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Article

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The Impact of Outward FDI on the South Korean Labor Market: Evidence on the Wages of Four Types of Workers*

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The purpose of this research is to identify the relation between OFDI (Outward Foreign Direct Investment) and wage inequality. In order to analyze various effects of OFDI on wages depending on the types of workers, the research classified laborers into four categories: permanent/skilled worker, permanent/unskilled worker, temporary/skilled worker, and temporary/unskilled worker. With controlling wage-determining factors such as education, labor union, individual fixed-effect, and industry-level effect, this paper examines whether OFDI attributes to the wage inequality among each type of workers. Moreover, this study also analyzes possible effects on wages that could vary according to the different characteristics of investments by classifying OFDI into two groups: OECD and non-OECD. The results reveal that OFDI makes certain differences according to skill-intensity and contract type in terms of influences on wages. It also shows that the effect of OFDI on wages is more subject to contract type than to skill-intensity. The classification of OFDI into OECD and non-OECD proves that effects on wages can vary by characteristics of the subject of investment.

Keywords: FDI, Skill-intensity, Contract Types, Wage Inequality
JEL Classification: F13, F14, F16

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I. Introduction

Recently, globalization has been rapidly progressing with the help of such factors as reduction in transportation costs, development of IT technology, and lowered trade barriers, which consequently have accelerated the OFDI (Outward Foreign Direct Investment) of multinational corporations to optimize their productivity. The scale of OFDI around the world soared to 1.4 trillion U.S. dollars in 2012 from 21.4 billion U.S. dollars in the 1990s (UNCTAD, 2012). The dramatic increase in OFDI becomes a direct cause of "deindustrialization" as it accelerates relocation of production activities overseas (Kang and Lee, 2011).

It has started to become more convincing that OFDI and the diminished domestic production activities caused by deindustrialization could create negative impacts on the labor market in terms of employment and wages. In particular, a concern was raised that relocation of production sites could reinforce wage inequality, victimizing specific laborers. For instance, Slaughter (2000) points out that affiliate activities of multinationals may substitute unskilled-labor-intensive production, giving rise to the relative demand-shift from skilled to unskilled workers.

The purpose of this paper is to find empirical evidence that OFDI tends to accelerate wage inequality. However, this paper addresses the possibility that the effect of OFDI can be heterogeneous depending on the types of workers. Using individual panel data published by Korean Labor Institute (KLI), we classify the workers into four categories depending on skill-intensity and job-permanency. Moreover, we examine the effect of OFDI based on investment destination: OFDI to OECD and non-OECD countries. The empirical results indicate that permanent workers obtain more wage-benefit than temporary ones by OFDI regardless of skill-intensity. In addition, when OFDI is divided into OECD and non-OECD, it turns out that their impacts are quite different.

In fact, the wage inequality triggered by reallocation of production is not a surprising issue, and there have been active discussions. According to Feenstra and Hanson (1996a), one of the most representative studies regarding the issue, 15-33 % of wage inequality observed in the manufacturing industry in the U.S. from 1979 to 1990 can be explained by global outsourcing. Other analogous studies conducted on the effects of global outsourcing or OFDI on increasing wage inequality also drew similar conclusions (Anderton and Breton, 1999; Head and Ries, 2002; Hijzen et al., 2005; Hsieh and Woo, 2005; Ahn et al., 2008; Becker et al., 2008; Driffield et al., 2009; Ebenstein et al., 2012). On the other

hand, Slaughter (2000) concludes that relocation of multinational corporations' production activities does not necessarily increase relative demand for skilled labor. There are also a significant number of researches that estimate that OFDI has little effect on relative demand for skilled labor or at the least, has even positive influences. (Lipsey, 2000; Lipsey, Ramstetter, and Blomström, 2000b; Becker et al., 2008; Masso et al., 2008).

Without considering the fact that the effect of OFDI on employment or wages can vary by individual level, however, those studies simply focus on the overall size of wage inequality. Facing the matter, Geishecker and Görg (2008) analyzed the effect of outsourcing on individual wages through utilization of individual panel data and discovered that the effect of outsourcing on wages can be heterogeneous according to individual skill-intensity. Geishecker and Görg (2008) categorized workers into three different groups according to skill-intensity and demonstrated an empirical analysis result that the wages of the group with the lowest skill-intensity increased by 1.8% whereas the highest skill-intensity group benefited with a 3.3% increase.

