using data from Survey of Business Activities, Statistics Korea.
Note: Subsidiaries located in North Korea are counted as a foreign subsidiary.

In addition, the time-series trends of the number of country-level foreign location for FDI seems interesting as the number seems to be slightly decreasing (from 64 countries in 2006 to 58 countries in 2019), and this is specified in Table 3-1-6 below.

Table 3-1-6. Number of Country-level Foreign Locations of Subsidiaries by Year

Year	2006	2007	2008	2009	2010	2011	2012
A: All	90	91	91	95	98	98	100
B: Manufacturing	82	80	81	82	83	86	88
B/A (%)	91.1	87.9	89.0	86.3	84.7	87.8	88.0

Year	2013	2014	2015	2016	2017	2018	2019
A: All	103	101	101	100	102	102	104
B: Manufacturing	90	92	92	92	88	89	89
B/A (%)	87.4	91.1	91.1	92.0	86.3	87.3	85.6

Source: Calculated by the author using data from Survey of Business Activities, Statistics Korea.
Note: North Korea is counted as a foreign country.

3.2. FDI Data by Sector

As previously discussed and also shown in Table 3-2-1, the manufacturing sector is the largest sector in Korea's FDI activities, accounting for 74.4% of Korea's total outward FDI stock (2006~2019), and is followed by 'financial and insurance activities' and 'wholesale and retail trade' sectors.

Table 3-2-1. Share of Outward FDI by SBA Sample Firm's Large-level Industry

Large-level Industry		Sum 2006-2019		2006		2019	
Code	Description	Value	Share	Value	Share	Value	Share
C	Manufacturing	1,182,274	74.39	33,487	83.34	128,186	69.64
K	Financial and insurance activities	126,972	7.99	1,483	3.69	18,420	10.01
G	Wholesale and retail trade	97,457	6.13	2,128	5.30	9,434	5.13
J	Information and communications	46,308	2.91	850	2.12	7,951	4.32
F	Construction	42,473	2.67	673	1.67	3,774	2.05
H	Transportation	29,371	1.85	1,112	2.77	3,193	1.73
M	Professional, scientific and technical activities	28,504	1.79	141	0.35	7,501	4.08
D	Electricity, gas, steam and water supply	16,553	1.04	15	0.04	2,913	1.58
I	Accommodation and food service activities	11,328	0.71	59	0.15	1,776	0.96
L	Real estate activities and renting and leasing	4,770	0.30	135	0.34	479	0.26
R	Arts, sports and recreation related services	1,031	0.06	45	0.11	92	0.05
N	Business facilities management and business support services	904	0.06	14	0.03	239	0.13
A	Agriculture, forestry and fishing	612	0.04	14	0.04	63	0.03
P	Education	378	0.02	3	0.01	40	0.02
E	Sewerage, waste management, materials recovery and remediation activities	206	0.01	4	0.01	9	0.00
B	Mining and quarrying	73	0.00	4	0.01	0	0.00
S	Membership organizations, repair and other personal services	39	0.00	12	0.03	1	0.00
Q	Human health and social work activities	1	0.00	0	0.00	0	0.00
Total Sum		*1,589,253*	*100.00*	*40,177*	*100.00*	*184,070*	*100.00*

Source: Calculated by the author using data from Survey of Business Activities, Statistics Korea.
Note: Unit of FDI value is in billion KRW, and that for share is percentage.

Table 3-2-2. Share of Outward FDI for 20 Middle-level Industries using SBA Data

Middle-level Industry		Sum 2006-2019		2006		2019	
Code	Description	Value	Share	Value	Share	Value	Share
26	Manufacture of Electronic Components, Computer, Radio, Television and Communication Equipment and Apparatuses	437,596	27.53	10,957	27.27	54,439	29.58
30	Manufacture of Motor Vehicles, Trailers and Semitrailers	214,508	13.50	12,341	30.71	20,732	11.26
24	Manufacture of Basic Metal Products	108,063	6.80	1,892	4.71	10,577	5.75
20	Manufacture of chemicals and chemical products except pharmaceuticals, medicinal chemicals	107,473	6.76	1,436	3.57	15,113	8.21
64	Financial Institutions, Except Insurance and Pension Funding	84,263	5.30	877	2.18	11,048	6.00
46	Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles	76,096	4.79	1,928	4.80	7,634	4.15
28	Manufacture of electrical equipment	54,652	3.44	581	1.45	4,554	2.47
22	Manufacture of Rubber and Plastic Products	51,892	3.27	1,096	2.73	4,562	2.48
29	Manufacture of Other Machinery and Equipment	51,778	3.26	727	1.81	3,937	2.14
41	General Construction	39,982	2.52	651	1.62	3,664	1.99
10	Manufacture of Food Products	35,222	2.22	849	2.11	4,215	2.29
71	Professional Services	26,303	1.66	70	0.17	7,194	3.91
66	Activities Auxiliary to Financial Service and Insurance Activities	26,031	1.64	366	0.91	5,298	2.88
31	Manufacture of Other Transport Equipment	24,124	1.52	552	1.37	1,257	0.68
47	Retail Trade, Except Motor Vehicles and Motorcycles	21,027	1.32	199	0.50	1,760	0.96
25	Manufacture of Fabricated Metal Products, Except Machinery and Furniture	17,914	1.13	425	1.06	2,181	1.19
14	Manufacture of wearing apparel, Clothing Accessories and Fur Articles	17,868	1.12	494	1.23	1,688	0.92
65	Insurance and Pension Funding	16,678	1.05	240	0.60	2,074	1.13
35	Electricity, gas, steam and air conditioning supply	16,553	1.04	15	0.04	2,913	1.58
50	Water Transport	12,952	0.81	740	1.84	390	0.21
	Top-20 Sum	*1,440,976*	*90.67*	*36,438*	*90.69*	*165,229*	*89.76*
	Total Sum	*1,589,253*	*100.00*	*40,177*	*100.00*	*184,070*	*100.00*

Source: Calculated by the author using data from Survey of Business Activities, Statistics Korea.
Note: Unit of FDI value is in billion KRW, and that for share is percentage.

For middle-level industries, as shown in Table 3-2-2, firms which produce

electronic devices such as mobile phones, computers, and TVs (hence manufacture electronic components, computer, radio, television and communication equipment and apparatuses) and automobile firms (which manufacture motor vehicles, trailers, and semitrailers) are the most actively engaged in FDI activities.

3.3. FDI Data by Location of Foreign Subsidiaries

According to the SBA dataset as depicted in Table 3-3-1, Korean firms, in general, invest the most in China throughout the period 2006 to 2019.

Table 3-3-1. Share of Outward FDI of Korean firms to Top 20 Foreign Locations (All Industry)

Country		Sum 2006-2019		2006		2019	
ISO	Name	Value	Share	Value	Share	Value	Share
CHN	China	523,999	32.97	18,425	45.86	52,206	28.36
USA	USA	294,662	18.54	6,171	15.36	41,483	22.54
HKG	Hong Kong	85,669	5.39	2,073	5.16	9,744	5.29
VNM	Vietnam	72,113	4.54	905	2.25	10,661	5.79
SGP	Singapore	49,220	3.10	906	2.26	6,483	3.52
IDN	Indonesia	46,274	2.91	657	1.64	5,736	3.12
IND	India	44,361	2.79	884	2.20	5,044	2.74
JPN	Japan	39,778	2.50	709	1.76	4,053	2.20
BRA	Brazil	32,980	2.08	620	1.54	2,918	1.59
NLD	Netherlands	31,833	2.00	170	0.42	3,367	1.83
MYS	Malaysia	30,786	1.94	607	1.51	3,102	1.69
GBR	Britain	29,143	1.83	950	2.36	3,288	1.79
AUS	Australia	25,208	1.59	567	1.41	2,848	1.55
DEU	Germany	25,206	1.59	828	2.06	2,342	1.27
CZE	Czech Republic	20,736	1.30	261	0.65	3,876	2.11
THA	Thailand	19,831	1.25	370	0.92	1,597	0.87
RUS	Russia	17,702	1.11	285	0.71	1,573	0.85
MEX	Mexico	16,962	1.07	150	0.37	2,727	1.48
CAN	Canada	15,071	0.95	321	0.80	1,754	0.95
TWN	Chinese Taipei	13,587	0.85	315	0.78	1,460	0.79
	Top-20 Sum	*1,435,122*	*90.30*	*36,174*	*90.04*	*166,262*	*90.33*
	Total Sum	*1,589,253*	*100.00*	*40,177*	*100.00*	*184,070*	*100.00*

Source: Calculated by the author using data from Survey of Business Activities, Statistics Korea.
Note: Unit of FDI value is in billion KRW, and that for share is percentage.

However, the share has constantly decreased from 45.9% in 2006 to 28.4% in 2019. This indicates that the Korean industrial structure is becoming less dependent on China. On the other hand, the share for Vietnam has more than doubled, and the share for USA has increased by more than 7 percent during the same period. Surprisingly, Korea's investment in Japan is not big considering the proximity of Japan with Korea.

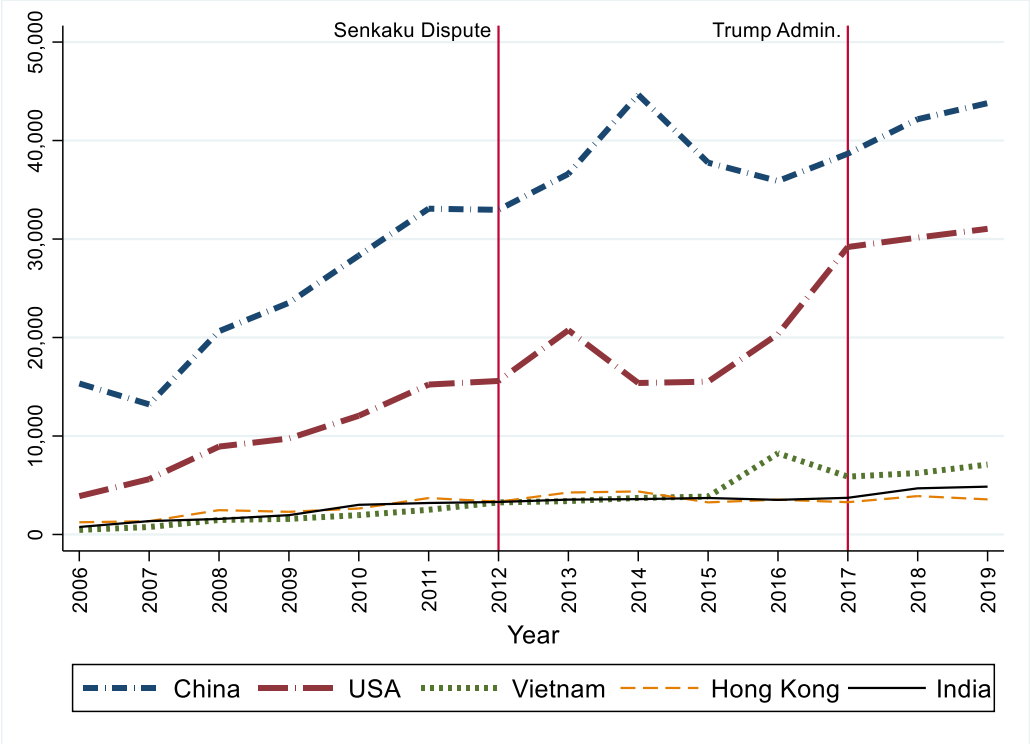
Table 3-3-2. Share of Outward FDI by Top 20 Foreign Locations (Manufacturing)

Country		Sum 2006-2019		2006		2019	
ISO	Name	Value	Share	Value	Share	Value	Share
CHN	China	433,085	36.63	17,066	50.96	42,821	33.41
USA	USA	226,221	19.13	4,334	12.94	30,345	23.67
VNM	Vietnam	49,128	4.16	520	1.55	6,941	5.41
HKG	Hong Kong	41,766	3.53	1,383	4.13	3,487	2.72
IND	India	41,419	3.50	849	2.54	4,748	3.70
BRA	Brazil	30,378	2.57	599	1.79	2,715	2.12
MYS	Malaysia	29,231	2.47	519	1.55	2,986	2.33
NLD	Netherlands	27,465	2.32	142	0.42	3,043	2.37
IDN	Indonesia	22,891	1.94	522	1.56	2,656	2.07
SGP	Singapore	21,395	1.81	600	1.79	2,142	1.67
AUS	Australia	19,698	1.67	548	1.64	1,814	1.42
JPN	Japan	18,622	1.58	468	1.40	1,971	1.54
CZE	Czech Republic	17,898	1.51	258	0.77	1,320	1.03
THA	Thailand	17,759	1.50	343	1.02	1,278	1.00
DEU	Germany	17,635	1.49	643	1.92	1,479	1.15
GBR	Britain	17,286	1.46	617	1.84	1,999	1.56
MEX	Mexico	15,916	1.35	143	0.43	2,521	1.97
RUS	Russia	14,870	1.26	165	0.49	1,299	1.01
POL	Poland	12,342	1.04	354	1.06	1,581	1.23
HUN	Hungary	11,076	0.94	469	1.40	1,296	1.01
Top-20 Sum		*1,086,080*	*91.86*	*30,542*	*91.21*	*118,442*	*92.40*
Total Sum		*1,182,274*	*100*	*33,487*	*100*	*128,186*	*100*

Source: Calculated by the author using data from Survey of Business Activities, Statistics Korea.
Note: Unit of FDI value is in billion KRW, and that for share is percentage.