Meanwhile, another perspective that the effect of outsourcing on wages can vary according to contract types (which also used individual panel data as Geishecker and Görg (2008) did) started to gain attention. Görg and Görlich (2012) concluded that outsourcing helps increase the wages of permanent workers or at the least, has a slight impact on them, whereas temporary workers are subject to drastic decreases in their wages. In addition, Lee and Lee (2013), in their study on the effects of outsourcing on wages based on the labor panel data of Korea, manifested that outsourcing to OECD countries helps increase the wages of permanent workers and yet has no meaningful influence on the wages of temporary workers. However, the research also found that outsourcing to non-OECD countries has created a negative impact on the wages of temporary workers whereas it has had little impact on permanent workers.

The researches cited above, which used individual data to analyze the effects of OFDI or global outsourcing on the domestic labor market, predict that responses to the same exogenous impact can be diversified according to either the heterogeneity of the skill-intensity or the contract type. However, these studies are subject to certain limitations as they did not analyze the heterogeneous impact of outsourcing on wages in a more detailed manner. For example, within a group of workers with the same skill-intensity, there could be differences in terms of bargaining power based on their contract types—whether it is permanent or temporary—and even among permanent workers,

bargaining power could be differentiated by skill-intensity. Of course, this logic also applies to temporary or less-skilled workers. Accordingly, if laborers are categorized by single criteria, as was done in previous researches, it might not be possible to more precisely apprehend the heterogeneous characteristics of labor.

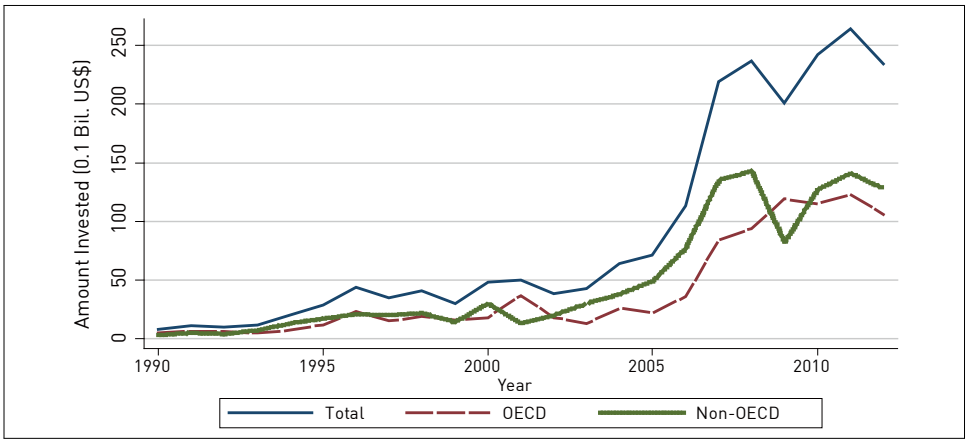
This research categorizes laborers by their skill-intensity and contract types of employment through utilization of the labor panel data in order to cover the effects of Korean OFDI on wages from more diversified perspectives. In short, this study aims to provide empirical evidence of the heterogeneous impact of OFDI on four types of labor: permanent-skilled, permanent-unskilled, temporary-skilled, and temporary-unskilled workers. With the focus not only on labor but also on the heterogeneous nature of OFDI, the research is also designed to prove hypothesis proposed by Ebenstein et al. (2012) that impacts of OFDI can be differentiated according to subject of investment. For instance, OFDI in non-OECD countries is to mainly exploit cheap labor costs while that in OECD countries is to mainly target the local market and access superior technologies. Since the purpose of OFDI is quite different, their effects on the labor market might be different as well. To empirically verify this, host countries are categorized into OECD and non-OECD, and impacts that each investment makes on the labor market are analyzed.

This study consists of the following chapters. In Section 2, we clarify stylized facts on OFDI and labor markets in South Korea. In Section 3, we discuss data and empirical model. Detailed analysis on the impacts of OFDI on different labor groups will be covered in Section 4. Finally, we summarize and conclude the discussion in Section 5.

II. Stylized Facts on South Korean FDI and the Labor Market

In this section, we observe changes in Korean OFDI and in wages, and discuss analogical interpretations of the changes. As shown in Figure 1, Korean OFDI has been dramatically increasing since 2000. The amount of Korean OFDI which was only 0.8 billion in 1990 reached 23.4 billion U.S. dollars in 2012. This figure also indicates that the scale of investment was bigger in non-OECD countries (12.8 billion U.S. dollars as of 2012) than in OECD countries (10.8 billion U.S. dollars as of 2012). In addition, the investments in both areas have maintained continual growth, with the exception of the sudden drop in non-OECD countries due to the global recession.