The situation is not largely different when analyzing only manufacturing firms (Table 3-3-2), except for the jump in the FDI ranking for Vietnam from the 4th to 3rd. China's share has decreased from 51.0% in 2006 to 33.4% in 2019. This tells us that the Korean manufacturing industry is also becoming less dependent on China. On the other hand, the share for Vietnam has more than tripled, and the share for USA has almost doubled during the same period.

Figure 3-3-1. Trends of Top 5 FDI Foreign Locations of Manufacturing Firms



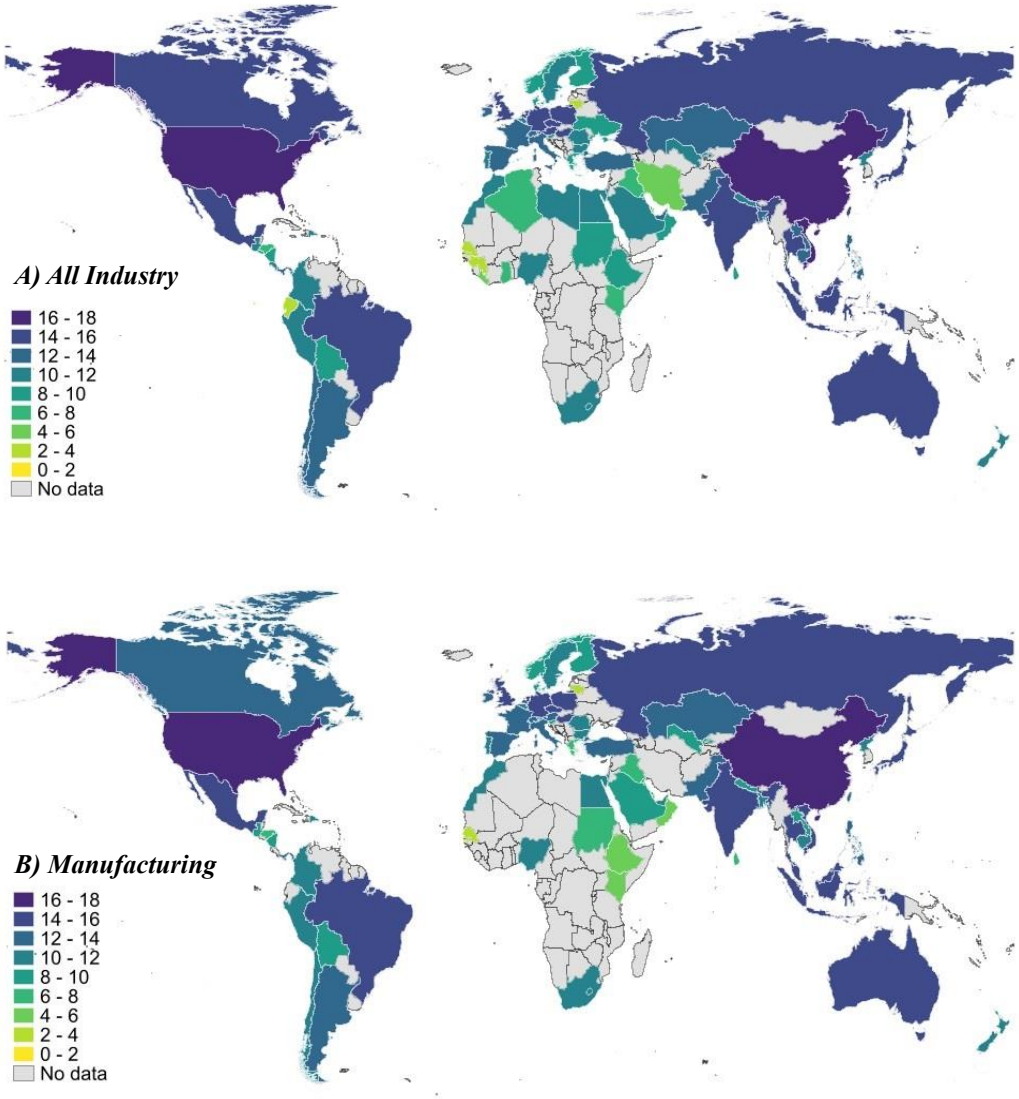
Source: Generated by the author using data from Survey of Business Activities, Statistics Korea.
Notes: Unit: Billion KRW.

Figure 3-3-1 describes the timeseries trends of Korea's top 5 FDI foreign

locations: China, USA, Vietnam, Hong Kong, and India. It is interesting to notice that when FDI to China is increasing between 2013-2014, FDI to the USA is decreasing, and when FDI to China is decreasing between 2014-2016, FDI to the USA and Vietnam steeply increases. This tells us that for the Korean manufacturing industry, Vietnam and USA have been choices of substitution to China for Korea's FDI. This phenomenon may be due to the geopolitical conflict of Senkaku Islands between China and Japan which begun in 2012, and Korean firms mitigated this risk by diverting FDI to other countries such as Vietnam and USA. Furthermore, after the Trump administration in the USA came into power, the FDI to the USA slowed in its increase, while FDI to China and Vietnam continued a more rapid increase.

A graphical representation of Korea's FDI by country is illustrated in Figure 3-3-2. There are only three countries that have log of FDI (in million KRA) of more than 18: the USA, China, and Vietnam, and they are colored in purple. Vietnam's purple color disappears when constrained to manufacturing firms only, but the value (log of FDI) is still the 3rd highest (China: 17.5; USA: 17.2; Vietnam:15.6).

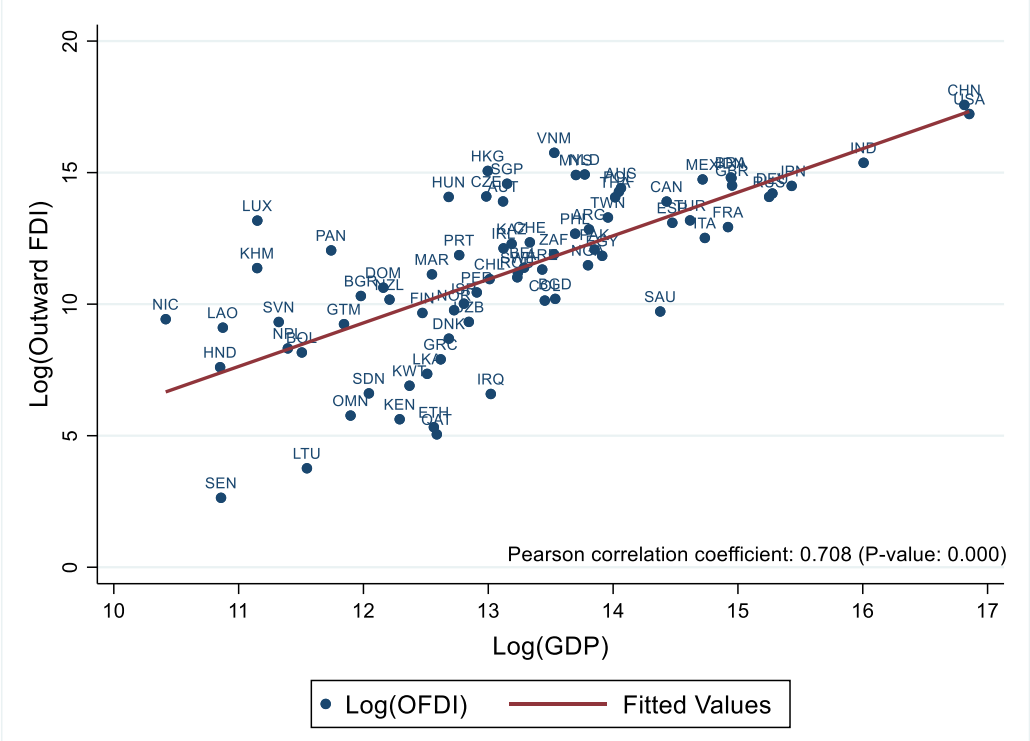
Figure 3-3-2. Geographical Portrait of Korea's Outward FDI (2019)



Source: Generated by the author using data from Survey of Business Activities, Statistics Korea.
Notes: 1) Antarctica, Greenland (DNK), and Svalbard (NOR) are dropped from the map.
2) Log of outward FDI of manufacturing firms in million KRW is reported here.

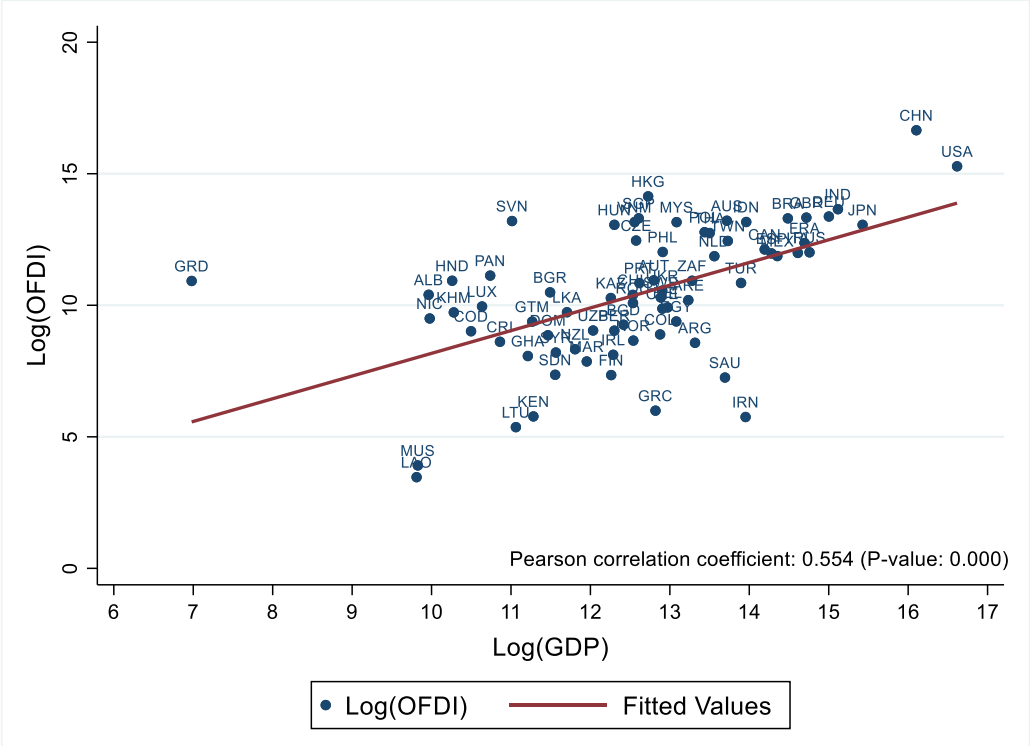
Figures 3-3-3 and 3-3-4 are scatter plots assessing the relationship between Korea's OFDI and the GDP of FDI locations in 2019 and 2006, respectively. They both show positive associations, suggesting that FDIs are directed more to countries with larger markets. This pattern has become clearer in recent years than the past, as the slope of the linear regression is steeper and correlation is higher for the 2019 graph than the 2006 graph.