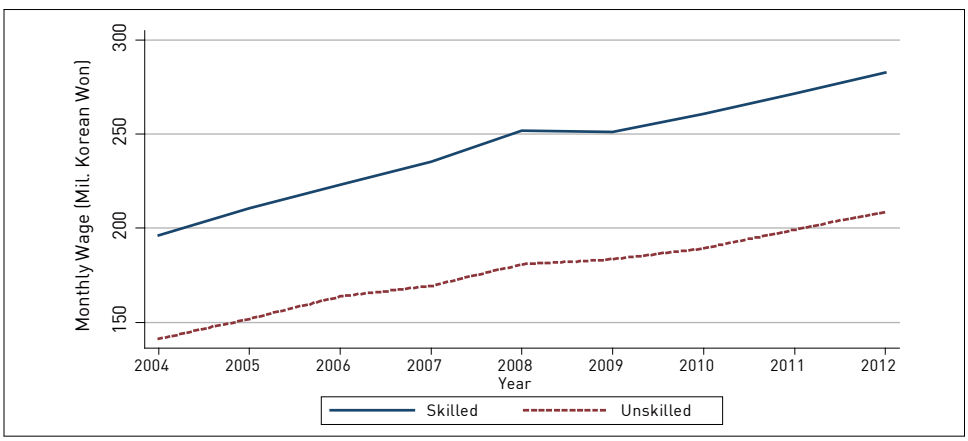
Figure 1. The Outward Foreign Direct Investment of Korea



Source: Export-Import Bank of Korea (www.koreaexim.go.kr/)

Figure 2 and Figure 3 describe the average monthly income of workers according to skill-intensity and contract type[1]. In Figure 2, the comparison between 2004 and 2012 reveals that the average monthly income of the skilled increased from 1.93 to 2.83 million KRW and that of the unskilled increased from 1.41 to 2.09 million KRW.

Figure 2. The Average Monthly Wage by Skill-intensity

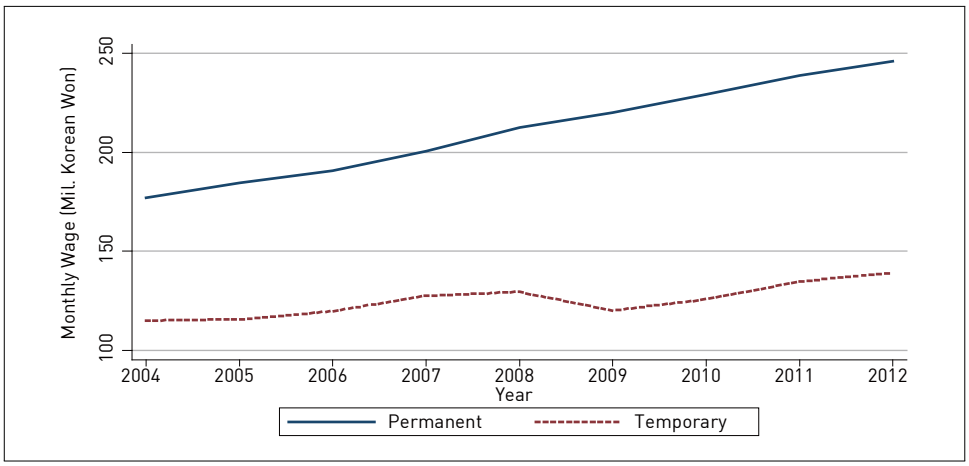


Source: Korean Ministry of Employment and Labor (http://laborstat.moel.go.kr/)

[1] Classification standards and definitions of contract type (permanent and temporary) will be introduced in Section 3.

However, Figure 3 reveals that the average monthly income of permanent workers soared from 1.77 to 2.46 million KRW whereas temporary workers benefited with just a minor increase, from 1.15 to 1.39 million KRW.

Figure 3. The Average Monthly Wage by Contract Type



Source: Korea Ministry of Employment and Labor (http://laborstat.moel.go.kr/)

Figure 2 and 3 indicate that the wage gap between the skilled and the unskilled is larger than the gap between permanent and temporary workers. Moreover, the wage gap between the two groups is widening as time passes. The overall figures support the idea that contract type has more impact on wages than skill-intensity does. Meanwhile, wages are constantly growing for both the skilled and the unskilled, whereas only permanent workers are enjoying sharp wage increases compared to temporary workers. It simply implies that the wage increase for both skilled and unskilled workers illustrated in the Figure 2 originates from the wage growth of permanent workers.