Figure 3-3-3. Korea's OFDI and GDP of FDI Locations (2019)



Source: Penn World Table 10.0 and the Survey of Business Activities, Statistics Korea.

Figure 3-3-4. Korea's OFDI and GDP of FDI Locations (2006)



Source: Penn World Table 10.0 and Survey of Business Activities, Statistics Korea.

3.4. Employment Data

As discussed in section 1.5, the skilled workers will be proxied as non-production workers, and the unskilled workers will be proxied as production workers in the empirical analysis. The SBA dataset provides data for firms' employment sizes for production-side and non-production-side workers.

Table 3-4-1 describes annual total number of full-time workers employed by SBA-listed Korean firms. For instance, in year 2019, the total number of full-time (non-temporary) workers employed by Korean firms with more than 50 workers and have capital stock of more than 300 million Korean Won is 4.15 million. These figures exclude the overseas staff, the employees who are sent and stationed abroad.

Out of the 4.15 million full-time workers, 1.10 million are working in production division, and 3.05 million are non-production workers. Also, in 2019, out of Korea's 1.10 million production workers, 1.08 million are employed by manufacturing firms, which accounts for 97.9% of the total. The number of non-production workers employed by manufacturing firms is 0.78 million, which only accounts for 25.5% of the total non-production workers (3.05 million). In manufacturing industry, the number of production workers is greater than the number of non-production workers, hence it is worthwhile to examine the impact of FDI on production workers.

Table 3-4-1. Employment Numbers for SBA-listed Korean Firms

	All Industry				Manufacturing			
Year	L	Lp	Lnp	Lnp/L (%)	L	Lp	Lnp	Lnp/L (%)
2006	2,908,370	1,209,940	1,698,430	58.4	1,530,248	1,031,687	498,561	32.6
2007	2,998,963	1,208,154	1,790,809	59.7	1,541,097	1,025,561	515,536	33.5
2008	3,081,612	1,064,721	2,016,891	65.4	1,526,904	1,030,442	496,462	32.5
2009	3,131,429	998,202	2,133,227	68.1	1,517,479	969,309	548,170	36.1
2010	3,208,689	1,011,491	2,197,198	68.5	1,563,091	956,161	606,930	38.8
2011	3,439,847	1,101,795	2,338,052	68.0	1,680,948	1,051,696	629,252	37.4
2012	3,619,004	1,176,076	2,442,928	67.5	1,761,849	1,124,300	637,549	36.2
2013	3,679,475	1,197,137	2,482,338	67.5	1,791,612	1,172,958	618,654	34.5
2014	3,768,164	1,182,229	2,585,935	68.6	1,793,199	1,154,011	639,188	35.6
2015	3,807,633	1,177,128	2,630,505	69.1	1,775,046	1,148,718	626,328	35.3
2016	3,867,821	1,110,042	2,757,779	71.3	1,762,871	1,073,950	688,921	39.1
2017	3,931,496	1,097,597	2,833,899	72.1	1,792,391	1,081,833	710,558	39.6
2018	4,065,591	1,163,079	2,902,512	71.4	1,837,515	1,141,033	696,482	37.9
2019	4,113,043	1,103,465	3,009,578	73.2	1,843,657	1,080,863	762,794	41.4

Source: Generated by the author using data from Survey of Business Activities, Statistics Korea.
Note: L, Lp, and Lnp refer to total, production, and non-production employment, respectively.

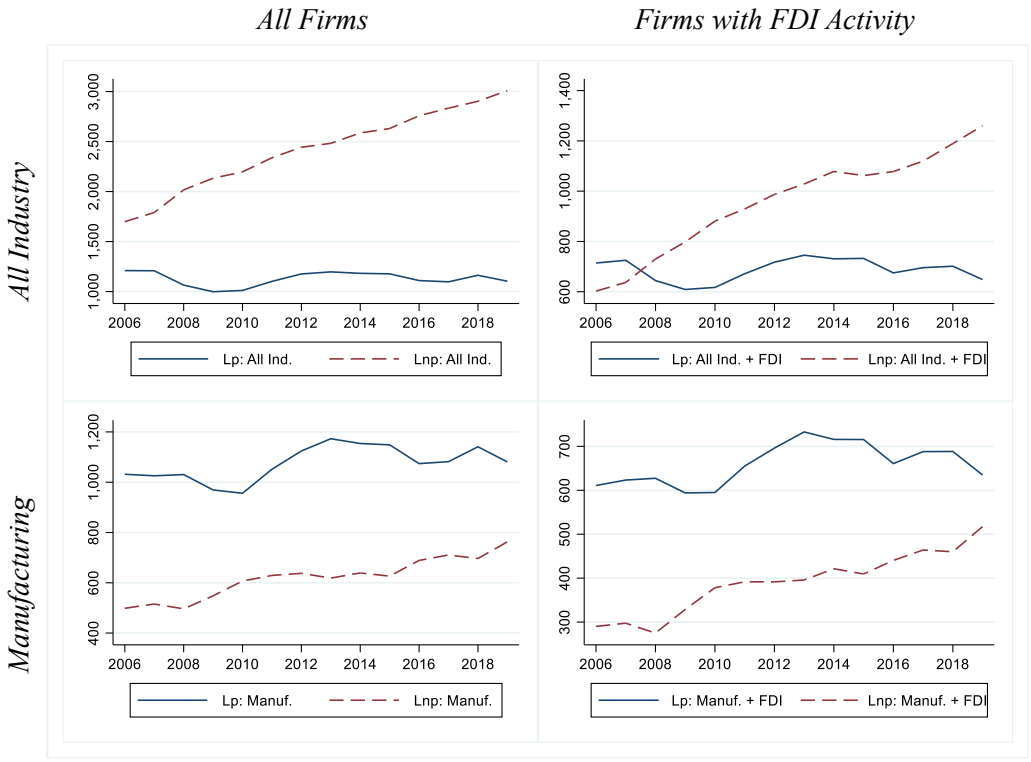
Table 3-4-2. Employment Numbers for SBA-listed Korean Firms with FDI Activity

	All Industry				Manufacturing			
Year	L	Lp	Lnp	Lnp/L (%)	L	Lp	Lnp	Lnp/L (%)
2006	1,316,722	714,185	602,537	45.8	901,003	610,835	290,168	32.2
2007	1,362,388	725,235	637,153	46.8	920,822	623,274	297,548	32.3
2008	1,374,603	644,349	730,254	53.1	902,304	627,317	274,987	30.5
2009	1,407,353	609,079	798,274	56.7	922,722	593,965	328,757	35.6
2010	1,498,344	617,345	880,999	58.8	973,133	594,940	378,193	38.9
2011	1,601,047	671,624	929,423	58.1	1,046,668	655,068	391,600	37.4
2012	1,704,860	717,659	987,201	57.9	1,087,462	695,927	391,535	36.0
2013	1,774,101	745,367	1,028,734	58.0	1,128,593	732,808	395,785	35.1
2014	1,809,326	731,018	1,078,308	59.6	1,137,165	715,823	421,342	37.1
2015	1,794,432	732,589	1,061,843	59.2	1,124,986	715,520	409,466	36.4
2016	1,753,166	675,068	1,078,098	61.5	1,101,053	660,730	440,323	40.0
2017	1,815,251	695,769	1,119,482	61.7	1,152,132	688,033	464,099	40.3
2018	1,891,014	701,558	1,189,456	62.9	1,148,440	688,360	460,080	40.1
2019	1,908,923	648,428	1,260,495	66.0	1,152,097	634,785	517,312	44.9

Source: Generated by the author using data from Survey of Business Activities, Statistics Korea.
Note: L, Lp, and Lnp refer to total, production, and non-production employment, respectively.

Table 3-4-2 shows the number of workers for the firms who conduct FDI activities. 62.7% of the manufacturing firms are engaged in FDI activities. It is clear that for both all-industry and manufacturing-industry firms, non-production worker shares of the firms with FDI activities are increasing over time. The graphs of time-series trends for number of workers are given in Figure 3-4-1.

Figure 3-4-1. Employment Trends: Production vs. Non-production Workers



Notes: 1) Blue solid line: Production worker (Lp); Red dashed line: non-production worker (Lnp).
2) Unit of number of workers in thousands.

There are a few aspects to point out from the above graphs. First, production workers outnumber non-production workers in manufacturing industry. Second, since 2006, the number of non-production workers almost monotonically increases while the growth of production workers stagnates. Third, the convergence of the two employment types is closer in the firms with FDI activities compared with all firms.

3.5. Data for Regression Sample

I use the 'Survey of Business Activities'(SBA) dataset acquired from Statistics Korea, which is formerly described in section 3. It contains firm-level data of firms with more than 50 workers (including part-time temporary workers) and have a capital stock of more than 300 million Korean Won. I used all data from Survey of Business Activities dataset, with FDI concentration ratio (FDI[15]: FDI/Tangible Assets) of less than 5,000, and replaced the missing FDI values to 0 for the firms which are not involved in FDI activities.

The dataset also contains information on the parent firms' foreign subsidiaries: the location of the subsidiary and the amount of investment. In the SBA panel dataset from years 2006 to 2019, there are 166,682 observations in total, and out of these, 83,453 observations are data of manufacturing firms. Among these observations, the number of observations of firms who invested in overseas territories at least once, and whose FDI value is less than 5,000 are 83,405. In addition, as the dependent variables are taking the one-year-ahead form $(t+1)$, the final year (2019) is excluded from the regression analysis. Also, other control variables such as sales, capital intensity, and total factor productivity (TFP) variables have some missing values. In the end, 64,344 observations were used for the regression analysis. Furthermore, all of the data which were originally in raw monetary terms were adjusted with the producer price index for the manufacturing

[15] FDI concentration ratio (FDI to tangible asset ratio). In the empirical analysis, the notation 'FDI' denotes FDI concentration ratio.

sector of Korea with a base year of 2016. The summary statistics are presented in table 3-5-1.

Table 3-5-1. Summary Statistics for Regression Sample

Variable	Notation	Unit	Obs.	Mean	S.D.	Min	Max
Skilled labor share	SLs_{t+1}	Ratio	64,344	0.370	0.238	0.0004	1
Ln(labor)	ln L_{t+1}	Ln(persons)	64,344	4.973	0.855	2.079	11.540
Ln(unskilled labor)	ln Lu_{t+1}	Ln(persons)	64,344	4.408	1.030	0	11.201
Ln(skilled labor)	ln Ls_{t+1}	Ln(persons)	64,344	3.726	1.131	0	11.153
FDI concentration ratio	FDI_t	Ratio	64,344	0.501	29.208	0	4965
Overseas staff	OS_t	Persons/mil.₩	64,344	0.0003	0.016	0	2.502
Ln(sales)	ln Q_t	Ln(mil.₩)	64,344	10.802	1.281	-0.003	18.986
Ln(capital intensity)	ln KL_t	Ln(mil.₩/persons)	64,344	5.761	0.825	1.706	9.423
Ln(TFP)	ln TFP_t	Ratio	64,344	7.476	0.882	-3.035	12.322

Source: Calculated by the author using data from Survey of Business Activities, Statistics Korea.
Notes: 1) Summary statistics for the sample used in regression analysis.
2) Labor only includes domestic full-time permanent workers. Overseas staff, part-time, and temporary workers are excluded.
3) FDI concentration ratio is FDI amount normalized by tangible assets.
4) Overseas staff variable is the number of overseas staff normalized by tangible assets.
5) Capital intensity is calculated by dividing capital stock by employment.
6) Mil.₩ denotes million Korean Won.

Skilled labor share, ln(labor), ln(unskilled labor), and ln(skilled labor) will be used as dependent variables and are in one-year-ahead terms. FDI concentration ratio will be used as the key explanatory variable, and overseas staff will be the instrument variable for the 2SLS estimations. The remaining three variables, ln(sales), ln(capital intensity), and ln(TFP) will be used as control variables. Detailed explanations regarding these variables and empirical strategies are provided in section 4.

4. Empirical Strategy

4.1. OLS Fixed Effects Estimation

4.1.1. Level Effects on Domestic Employment

I designed my reduced-form econometric models based on equation (4-4-1) below. Dependent variables are log of total employment size, $\ln L_{it+1}$, log of unskilled employment size, $\ln Lu_{it+1}$, and log of skilled employment size, $\ln Ls_{it+1}$, and these variables are in one-year-ahead terms. The key explanatory variable is FDI concentration ratio, FDI_{it}, and is one-year-lagged from the dependent variables. Moreover, three control independent variables are selected, and are also one-year-lagged from the dependent variables. First, log of sales, $\ln Q_{it}$, is selected as it is indicative of current performance as well as the size of the firm. Second and third, capital intensity, $\ln KL_{it}$, which is calculated as log of capital stock to labor ratio, and log of total factor productivity (TFP)[16], $\ln TFP_{it}$, are included because the employment can be affected by automation and other labor-saving technologies, hence these variables are also selected as control variables in Ni et al. (2022) for these reasons. I also included firm-specific and year-specific fixed effects in order to capture firm-specific attributes, and formed the following equations 4-1-1, 4-1-2, and 4-1-3 to examine the effects of FDI on domestic total, unskilled, and skilled employment using ordinary least squares (OLS) fixed effects

[16] TFP measure follows Levinsohn and Petrin (2003).

estimations:

$$\ln L_{it+1} = \beta_0 + \beta_1 FDI_{it} + \beta_2 \ln Q_{it} + \beta_3 \ln KL_{it} + \beta_4 \ln TFP_{it} + \mu_i + \nu_t + \epsilon_{it} \quad (4\text{-}1\text{-}1)$$

$$\ln Lu_{it+1} = \beta_0 + \beta_1 FDI_{it} + \beta_2 \ln Q_{it} + \beta_3 \ln KL_{it} + \beta_4 \ln TFP_{it} + \mu_i + \nu_t + \epsilon_{it} \quad (4\text{-}1\text{-}2)$$

$$\ln Ls_{it+1} = \beta_0 + \beta_1 FDI_{it} + \beta_2 \ln Q_{it} + \beta_3 \ln KL_{it} + \beta_4 \ln TFP_{it} + \mu_i + \nu_t + \epsilon_{it} \quad (4\text{-}1\text{-}3)$$

where ϵ_{it} denotes an error term, and μ_i and ν_t are firm and year fixed effects, respectively. These equations will represent the benchmark models for testing the level effects. These test the elasticity of changes in FDI on changes in employment size. Lastly, heteroskedasticity-robust statistics are used.

Moreover, I created FDI concentration ratio variables for FDIs to specific countries, national associations, and continents. For example, FDI concentration ratio for ASEAN is calculated by dividing the sum of Korean manufacturing firms' FDIs to ASEAN countries by tangible assets. The selected countries are China, USA, Vietnam, Hong Kong, India, Brazil, Malaysia, Netherlands, Indonesia, Singapore, Australia, Japan, Czech Republic, Thailand, Germany, UK, Mexico, Russia, and Poland, which are Korea's top-20 FDI partner countries.

4.1.2. Growth Effects on Domestic Employment

If the outward FDI not only increases the employment size itself, but also enhances the growth rate of the parent firm's employment, policy makers may therefore pursue the promotion of outward FDI for the sustainable job creation, and have reason to reconsider the currently ongoing reshoring policies of which the expected effects are not sufficiently backed up by empirical evidence. Therefore, instead of taking the level values for dependent variables, the growth rates of the domestic total employment, unskilled employment, and skilled employment are used as dependent variables to estimate the domestic employment growth effects from outward FDI.

Corresponding to the regression equations for the level effects in section 4-1-1, ordinary least squares fixed effects estimations are used here:

$$\Delta \ln L_{it+1} = \beta_0 + \beta_1 FDI_{it} + \beta_2 \ln Q_{it} + \beta_3 \ln KL_{it} + \beta_4 \ln TFP_{it} + \mu_i + \nu_t + \epsilon_{it} \quad (4\text{-}1\text{-}4)$$

$$\Delta \ln Lu_{it+1} = \beta_0 + \beta_1 FDI_{it} + \beta_2 \ln Q_{it} + \beta_3 \ln KL_{it} + \beta_4 \ln TFP_{it} + \mu_i + \nu_t + \epsilon_{it} \quad (4\text{-}1\text{-}5)$$

$$\Delta \ln Ls_{it+1} = \beta_0 + \beta_1 FDI_{it} + \beta_2 \ln Q_{it} + \beta_3 \ln KL_{it} + \beta_4 \ln TFP_{it} + \mu_i + \nu_t + \epsilon_{it} \quad (4\text{-}1\text{-}6)$$

where the log-differences are taken to represent for the growth rates, i.e., $\Delta \ln L_{it+1} = \ln L_{it+1} - \ln L_{it}$, $\Delta \ln Lu_{it+1} = \ln Lu_{it+1} - \ln Lu_{it}$, and $\Delta \ln Ls_{it+1} = \ln Ls_{it+1} -$

$\ln Ls_{it}$. These equations will represent the benchmark models for testing the growth effects.

4.1.3. Effects on Domestic Skill Composition

Furthermore, I test the effects of outward FDI on the share of skilled labor. This also evaluates the prediction of the Feenstra and Hanson (1996) model where the share of skilled workers is expected to increase when capital movement occurs from a home country to a foreign country, when the skilled to unskilled relative wage is smaller at home. The econometric estimation model for this exercise is as follows:

$$SLs_{it+1} = \beta_0 + \beta_1 FDI_{it} + \beta_2 \ln Q_{it} + \beta_3 \ln KL_{it} + \beta_4 \ln TFP_{it} + \mu_i + \nu_t + \epsilon_{it} \quad (4\text{-}1\text{-}7)$$

where $SLs = \frac{Ls}{Ls+Lu} = \frac{Ls}{L}$, i.e., the share of skilled labor is calculated by dividing number of skilled workers by the total employment.

4.2. Endogeneity Issues

Moreover, in dynamic panel models that use OLS estimations, FDI may not be strictly exogenous with employment, as employment level itself can influence FDI. For instance, when a firm decides to greatly increase its domestic employment size, there may be less capital available to fund overseas investment because of the heavily-increased wage burden. Also, if a firm has a high number of workers during an economic downturn and thus has a shortfall to pay out wages, the firm may disinvest from foreign subsidiaries to improve cashflow for spending on wage. In either direction, simultaneity issues can arise from the OLS estimations.

Two possible solutions are tried to mitigate these endogeneity issues. First, taking one-year-ahead term for the dependent variable (for example, using $\ln L_{it+1}$, instead of using $\ln L_{it}$), which gives time lags by one year to the independent variables, can mitigate the endogeneity problems to some extent, as the effect of FDI on the future domestic employment is estimated, instead of the current domestic employment[17]. Therefore, the causal direction from previous FDI to future domestic employment is considered in the regression model. The second possible solution is to use instrumental variable and adopt the two-stage least squares (2SLS) estimation method.

[17] Similar measures are taken in Han and Kim (2022), Hong and Moon (2017), and Head and Ries (2001). For example, Han and Kim (2022) state that they gave lags by one year to all explanatory variables "to control for the pre-OFDI characteristics of firms".

4.3. 2SLS Estimation

As widely known, "instrumental variable (IV) regression is a general way to obtain a consistent estimator of the unknown coefficients of the population regression function when the regressor … is correlated with the error term." (Stock and Watson, 2007). The number of employees sent overseas is one possible instrument for FDI. The SBA dataset provides the number of full-time staff members of a firm that are dispatched or stationed abroad. These overseas employees are employed by the parent firm, and not by its foreign subsidiaries. Thus, there are many firms that have overseas staff even though they have no foreign subsidiaries. Moreover, this instrument is not part of the dependent variable (the domestic labor).

Here, I review the relevance of this instrument. Staff members are often sent abroad to investigate possible investment opportunities, and therefore the number of overseas staff can be interpreted as the degree of the firm's interests in foreign direct investment. Recall that the explanatory variable, FDI concentration ratio (FDI_{it}), is the amount of outward FDI normalized by the size of the firm which is measured by the amount of tangible assets. Similarly, I created a variable OS_{it} which is calculated as the number of overseas staff divided by the amount of tangible assets. Pearson correlation between OS_{it} and FDI_{it} turned out to be 37% with p-value of less than 1% level, which represent for a strong statistical significance.

To examine the exclusion restriction of the IV, first of all, the number of overseas staff is not counted in the domestic employment which is the dependent variable.

Therefore, it is not directly related to the dependent variable. It is also supported by the Pearson correlation tests of which the correlations between OS_{it} and all possible dependent variables ($\ln L_{it+1}$, $\ln Lu_{it+1}$, $\ln Ls_{it+1}$), and their contemporary time values ($\ln L_{it}$, $\ln Lu_{it}$, $\ln Ls_{it}$) are all less than 1%, which imply that it is difficult to say that the number of overseas staff (normalized by firm size) is related to domestic employment.

Furthermore, some employees are sent abroad to engage either with foreign companies, foreign subsidiaries, foreign customers, or to investigate possible opportunities for foreign investment or trade with existing or potential foreign trade-partner firms. Customer services in foreign countries are often outsourced to foreign firms, so this purpose is assumed to be negligible. Thus, manufacturing firms' businesses with foreign companies and foreign subsidiaries are often related to trade of FDI.

Additionally, there are only two components that are related to foreign activities in Feenstra and Hanson (1996) model, i.e., foreign investment and trade of intermediate goods. Therefore, it is difficult to think of reasons that a firm i's number of overseas staff (OS_{it}) could have important effects on the firm's future domestic employment ($\ln L_{it+1}$) except through the overseas staff's impact on outward FDI and trade.[18] In fact, it is worthwhile to note that although OS_{it} is expected to signal for firm i's level of interests in foreign activities, but it is not necessarily a byproduct of firm i's foreign

[18] Although one might argue for causality issues that increasing domestic employment can reduce the available funding to pay for operations expenses and for wages of overseas staff, and thus can negatively affect OS, increasing domestic employment often means the firm's prospect business is profitable, and the expenses for OS are relatively not high enough to affect FDI decisions.

activities as there are many cases of $OS_{it} > 0$ when outward FDI is zero or trade is zero.

Since it was presumed that firm i's number of overseas staff has important effects on the firm's future domestic employment through either FDI or trade, I tested the F-statistics of first-stage regressions when the instrumented explanatory variables are FDI concentration ratio (FDI_t, FDI normalized with tangible assets), inter-firm trade normalized with tangible assets ($Inter\_Trade_t$), and intra-firm normalized with tangible assets ($Intra\_Trade_t$). Here, inter-firm trade means the volume of trade with other firms, and intra-firm trade means the volume of trade between parent firm and its foreign subsidiary firms. The results for the first-stage regressions are presented in Table 4-3-1.

Table 4-3-1. First-stage Regression Results

	(1) FDI_t	(2) $Inter\_Trade_t$	(3) $Intra\_Trade_t$
OS_t	1,274***	10,982	2,187
	(0.000)	(0.110)	(0.102)
ln Q_t	-0.336*	-4.299	-0.550
	(0.071)	(0.184)	(0.414)
ln KL_t	1.483***	3.437	1.304
	(0.000)	(0.624)	(0.377)
ln TFP_t	0.266**	2.209	0.386
	(0.010)	(0.133)	(0.180)
Observations	64,344	64,344	64,344
Firm & Year FEs	Y	Y	Y
F-Statistic	56.02	2.55	2.67
P-value for F-Statistic	0.000	0.110	0.102

Notes: Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).