It is more logical to judge that differences in bargaining power and stability of employment, rather than differences in productivity, are responsible for the wage gap between the two groups of permanent and temporary workers. This is because productivity difference, if it were the cause, would not be able to explain why the wage gap between permanent and temporary workers is greater than that between the skilled and the unskilled ones. Consequently, this can lead one to the idea that exogenous shocks to the labor market such as OFDI could result in more damage to temporary workers, who suffer from both weak

bargaining power and instability of employment, regardless of skill-intensity. Accordingly, the heterogeneous impact of OFDI on wages is more likely to be subject to contract types than to skill-intensity. Therefore, the purpose of this study is to conduct an empirical test to support the idea that when various wage-determining factors are controlled, contract type can explain the heterogeneous impact of OFDI on wages better than skill-intensity can.

III. Empirical Strategy and Data

1. Empirical Strategy

This study implements an empirical analysis on the impact of OFDI ($OFDISH_{jt}$) in industry j on wages ($W_{i,jt}$) of workers by utilizing labor panel data from 1998 to 2010. In order to exclude the possible effects of hourly wages, we consider a form of log linearization as designating average monthly income as a dependent variable.[2] As explained above, this paper focuses on whether OFDI creates heterogeneous impact on wages according to labor type. Accordingly, we set a dummy variable for each category, the permanent-skilled ($Perm\_Skilled_{it}$), the permanent-unskilled ($Perm\_Unskilled_{it}$), the temporary-skilled ($Temp\_Skilled_{it}$), and the temporary-unskilled ($Temp\_Unskilled_{it}$) workers. In the case of the OFDI variable, amounts of OFDI are normalized according to the size of each industry, taking into account the industrial scale effects.

As many researches point out,[3] however, the estimates of independent variables can be biased, provided that unobserved individual characteristics are correlated with the independent variables. Thus, this paper controls the effects of time-invariant individual characteristics on wages by including the fixed effect, δ_i, in the model. In addition, other wage-influencing factors are also included in the estimation. First of all, education is included as an independent variable in order to control the effect of education on wages. To figure out the wage gap between residents of the capital area and those living outside of the capital area, the area of residence is also included in the analysis model. Also, to control the effects of firm size on wages, dummy variables denoting the number of employee are incorporated in the model. Furthermore, labor union

[2] Wage per hour can be calculated by dividing average of monthly wage into average of monthly working hours (weekly working hours * 4.3). See Lee and Kim (2009) and Shin (2009).

[3] See Hausman and Taylor (1981), Konings (2001), Baltagi et al. (2003), and Semykina and Wooldridge (2010).

is set as an independent variable to determine whether insiders benefit from wage premium due to the exclusive bargaining power of labor unions, as McDonald and Solow (1981) pointed out. In order to consider inherent element of industry, we put log of R&D expenses in the model. Additionally, by including year dummies in the model, we control various macroeconomic factors on wages such as the business cycle or exchange rate. Based on these variables discussed above, the empirical equation can be written as follows.[4]

$$\begin{aligned} ln\,W_{ijt} = {} & \alpha X_{it} + \beta_1 \log(OFDISH)_{jt} + \beta_2 Perm\_Skilled_{it} + \beta_3 Perm\_Unskilled_{it} \\ & + \beta_4 Temp\_Skilled_{it} + \gamma_1 \log(OFDISH)_{jt} * Perm\_Skilled_{it} \\ & + \gamma_2 \log(OFDISH)_{jt} * Perm\_Unskilled_{it} + \gamma_3 \log(OFDISH)_{jt} \\ & * Temp\_Skilled_{it} + \varphi \log(R\&D)_{jt} + \delta_i + \tau_t + \epsilon_{ijt} \end{aligned} \tag{1}$$

where X_{it} refers to individual factors on wages.

Here, the dummy of $Temp\_Skilled_{it}$ is excluded from the model as a base-category. The interaction term between OFDI and the dummy variables is also included in the model to observe the heterogeneous impact of OFDI on the wages of workers in each category. If OFDI has heterogeneous impact on wages according to labor type, those interaction variables will be significant. Furthermore, this paper conducts an analysis of the effects on wages according to subject of investment by classifying $OFDISH_{jt}$(entire OFDI) into $OECDSH_{jt}$ (OFDI in OECD countries) and $N.OECDSH_{jt}$(OFDI in non-OECD countries) in order to discover the heterogeneous impact on the domestic labor market according to the subject of OFDI.