From the above results, it is difficult to say that the number of overseas staff

affects domestic employment through intra- or inter-firm trade, as the first stage F-statistics for models (2) and (3) are far below 10, but it is safe to say that the number of overseas staff affects domestic employment through outward FDI as the first stage F-statistic for model (1) is 56 which is far greater than 10, the rule of thumb suggested by Stock and Yogo (2002). Furthermore, the regression coefficient of OS_t in model (1) is statistically significant, implying its solid relation with FDI_t, but is insignificant in models (2) and (3), and thus OS_t fails to meet the relevance condition when it is used as an IV for inter- and intra-firm trade.

In summary, the number of overseas staff is used as an instrument variable in the 2SLS regression analysis in this paper for the logic explained above. However, I acknowledge the weakness of using number of overseas staff as an IV. It may not be a perfectly exogenous IV since it is a choice by each firm, and not exogenously given. It may affect future domestic employment via other unseen routes. Also, it may not perfectly satisfy the relevance condition. In the case of technology-intensive industries, the amount of FDI is very large due to facility installations, but there are often only a small number of overseas staff with facility-handling know-how who are sent abroad to help the foreign subsidiaries.

5. Results

5.1. Results: Level Effects on Domestic Employment

As presented in Table 5-1-1, the results of OLS fixed effects estimations (models 1, 2, 4, 5, 7, and 8) and 2SLS estimations (models 3, 6, and 9) suggest that there is no evidence of outward investment affecting total employment size of parent firms, but there is evidence that it negatively affects the employment of unskilled workers and positively affects employment of skilled workers (Table 5-1-1). An increase in one unit of (or doubling of) FDI concentration ratio is associated with 0.032% to 0.067% decrease in domestic employment size of unskilled labor, and 0.019% to 0.022% increase in domestic employment size of skilled labor. The main results stay unchanged even when tested with firm and 'year-sector group' fixed effects which can capture the unobserved shocks on specific sector in a certain year.[19]

Also, the summaries of regression results for foreign investments to specific countries, national associations, and continents are presented in Table 5-1-2, 5-1-3, and 5-1-4, respectively. Investments to different groups of destinations generally follow the results of the benchmark models with aggregate outward investments, which are positively associated with employment of skilled labor and negatively associated with employment of unskilled labor. However, there are a few further findings to note. FDI

[19] See Table A3-1 in Appendix A3.

to China was estimated to have negative impact on total domestic employment, as its positive impact on skilled employment did not offset its strong negative impact on the employment of unskilled labor. On the other hand, FDI to ASEAN countries shows a positive association with the total domestic employment.

Table 5-1-1. Regression Results: Level Effects

DV:	Total Employment ($\ln L_{t+1}$)			Unskilled Employment ($\ln Lu_{t+1}$)			Skilled Employment ($\ln Ls_{t+1}$)		
	(1) OLS	(2) OLS	(3) 2SLS	(4) OLS	(5) OLS	(6) 2SLS	(7) OLS	(8) OLS	(9) 2SLS
FDI_t	0.001	-0.000	0.001	-0.032	-0.033	-0.067	0.020	0.019	0.022
($\times 10^2$)	(0.895)	(0.992)	(0.940)	(0.008)***	(0.006)***	(0.052)*	(0.002)***	(0.003)***	(0.081)*
$\ln Q_t$		0.395	0.395		0.428	0.428		0.309	0.309
		(0.000)***	(0.000)***		(0.000)***	(0.000)***		(0.000)***	(0.000)***
$\ln KL_t$		-0.163	-0.163		-0.203	-0.203		-0.094	-0.094
		(0.000)***	(0.000)***		(0.000)***	(0.000)***		(0.000)***	(0.000)***
$\ln TFP_t$		-0.065	-0.065		-0.071	-0.071		-0.042	-0.042
		(0.000)***	(0.000)***		(0.000)***	(0.000)***		(0.005)***	(0.005)***
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	64,344	64,344	64,344	64,344	64,344	64,344	64,344	64,344	64,344
R-Sq.	0.927	0.944		0.799	0.813		0.769	0.775	

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).

2) Regression coefficients of FDI are reported in 'original value $\times$ 10^2'.

Table 5-1-2. Regression Coefficients for FDI from Korea to its Top-20 FDI Partners:

Level Effects

FDI Rank	Country	Total	Unskilled	Skilled
1	China	-0.008	-0.026	0.014
		(0.077)*	(0.000)***	(0.027)**
2	USA	0.002	-0.023	0.051
		(0.440)	(0.000)***	(0.000)***
3	Vietnam	0.041	-0.326	0.183
		(0.316)	(0.002)***	(0.004)***
4	Hong Kong	-0.320	-4.220	0.754
		(0.363)	(0.082)*	(0.537)
5	India	0.002	-0.059	0.125
		(0.662)	(0.000)***	(0.000)***
6	Brazil	0.001	-0.022	0.046
		(0.708)	(0.000)***	(0.000)***
7	Malaysia	0.673	-2.087	0.046
		(0.325)	(0.164)	(0.000)***
8	Netherlands	-68.021	-68.605	-58.976
		(0.008)***	(0.094)*	(0.007)***
9	Indonesia	0.042	-0.182	0.083
		(0.017)**	(0.001)***	(0.000)***
10	Singapore	-4.731	-43.579	8.271
		(0.038)**	(0.008)***	(0.425)
11	Australia	-22.107	-91.143	28.394
		(0.064)*	(0.029)**	(0.615)
12	Japan	1.747	2.417	1.803
		(0.009)***	(0.109)	(0.055)*
13	Czech Republic	25.983	27.378	-10.694
		(0.051)*	(0.311)	(0.895)
14	Thailand	0.537	0.256	-0.956
		(0.558)	(0.879)	(0.792)
15	Germany	0.003	-0.050	0.175
		(0.660)	(0.276)	(0.000)***
16	UK	15.447	-33.789	74.507
		(0.476)	(0.407)	(0.017)**
17	Mexico	-1.015	-2.386	0.718
		(0.003)***	(0.138)	(0.587)
18	Russia	-6.042	-6.416	-6.025
		(0.015)**	(0.014)**	(0.548)
19	Poland	0.001	-0.026	0.055
		(0.716)	(0.000)***	(0.000)***
20	Hungary	-1.206	-40.429	7.881
		(0.962)	(0.384)	(0.805)

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).

2) Regression coefficients of FDI are reported in 'original value × 10^2'.

3) The red-colored values indicate regression coefficients are positive and significant.

4) The blue-colored values indicate regression coefficients are negative and significant.

Table 5-1-3. Regression Coefficients for FDI by National Association: Level Effects

	Total	Unskilled	Skilled
ASEAN	0.025	-0.141	0.071
	(0.084)*	(0.001)***	(0.000)***
BRICS	-0.007	-0.025	0.016
	(0.109)	(0.000)***	(0.017)**
OECD	0.0001	-0.011	0.023
	(0.910)	(0.000)***	(0.000)***
European Union	0.001	-0.016	0.041
	(0.500)	(0.002)***	(0.000)***
G7	0.002	-0.014	0.040
	(0.420)	(0.010)***	(0.000)***
OPEC	10.864	-0.166	33.852
	(0.246)	(0.992)	(0.043)**

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).
2) Regression coefficients of FDI are reported in 'original value × 10^2'.
3) The red-colored values indicate regression coefficients are positive and significant.
4) The blue-colored values indicate regression coefficients are negative and significant.

Table 5-1-4. Regression Coefficients for FDI by Continent: Level Effects

	Total	Unskilled	Skilled
East & Southeast Asia	-0.001	-0.044	0.023
	(0.900)	(0.009)***	(0.029)**
Central & South Asia	0.002	-0.053	0.121
	(0.744)	(0.000)***	(0.000)***
West Asia & North Africa	0.0390	-0.370	0.843
	(0.376)	(0.000)***	(0.000)***
Sub-Saharan Africa	32.115	-110.354	43.820
	(0.388)	(0.384)	(0.566)
North America & Europe	0.001	-0.010	0.023
	(0.604)	(0.000)***	(0.000)***
Latin America & Caribbean	-0.003	-0.028	0.047
	(0.472)	(0.000)***	(0.000)***

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).
2) Regression coefficients of FDI are reported in 'original value × 10^2'.
3) The red-colored values indicate regression coefficients are positive and significant.
4) The blue-colored values indicate regression coefficients are negative with significance.

5.2. Results: Growth Effects on Domestic Employment

As shown in Table 5-2-1, the results of OLS fixed effects estimations of models 4, 5, 7, and 8, and 2SLS estimations of models 6 and 9) all suggest that there is no evidence of outward investment affecting the growth rate of unskilled employment in parent firms, while it positively affects the employment of skilled workers (Table 5-2-1). Furthermore, the 2SLS estimation of model 3 gives some evidence that outward investment can increase the growth rate of total domestic employment. An increase in one unit of (or doubling of) FDI concentration ratio is associated with a 0.023% to 0.027% increase in growth of domestic employment of skilled labor, and a 0.029% increase in growth of total domestic employment. The main results are not altered even when tested with firm and 'year-sector group' fixed effects.[20]

The corresponding summaries of regression results for foreign investments to specific countries, national associations, and continents are presented in Table 5-2-2, 5-2-3, and 5-2-4, respectively. Investments to different groups of destinations generally follow the results of the benchmark models, with aggregate outward investments being positively associated with growth of employment of skilled labor and not associated with the growth of total and unskilled employments. However, FDI to China was estimated to have a negative impact on growth of unskilled domestic employment, and as a result, have no net effect on total domestic employment. In contrast, FDI to the USA was

[20] See Table A3-2 in Appendix A3.

estimated to increase the growth of all three types (total, unskilled, and skilled) of domestic employment.

Furthermore, FDIs to national associations and continents of developed countries such as OECD, G7, EU, North America & Europe was estimated to positively affect the growth of all three types of domestic employment, while FDI to developing countries such as BRICS, ASEAN, Sub-Saharan Africa show negative or insignificant associations with the growth of domestic employment of unskilled labor.

Table 5-2-1. Regression Results: Growth Effects

DV:	Total Employment ($\Delta \ln L_{t+1}$)			Unskilled Employment ($\Delta \ln Lu_{t+1}$)			Skilled Employment ($\Delta \ln Ls_{t+1}$)		
	(1) OLS	(2) OLS	(3) 2SLS	(4) OLS	(5) OLS	(6) 2SLS	(7) OLS	(8) OLS	(9) 2SLS
FDI_t	0.005	-0.000	0.029	-0.007	-0.007	0.006	0.023	0.024	0.027
($\times 10^2$)	(0.592)	(0.536)	(0.044)**	(0.477)	(0.508)	(0.689)	(0.005)***	(0.001)***	(0.094)*
$\ln Q_t$		-0.113	-0.113		-0.121	-0.121		-0.074	-0.074
		(0.000)***	(0.000)***		(0.000)***	(0.000)***		(0.000)***	(0.000)***
$\ln KL_t$		0.258	0.258		0.260	0.260		0.183	0.183
		(0.000)***	(0.000)***		(0.000)***	(0.000)***		(0.000)***	(0.000)***
$\ln TFP_t$		0.063	0.063		0.060	0.060		0.052	0.052
		(0.000)***	(0.000)***		(0.000)***	(0.000)***		(0.000)***	(0.000)***
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	64,344	64,344	64,344	64,344	64,344	64,344	64,344	64,344	64,344
R-Sq.	0.109	0.209		0.072	0.088		0.050	0.055	

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).

2) Regression coefficients of FDI are reported in 'original value $\times$ 10^2'.

Table 5-2-2. Regression Coefficients for FDI from Korea to its Top-20 FDI Partners: Growth Effects

FDI Rank	Country	Total	Unskilled	Skilled
1	China	-0.004	-0.020	0.034
		(0.512)	(0.000)***	(0.000)***
2	USA	0.019	0.015	0.023
		(0.000)***	(0.001)***	(0.012)**
3	Vietnam	0.042	0.016	0.025
		(0.474)	(0.897)	(0.822)
4	Hong Kong	-0.079	-1.168	0.668
		(0.820)	(0.695)	(0.510)
5	India	0.055	0.034	0.066
		(0.000)***	(0.000)***	(0.001)***
6	Brazil	0.020	0.012	0.024
		(0.000)***	(0.000)***	(0.001)***
7	Malaysia	1.639	0.516	0.024
		(0.002)***	(0.746)	(0.001)***
8	Netherlands	-71.580	-60.706	-68.112
		(0.000)***	(0.028)**	(0.025)**
9	Indonesia	0.069	0.015	0.085
		(0.000)***	(0.746)	(0.001)***
10	Singapore	1.004	-16.077	8.405
		(0.594)	(0.501)	(0.425)
11	Australia	-32.892	-57.854	2.603
		(0.001)***	(0.421)	(0.969)
12	Japan	0.553	0.983	0.344
		(0.358)	(0.763)	(0.713)
13	Czech Republic	3.872	-15.519	29.546
		(0.740)	(0.593)	(0.763)
14	Thailand	1.493	2.486	-3.892
		(0.335)	(0.257)	(0.195)
15	Germany	0.084	0.030	0.135
		(0.000)***	(0.498)	(0.043)**
16	UK	-14.171	-13.901	-5.917
		(0.322)	(0.728)	(0.858)
17	Mexico	-0.456	-0.196	0.164
		(0.109)	(0.902)	(0.906)
18	Russia	0.927	-2.422	8.392
		(0.862)	(0.503)	(0.618)
19	Poland	0.024	0.016	0.029
		(0.000)***	(0.000)***	(0.002)***
20	Hungary	-10.471	-68.841	44.326
		(0.755)	(0.168)	(0.337)

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).
2) Regression coefficients of FDI are reported in 'original value × 10^2'.
3) The red-colored values indicate regression coefficients are positive and significant.
4) The blue-colored rows indicate regression coefficients are negative and significant.

Table 5-2-3. Regression Coefficients for FDI by National Association: Growth Effects

	Total	Unskilled	Skilled
ASEAN	0.038	0.010	0.040
	(0.047)**	(0.803)	(0.166)
BRICS	-0.002	-0.017	0.033
	(0.729)	(0.007)***	(0.000)***
OECD	0.0090	0.006	0.012
	(0.000)***	(0.005)***	(0.003)***
European Union	0.019	0.010	0.024
	(0.000)***	(0.008)***	(0.002)***
G7	0.016	0.011	0.021
	(0.000)***	(0.012)**	(0.004)***
OPEC	18.357	3.130	36.402
	(0.139)	(0.886)	(0.138)

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).
2) Regression coefficients of FDI are reported in 'original value × 10^2'.
3) The red-colored values indicate regression coefficients are positive and significant.
4) The blue-colored values indicate regression coefficients are negative and significant.

Table 5-2-4. Regression Coefficients for FDI by Continent: Growth Effects

	Total	Unskilled	Skilled
East & Southeast Asia	0.004	-0.013	0.032
	(0.764)	(0.315)	(0.000)***
Central & South Asia	0.054	0.030	0.071
	(0.000)***	(0.039)**	(0.003)***
West Asia & North Africa	0.357	0.198	0.437
	(0.000)***	(0.001)***	(0.002)***
Sub-Saharan Africa	-67.483	0.618	-102.190
	(0.101)	(0.994)	(0.392)
North America & Europe	0.010	0.006	0.012
	(0.000)***	(0.001)***	(0.002)***
Latin America & Caribbean	0.018	0.012	0.023
	(0.000)***	(0.041)**	(0.009)***

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).
2) Regression coefficients of FDI are reported in 'original value × 10^2'.
3) The red-colored values indicate regression coefficients are positive and significant.

5.3. Results: Effects on Domestic Skill Composition

Lastly, as specified in Table 5-3-1, the results of OLS fixed effects estimations (models 1 and 2) and 2SLS estimation (model 3) all suggest that outward investment positively affects the share of skilled labor of parent firms. An increase in one unit of (or doubling of) FDI concentration ratio increases the share of skilled labor by 0.006 to 0.013 percentage points. This follows the expected outcome of Feenstra and Hanson's offshoring model outlined in section 2, which predicts foreign investment to have a positive impact on the share of skilled employment in the home country (i.e., South Korea) with a low skilled-to-unskilled relative wage compared to other countries, suggesting an improvement in skill level in the domestic labor market. These results do not change when tested with firm and 'year-sector group' fixed effects.[21]

[21] See Table A3-3 in Appendix A3.

Table 5-3-1. Results: Skill Composition

DV:	Share of Skilled Labor ($SLs_{t+1} = Ls_{t+1}/L_{t+1}$)		
	(1) OLS	(2) OLS	(3) 2SLS
FDI_t	0.006	0.006	0.013
($\times 10^2$)	(0.000)***	(0.000)***	(0.058)*
ln Q_t		-0.020	-0.020
		(0.000)***	(0.000)***
ln KL_t		0.019	0.019
		(0.000)***	(0.000)***
ln TFP_t		0.005	0.005
		(0.094)*	(0.094)*
Firm FE	Y	Y	Y
Year FE	Y	Y	Y
Observations	64,344	64,344	64,344
R-Sq.	0.592	0.593	

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).
2) Regression coefficients of FDI are reported in 'original value $\times$ 10^2'.

Also, the summaries of regression results for foreign investments to specific countries, national associations, and continents are presented in Tables 5-3-2 and 5-3-3. As in Table 5-3-2, outward investments to top-10 FDI partner countries all significantly increase the domestic share of skilled labor except for those to Hong Kong, and as in the left-side column of Table 5-3-3, those to selected national associations also turned out to increase the domestic share of skilled labor, except for those to OPEC countries. Outward FDI of Korean manufacturing firms to Hong Kong is largely related to the financial and operation sector, and to OPEC countries for importing crude oil, and these sectors are often not related to offshoring of production activities. This may be the reason for the insignificant result of OFDI to these regions on the share of skilled labor. Further, outward investments to all six continents also shows significant and positive associations with the share of skilled labor, as specified in the right-side column of Table 5-3-3.

Moreover, the fact that OFDI increases the share of skilled labor in most of the cases implies that even for the cases of horizontal-purpose FDI, which is less related to offshoring of production process, foreign investments can help upgrade the skill composition of domestic employment due to the required increase in headquarter activities as pointed out in Castellani et al. (2008).

Table 5-3-2. Regression Coefficients for Korea's FDI to its Top-20 FDI Partners: Skill Composition

FDI Rank	Country	Reg. Coef.	FDI Rank	Country	Reg. Coef
1	China	0.006 (0.000)***	11	Australia	25.928 (0.161)
2	USA	0.014 (0.000)***	12	Japan	0.106 (0.710)
3	Vietnam	0.038 (0.063)*	13	Czech Republic	-5.126 (0.710)
4	Hong Kong	0.386 (0.371)	14	Thailand	0.038 (0.955)
5	India	0.035 (0.000)***	15	Germany	0.045 (0.001)***
6	Brazil	0.013 (0.000)***	16	UK	22.560 (0.024)**
7	Malaysia	0.918 (0.002)***	17	Mexico	0.593 (0.291)
8	Netherlands	14.921 (0.044)**	18	Russia	0.886 (0.608)
9	Indonesia	0.015 (0.041)**	19	Poland	0.016 (0.000)***
10	Singapore	5.635 (0.098)*	20	Hungary	13.194 (0.208)

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).
2) Regression coefficients of FDI are reported in 'original value × 10^2'.
3) The red-colored values indicate regression coefficients are positive and significant.

Table 5-3-3. Regression Coefficients for FDI by Country Groups: Skill Composition

By National Association		By Continent	
	Reg. Coef		Reg. Coef
ASEAN	0.014	East & Southeast Asia	0.007
	(0.053)*		(0.000)***
BRICS	0.007	Central & South Asia	0.034
	(0.000)***		(0.000)***
OECD	0.007	West Asia & North Africa	0.237
	(0.000)***		(0.000)***
European Union	0.011	Sub-Saharan Africa	10.074
	(0.000)***		(0.686)
G7	0.011	North America & Europe	0.006
	(0.000)***		(0.000)***
OPEC	9.070	Latin America & Caribbean	0.015
	(0.118)		(0.000)***

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).
2) Regression coefficients of FDI are reported in 'original value × 10^2'.
3) The red-colored values indicate regression coefficients are positive and significant.

6. Conclusion

As Castellani et al. (2008) points out, “advanced countries share the fear of job exodus associated to firms’ international production when they see their companies closing down domestic plants and opening up new ones abroad.” As a result, national policies are often designed to reduce outward FDI, considering it is a capital flight that may negatively affect the labor market of the source economy. Since the introduction of the so-called ‘Reshoring U-turn Act’ in 2013, Korean government has implemented strong policies for the reshoring of multinational firms. However, promoting unconditional reshoring policies may not be an optimal strategy for job creation, and there are numerous studies that explore the positive effects of outward investments on parent firms’ employment along with upgrading in skill composition of employment, with theoretical explanation (representatively, Feenstra and Hanson, 1996) backed by empirical evidence (representatively, Castellani et al., 2008).

This paper empirically investigates the impact of OFDI by Korean manufacturing firms on their total, skilled, and unskilled employment as well as skill composition of employees, using Statistics Korea’s Survey of Business Activities firm-level dataset which contains data for all of Korean firms which have 50 employees or more and have capital stock of 300 million KRW or more in the period of 2006-2019. The results of both OLS fixed effects estimation and 2SLS estimation with instrumental variable show that the globalization of production activities of Korean manufacturing firms did not reduce total employment, rather, there is some evidence that it enhanced

the growth rate of total employment. Furthermore, OFDI was found to increase both the level and growth of employment of skilled labor and did not reduce growth of unskilled labor. However, OFDI did reduce the level of unskilled labor. Moreover, empirical results suggest that outward investment can upgrade the skill composition of employment of parent firms as it positively affects the share of skilled labor.

These results are consistent with Feenstra and Hanson's offshoring model that expects outward investment's positive consequences on relative demand for the skilled labor and negative consequences on that for the unskilled labor of the home country (i.e., South Korea) with a low relative wage for skilled workers compared to other countries. Therefore, it can also be inferred that Korea's outward FDI structure is focused on the offshoring of low-skill intensive intermediate production activities.

Furthermore, the empirical results show the different effects of FDIs to various destinations (countries, continents, and national associations). For example, FDI to China has negative effects, but FDI to USA has positive effects on growth of unskilled labor. Also, only FDI to China reduces the level of total employment, while FDIs to other countries do not. This may be because the patterns of FDI from South Korea to China are relatively more focused on offshoring of low skill-intensive intermediate production activities, and thus, the negative impact on unskilled labor outweighs the positive impact on skilled labor. More thorough research on the characteristics of Korea's FDI to specific regions along with the industrial and employment structures of foreign subsidiaries in the destination regions are left for future research.

In summary, outward FDI of Korean manufacturing firms affects domestic employment in different ways according to various circumstances. It has a negative impact on the employment of unskilled labor. However, outward FDI not only can create domestic jobs for skilled workers, but also can enhance the growth rate of the total employment and the share of skilled labor, upgrading the skill composition of employment of parent firms. Therefore, the strategy for reshoring should be carefully planned when the purpose of the policy is to increase the size of domestic employment. Sometimes, it may be a mistake to make the firms who are already positively contributing to increasing domestic jobs 'U-turn' investments back to their home country, and thus, unconditional reshoring policy ought to be curbed.

6.1. Limitations

The author acknowledges the limitations of this research. First, the application of foreign investment data for Feenstra and Hanson's offshoring model could be biased because some horizontal-purpose FDIs are not related to offshoring activities for the production of intermediate goods. However, the empirical evidence for general trend of outward investment positively affecting level, growth, and share of skilled employment imply that even for the horizontal-purpose FDI, which is less related to offshoring of production process, help skill upgrading of domestic employment via the required increase in headquarter activities as pointed out in Castellani et al. (2008).

Second, the IV used in this research may not be perfectly exogenous since it is a choice by each firm, and not exogenously given. It may affect the future domestic employment via other unseen routes. Also, it may not perfectly satisfy the relevance condition. In the case of technology-intensive industries, the amount of FDI is very large due to facility installations, but there are often only a small number of staff with facility-handling know-how who are sent abroad to help the foreign subsidiaries.

Third, the use of production and non-production labor as proxies for unskilled and skilled labor respectively may be flawed. Although these proxies are used in many other literatures in international and labor economics[22], they may include contradictory cases. For example, low-skilled clerks at office should be considered as unskilled or low-

[22] See section 1.5.2.

skilled as the requirements for job entry are low, but are included in non-production labor. Conversely, production workers may have high-skills such as fine process technology or welding technique.

Lastly, the empirical results can only reflect the case of Korean manufacturing firms, and thus, may not be able to represent the cases of other countries.

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Appendix

A1. KSIC Industry Classifications in SBA Data

Table A1-1. KSIC Industry Classifications in SBA Data

Middle-level Classification		Large-level Classification	
Code	Description	Code	Description
1	Agriculture	A	Agriculture, forestry and fishing
2	Forestry	A	Agriculture, forestry and fishing
3	Fishing	A	Agriculture, forestry and fishing
5	Mining of Coal, Crude Petroleum and Natural Gas	B	Mining and quarrying
6	Mining of Metal Ores	B	Mining and quarrying
7	Mining of Non-metallic Minerals, Except Fuel	B	Mining and quarrying
8	Mining support service activities	B	Mining and quarrying
10	Manufacture of Food Products	C	Manufacturing
11	Manufacture of Beverages	C	Manufacturing
12	Manufacture of Tobacco Products	C	Manufacturing
13	Manufacture of Textiles, Except Apparel	C	Manufacturing
14	Manufacture of wearing apparel, Clothing Accessories and Fur Articles	C	Manufacturing
15	Tanning and Dressing of Leather , Manufacture of Luggage and Footwear	C	Manufacturing
16	Manufacture of Wood Products of Wood and Cork ; Except Furniture	C	Manufacturing
17	Manufacture of Pulp, Paper and Paper Products	C	Manufacturing
18	Printing and Reproduction of Recorded Media	C	Manufacturing
19	Manufacture of Coke, hard-coal and lignite fuel briquettes and Refined Petroleum Products	C	Manufacturing
20	Manufacture of chemicals and chemical products except pharmaceuticals, medicinal chemicals	C	Manufacturing
21	Manufacture of Pharmaceuticals, Medicinal Chemicals and Botanical Products	C	Manufacturing
22	Manufacture of Rubber and Plastic Products	C	Manufacturing
23	Manufacture of Other Non-metallic Mineral Products	C	Manufacturing

24	Manufacture of Basic Metal Products	C	Manufacturing
25	Manufacture of Fabricated Metal Products, Except Machinery and Furniture	C	Manufacturing
26	Manufacture of Electronic Components, Computer, Radio, Television and Communication Equipment and Apparatuses	C	Manufacturing
27	Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks	C	Manufacturing
28	Manufacture of electrical equipment	C	Manufacturing
29	Manufacture of Other Machinery and Equipment	C	Manufacturing
30	Manufacture of Motor Vehicles, Trailers and Semitrailers	C	Manufacturing
31	Manufacture of Other Transport Equipment	C	Manufacturing
32	Manufacture of Furniture	C	Manufacturing
33	Other manufacturing	C	Manufacturing
35	Electricity, gas, steam and air conditioning supply	D	Electricity, gas, steam and water supply
36	Water Supply	D	Electricity, gas, steam and water supply
37	Sewage, Wastewater and Human Waste Treatment Services	E	Sewerage, waste management, materials recovery and remediation activities
38	Waste Collection, Disposal and Materials Recovery	E	Sewerage, waste management, materials recovery and remediation activities
39	Remediation activities and other waste management services	E	Sewerage, waste management, materials recovery and remediation activities
41	General Construction	F	Construction
42	Special Trade Construction	F	Construction
45	Sale of Motor Vehicles and Parts	G	Wholesale and retail trade
46	Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles	G	Wholesale and retail trade
47	Retail Trade, Except Motor Vehicles and Motorcycles	G	Wholesale and retail trade
49	Land Transport ; Transport Via Pipelines	H	Transportation
50	Water Transport	H	Transportation
51	Air Transport	H	Transportation
52	Storage and support activities for transportation	H	Transportation
55	Accommodation	I	Accommodation and food service activities
56	Food and beverage service activities	I	Accommodation and food service activities
58	Publishing activities	J	Information and communications
59	Motion picture, video and television programme production, sound recording and music publishing activities	J	Information and communications
60	Broadcasting	J	Information and communications
61	Telecommunications	J	Information and communications

62	Computer programming, consultancy and related activities	J	Information and communications
63	Information service activities	J	Information and communications
64	Financial Institutions, Except Insurance and Pension Funding	K	Financial and insurance activities
65	Insurance and Pension Funding	K	Financial and insurance activities
66	Activities Auxiliary to Financial Service and Insurance Activities	K	Financial and insurance activities
68	Real Estate Activities	L	Real estate activities and renting and leasing
69	Renting and leasing; except real estate	L	Real estate activities and renting and leasing
70	Research and Development	M	Professional, scientific and technical activities
71	Professional Services	M	Professional, scientific and technical activities
72	Architectural, Engineering and Other Scientific Technical Services	M	Professional, scientific and technical activities
73	Professional, Scientific and Technical Services, n.e.c.	M	Professional, scientific and technical activities
74	Business Facilities Management and Landscape Services	N	Business facilities management and business support services
75	Business Support Services	N	Business facilities management and business support services
84	Public Administration and Defence ; Compulsory Social Security	O	Public administration and denfence ; compulsory social security
85	Education	P	Education
86	Human Health	Q	Human health and social work activities
87	Social Work Activities	Q	Human health and social work activities
90	Creative, Arts and Recreation Related Services	R	Arts, sports and recreation related services
91	Sports activities and amusement activities	R	Arts, sports and recreation related services
94	Membership Organizations	S	Membership organizations, repair and other personal services
95	Maintenance and Repair Services	S	Membership organizations, repair and other personal services
96	Other Personal Services Activities	S	Membership organizations, repair and other personal services

A2. List of Reshoring Policies of Korea

Table A2-1. List of Reshoring Policies of Korea

Tax Incentives
On July 26, 2021, the Ministry of Economy and Finance released its 2021 Tax Revision Bill. The bill outlines measures designed to incentivize investment in national strategy technologies, new growth engines, core technologies, and the intellectual property market, as well as “boost consumption and support businesses” more broadly. Under this bill, the government will expand its re-shoring tax incentives (100 percent income tax cut for five years) to cover overseas companies that return to South Korea within two years— beyond the current one-year limit.
On June 28, 2021, the Ministry of Economy and Finance released its Economic Policies, H2 2021, which outlines several policies aiming to attract foreign investment in “strategic technologies,” including semiconductors, batteries, and vaccines. For example, the government states that it will provide “tax and financial support” to companies working on strategic technologies.
On January 6, 2021, the government issued Updates to the 2020 Tax Revision, which include expanding “the job creation tax incentive to companies which failed to retain jobs in 2020" and expanding "corporate investment tax deductions to almost all businesses, except rental property businesses and clubs."
On July 22, 2020, the South Korean government released a 2020 Tax Revision Bill, which the National Assembly approved on December 2, 2020. According to a Ministry of Economy and Finance (MOEF) press release, the bill aims to support COVID-19 economic recovery efforts by providing additional tax incentives, including offering "higher tax deductions for investments in new growth engines, including those in the Korean New Deal," allowing investment tax credits and tax deductions for losses to be carried over for longer periods of time, providing tax incentives to companies either increasing workplaces or opening new ones, and more.

On June 1, 2020, the Ministry of Economy and Finance released its Economic Policies, H2 2020, which outlined several policies aiming to attract foreign investment. For example, the government states that it will "improve tax deduction for corporate investment," provide re-shoring support, and reduce income tax for foreign researchers to promote research and development (R&D), among other initiatives.

On May 13, 2021, President Moon Jae-in unveiled the government's new K-Semiconductor Strategy. Under the strategy, the government will aim to attract more than KRW510 trillion (US$450 billion) of investments from the private chip sector through significant tax incentives and other measures. These include up to 50 percent in tax breaks for chip research and development (R&D) investments and a six-fold increase in tax breaks for investments in facilities.

On January 6, 2021, the government announced Updates to 2020 Tax Revision. Updates include adding "25 new technologies to the facilities investment tax deduction given to new technology commercialization"; offering "a separately-taxed dividend income tax of nine percent for up to 200 million won [US$175,000] of investment in New Deal infrastructure funds and a separately-taxed dividend income tax of 14 percent for up to 100 million won [US$87,000] investment in mutual funds investing in New Deal projects"; and expanding "technology R&D tax reduction to 240 technologies," which now includes digital and green new deal technologies and bio health technologies.

Subsidies

On June 28, 2021, the Ministry of Economy and Finance released its Economic Policies, H2 2021, which outlines several policies aiming to attract foreign investment in "strategic technologies." For example, the government states that it will launch a KRW2 trillion (US$1.7 billion) "support package" and "expand reshoring support" in this area.

On December 17, 2020, in its Economic Policy Direction for 2021, the Korean Ministry of Economy and Finance announced expanding subsidies and relaxed accreditation requirements for high-tech investments and two or more companies that re-shore together "outside metropolitan areas." The ministry also noted that maximum levels of support "within the scope

of current laws and regulations" would be provided to re-shoring companies considered to be of strategic importance.

On December 2, 2020, the National Assembly enacted its 2021 budget. The proposed budget allocated KRW65.9 trillion (US$57.6 billion) to promote investment, including KRW200 billion (US$175 million) to "increase incentives, expand on-site support, make joint investment in R&D centers and living accommodations to attract foreign talents, and increase support for global joint projects."

On September 1, 2020, the Korean Ministry of Economy and Finance announced additional measures in the 2021 budget for re-shoring companies amounting to KRW52.2 billion (US$45 million), a 147 percent increase from 2020. These include the expansion of investment incentives, subsidies for job creation, and the expansion of a "one-stop support desk" that provides customized support to investors.

On February 3, 2020, the Ministry of Trade, Industry and Energy announced amendments to the Foreign Investment Promotion Act, which took effect on August 5, 2020. The amendment adds 2,990 technologies across 33 sectors to the list of technologies eligible for government cash grants.

On August 31, 2021, the Ministry of Finance announced the allocation of subsidies in its 2022 National Budget that aims to stimulate growth in key high-technology industries, including semiconductors, biotechnology, and electric vehicles. The budget includes ₩2.8 trillion (US$2.4 billion) in subsidies for these industries, often referred to as "the Big 3."

On May 13, 2021, President Moon Jae-in unveiled the government's new K-Semiconductor Strategy. Under the strategy, the government will provide "all-embracing support" to semiconductor companies, by providing "low-interest loans for facility investments" to allow production capacity to be "expanded rapidly." Facilities covered in this measure include electricity transmission lines and water/wastewater recycling.

On November 10, 2020, the Korean Ministry of Trade, Industry and Energy announced amendments to the Act on Support for Overseas Companies to Return to Korea (U-turn Act) aimed at strengthening support for high-tech industries and R&D centers returning to Korea. The amendment widens the scope of companies eligible for U-turn subsidies and support –

relaxing business site requirements, employment thresholds, and domestic-overseas product uniformity standards. The amendment also makes it possible for research facilities, R&D centers, and hi-tech industries to receive U-turn subsidies.

On July 9, 2020, the Korean Ministry of Trade, Industry and Energy issued its Materials, Parts, Equipment 2.0 Strategy in response to Japan's export regulations in mid-2019 and as a "preemptive response to global supply chain reorganization." Under the strategy, the Korean government will allocate KRW1.5 trillion (US$1.3 billion) over five years to develop new technologies in the materials, parts and equipment sectors and to attract high-tech industries from abroad, including through U-turn (re-shoring) subsidies, infrastructure investments, and high-tech investment tax deductions.

Administrative Barriers

On June 28, 2021, the Ministry of Economy and Finance released its Economic Policies, H2 2021, which outlines several policies aiming to attract foreign investment in "strategic technologies." For example, the government states that it will work on "deregulation to approve new technologies or businesses" in this area.

On July 22, 2020, the government released a 2020 Tax Revision Bill, which the National Assembly approved on December 2, 2020. The bill follows up on the government's earlier H2 2020 economic policy outline and redesigns the "nine facilities investment tax incentives into one consolidated tax incentive."

On June 1, 2020, the Ministry of Economy and Finance released its Economic Policies, H2 2020, which outlined several policies aiming to incentivize investment. For example, the government states that it will "make tax deductions for facilities investment simple and easy by integrating it with other investment tax deduction programs."

On February 3, 2020, the Ministry of Trade, Industry and Energy announced amendments to the Foreign Investment Promotion Act, which took effect on August 5, 2020. Among other actions, the amendment recognizes foreign reinvestment of earned surplus as foreign direct investment.

On May 13, 2021, President Moon Jae-in unveiled the government's new K-Semiconductor Strategy. Under this measure, the government will provide "all-embracing support" to semiconductor companies through "regulatory reform," to allow for corporate investments to be "made in a timely manner." For example, licensing approval procedures will be "shortened as much as possible."

On June 1, 2020, the Ministry of Economy and Finance released its Economic Policies, H2 2020, which outlined several policies aiming to incentivize investment. For example, the government states that it will revise regulations to promote "smart working and doing business remotely"; work to deregulate additional key industries including data and artificial intelligence, autonomous vehicles, medical technologies, Fintech, tech startups, and e-commerce; and promote "regulatory sandboxes" as well as "regulation-free zones."

Special Economic Zones

On November 2020, the Korean government announced the "Free Economic Zone 2.0: 2030 Vision and Strategies," which outlines three aims: (1) expanding the direction of the FEZs away from development only and attracting foreign investment to achieve innovative growth, (2) offering incentives to high-tech and key strategic industries, and (3) implementing regulatory reforms to facilitate investment in new industries.

On June 1, 2020, the Ministry of Economy and Finance released its Economic Policies, H2 2020, which outlined several policies aiming to attract foreign investment. For example, the government states that it will "give a 30 percent rent reduction to businesses locating in free economic zones, free trade zones, and foreign investment zones."

On July 6, 2021, the Ministry of Trade, Industry and Energy (MOTIE) announced amendments to the Enforcement Decree of the Designation and Management of Free Trade Zones Act, which took effect on July 13, 2021. According to a MOTIE press release, high-tech and re-shoring/U-turn companies are now eligible to enter free trade zones if they have an export ratio exceeding 30 percent — significantly lower than the 50 percent required of other large businesses.

On May 13, 2021, President Moon Jae-in unveiled the government's new K-Semiconductor Strategy. Under the strategy, the government will "establish a close-knit supply network for materials, parts and equipment," including complexes in Pangyo, Cheongju, Yongin, Hwaseong and Cheonan.

Other Policies

On June 1, 2020, the Ministry of Economy and Finance released its Economic Policies, H2 2020, which outlined several policies aiming to incentivize investment. For example, the government states that it will "promote corporate investment in logistics centers and manufacturing facilities, worth 6.2 trillion won (US$5.4 billion)" and "develop 10 trillion won (US$8.7 billion) worth of public projects for private investment, including 1.5 trillion won (US$1.3 billion) wastewater treatment facilities."

On February 7, 2022, the city of Seoul launched "Invest Seoul," an investment promotion agency (IPA) to attract foreign investment and overseas companies. Invest Seoul focuses on four areas: (1) market research for FDI in Seoul, (2) attraction of global companies, (3) promotion of investment, and (4) setting up global companies' Seoul offices. The agency will support companies in investment registration and aims to attract financial services companies leaving Hong Kong.

On August 26, 2020, according to Yonhap News, the city of Busan signed a memorandum of understanding (MOU) with Korea Trade-Investment Promotion Agency (KOTRA) to further promote foreign investment and business reshoring, and bring overseas production and services back to Korea. Both agreed to "work together to find global investors and venture capitalists, appoint a trade office dedicated to the partnership and run joint-corporate events and presentations overseas." KOTRA will also help city governments set up foreign direct investment (FDI) policies and implement investment initiatives in major growth sectors.

Source: Asia Society Policy Institute.

A3. Regression Results with Year-Sector Group Fixed Effects

Table A3-1. Regression Results with Year-Sector Group FE: Level Effects

DV:	Total Employment (ln L_{t+1})			Unskilled Employment (ln Lu_{t+1})			Skilled Employment (ln Ls_{t+1})		
	(1) OLS	(2) OLS	(3) 2SLS	(4) OLS	(5) OLS	(6) 2SLS	(7) OLS	(8) OLS	(9) 2SLS
FDI_t	0.002	-0.000	0.001	-0.031	-0.033	-0.067	0.022	0.021	0.025
($\times 10^2$)	(0.820)	(0.967)	(0.952)	(0.006)***	(0.005)***	(0.054)*	(0.006)***	(0.007)***	(0.072)*
ln Q_t		0.402	0.402		0.433	0.433		0.319	0.319
		(0.000)***	(0.000)***		(0.000)***	(0.000)***		(0.000)***	(0.000)***
ln KL_t		-0.162	-0.162		-0.203	-0.203		-0.089	-0.088
		(0.000)***	(0.000)***		(0.000)***	(0.000)***		(0.000)***	(0.000)***
ln TFP_t		-0.073	-0.073		-0.077	-0.077		-0.053	-0.053
		(0.000)***	(0.000)***		(0.000)***	(0.000)***		(0.000)***	(0.000)***
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year-Sector FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	64,338	64,338	64,338	64,338	64,338	64,338	64,338	64,338	64,338
R-Sq.	0.929	0.945		0.801	0.815		0.772	0.777	

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).

2) Regression coefficients of FDI are reported in 'original value $\times$ 10^2'.

Table A3-2. Regression Results with Year-Sector Group FE: Growth Effects

DV:	Total Employment ($\Delta \ln L_{t+1}$)			Unskilled Employment ($\Delta \ln Lu_{t+1}$)			Skilled Employment ($\Delta \ln Ls_{t+1}$)		
	(1) OLS	(2) OLS	(3) 2SLS	(4) OLS	(5) OLS	(6) 2SLS	(7) OLS	(8) OLS	(9) 2SLS
FDI_t	0.004	-0.000	0.030	-0.007	-0.006	0.008	0.023	0.024	0.027
($\times 10^2$)	(0.625)	(0.519)	(0.046)**	(0.503)	(0.585)	(0.605)	(0.004)***	(0.001)***	(0.094)*
$\ln Q_t$		-0.117	-0.117		-0.129	-0.129		-0.074	-0.074
		(0.000)***	(0.000)***		(0.000)***	(0.000)***		(0.000)***	(0.000)***
$\ln KL_t$		0.261	0.261		0.263	0.263		0.188	0.188
		(0.000)***	(0.000)***		(0.000)***	(0.000)***		(0.000)***	(0.000)***
$\ln TFP_t$		0.067	0.067		0.066	0.066		0.053	0.053
		(0.000)***	(0.000)***		(0.000)***	(0.000)***		(0.000)***	(0.000)***
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year-Sector FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	64,338	64,338	64,338	64,338	64,338	64,338	64,338	64,338	64,338
R-Sq.	0.117	0.219		0.080	0.096		0.058	0.063	

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).

2) Regression coefficients of FDI are reported in 'original value $\times$ 10^2'.

Table A3-3. Regression Results with Year-Sector Group FE: Skill Composition

DV:	Share of Skilled Labor ($SLs_{t+1} = Ls_{t+1}/L_{t+1}$)		
	(1) OLS	(2) OLS	(3) 2SLS
FDI_t	0.006	0.006	0.014
($\times 10^2$)	(0.000)***	(0.000)***	(0.059)*
$\ln Q_t$		-0.019	-0.019
		(0.000)***	(0.000)***
$\ln KL_t$		0.021	0.021
		(0.000)***	(0.000)***
$\ln TFP_t$		0.004	0.004
		(0.169)	(0.170)
Firm FE	Y	Y	Y
Year-Sector FE	Y	Y	Y
Observations	64,338	64,338	64,338
R-Sq.	0.597	0.598	

Notes: 1) Robust p-values are in parentheses (*: p<0.1, **: p<0.05, *** p<0.01).

2) Regression coefficients of FDI are reported in 'original value $\times$ 10^2'.

국문 초록

해외직접투자가 국내 고용 및 숙련구조에 미치는 영향

오늘날 여러 국가들은 해외직접투자를 줄이기 위한 정책설계에 힘을 기울인다. 이는 해외직접투자가 원천경제의 노동시장에 부정적인 영향을 미칠 수 있는 자본도피 성격이 강하다는 통념에서 기인하는 경우가 많다. 2013년 '해외진출기업복귀법'이 도입된 이후, 한국정부는 다국적 기업의 리쇼어링을 위한 강력한 정책을 시행해왔다. 그러나 기존 이론 및 실증 연구에서는 무조건적인 리쇼어링 정책 추진은 고용창출을 위한 최적의 전략이 아닐 수 있으며, 기업의 해외투자가 고용의 숙련구조 고도화와 함께 모기업의 고용에 긍정적인 영향을 미칠 수 있음을 밝히고 있다.

본 논문은 2006~2019년 통계청 기업활동조사의 기업수준 자료를 이용하여 국내 제조업 기업의 해외직접투자가 해당 기업의 총 고용, 숙련 및 비숙련 고용, 그리고 고용 숙련구조에 미치는 영향을 실증적으로 분석하였다. 기업활동조사 자료는 해당 연도에 자본금 3억원 이상, 상용근로자 50인 이상인 국내 회사법인을 대상으로 실행하는 전수 조사를 바탕으로 구축되었다. 해당 자료를 분석하여 도출한 OLS 고정효과 추정과 도구변수를 활용한 2SLS 추정 결과에 따르면, 국내 제조업 기업의 해외직접투자를 통한 생산활동 글로벌화는 기업의 고용 수준을 감소시키지 않았으며, 오히려 고용 성장률을 높이는 것으로 나타났다. 또한 해외직접투자는 숙련 노동자의 고용 수준과 성장률을 모두 증가시켰으며, 비숙련 노동자의 고용 증가율을 감소시키지 않은 것으로 나타났다. 반면에, 해외직접투자는 미숙련 노동자의 고용 수준을 감소시켰다. 더 나아가, 본 연구에서는 해외직접투자가 숙련 노동자의 고용 비중에 긍정적인 영향을

미침으로 인해 모기업 고용의 숙련구조를 고도화시킬 수 있음을 실증적으로 검증하였다.

이러한 연구결과는 다른 국가에 비해 숙련 노동의 상대임금이 낮은 본국의 숙련 노동 상대수요에 대한 해외투자의 긍정적인 영향, 그리고 비숙련 노동 상대수요에 대한 해외투자의 부정적인 영향을 예측하는 Feenstra & Hanson의 오프쇼어링 모델에 부합한다. 이를 바탕으로, 한국의 해외직접투자 구조는 비숙련 노동을 필요로 하는 중간재 생산활동의 오프쇼어링에 치중되어 있음을 유추할 수 있다.

주요어: 해외직접투자, 리쇼어링, 고용 숙련구조, 기업수준분석, 다국적기업, 한국경제.

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