2. Data

The data of individual workers is obtained from the Korean Labor and Income Panel Study (KLIPS) for 1998-2010 published by the Korea Labor Institute (KLI)[5]. This governmental study helps us control both individual wage-determining

[4] Moreover, since the effects of OFDI on wages may depend on industrial attributes, we take the interaction between OFDI and R&D into the model as well. The results including the interaction term is suggested in the appendix.

[5] KLIPS is data from longitudinal survey annually conducted on the family members of 5000 households residing in urban areas. The survey is to investigate the characteristics of the households and their economic activities such as labor market transfer, earning, consumption, education, and job training, as well as social activities. KLIPS has so far carried out 13 surveys since its first survey was

and time-invariant individual factors. Since the data contains the information on contract and types of workers, it is possible to analyze the effects of OFDI on wages in a more diversified manner.

As shown in Table 1, the KLIPS classifies laborers into permanent workers and temporary workers according to their contract types. In step with the criteria of KOSIS, this paper defines regular employees as permanent workers while temporary and daily employees as temporary ones.[6] Table 2 suggests that the categorization of laborers in the KLIPS based on the Korean Standard Classification of Occupations (KSCO). Following the classification of KSCO, we classify the worker as skilled and unskilled workers as shown in the Table 2.[7]

Table 1. Classification by Contract Type

Wage workers			Non-wage workers	
Permanent	Temporary			
Regular	Temporary but not daily	Daily	Owner operators	Unpaid family workers

Table 2. Classification by Skill-intensity

	Classification of Occupations
Skilled (= Non-production) Workers	Legislators, Senior Officials, and Managers
	Professionals
	Technicians and Associate Professionals
	Clerks
	Service Workers
	Sales Workers
	Skilled Agricultural, Forestry, and Fishery Workers
Unskilled (= Production) Workers	Craft and Related Trades Workers
	Plant, Machine Operators, and Assemblers
	Elementary Occupations

conducted on 5,000 households and 13,312 family members over the age of 15 in 1998.

[6] KOSIS complies with the standards of the Department of Labor that classifies laborers by length of contract. The three-party commission categorizes laborers into temporary workers, hourly workers, and atypical workers based on consistency of employment. Conceptions can vary according to purposes of researches and characteristics of materials on which studies rely.

[7] The skill-intensity can be represented not only by occupation, but also by individual ability. Hence, we use the level of education as a proxy of skill-intensity and run the auxiliary regression. The results are suggested in the appendix.

As for OFDI data, this paper refers to the industrial OFDI data from 1998 to 2010 provided by the Export-Import Bank of Korea. This material provides the amount of OFDI by industry based on three-digit Korean Standard Industrial Classification (KSIC, Rev.9). Since KLISP provides in which industry the each worker engages based on three-digit KSIC, we can match KLIPS data and OFDI data. Then the estimates of OFDI imply that how much individual wage is affected by the change in industry-level OFDI on average.

To control industrial factors other than OFDI, industrial R&D expenses are considered as variables, utilizing the data of the Korean Manufacturing Census and the National Science and Technology Information Service. Since the source material is not as detailed as that of the OFDI, the industrial variable is reprocessed as follows. First of all, for the manufacturing and mining industries, each industry size is reflected according to the minor (three digits) categorization, equivalent to the KSIC for OFDI data, while other industries use the two digit system employed in the System of National Accounts published by the Bank of Korea for major categorization. As for industrial R&D expense, with no data by minor classification available, two-digit data are used. Finally, among the analysis data are industrial output, R&D expense, and OFDI, all three of which are simply nominal data. Because they are indicated by different currency units—a million KRW for the former and the U.S. dollar for the latter—annual currency rates and GDP deflator from the Economy Statistics System of the Bank of Korea are used to actualize any numbers into KRW.

Table 3 demonstrates summary statistics of the variables used in our analysis. First of all, summary statistics of wages according to characteristics of laborer with more detailed categorizations of skill-intensity and contract type can be observed.[8] Average hourly wages for permanent-skilled workers is 10,200 KRW. However, when a laborer belongs to the same contract type (permanent) but is less skilled, that person only receives 7,200 KRW per hour on average, which indicates that skill-intensity leads to wage differences. In terms of temporary workers, on the other hand, the average hourly wage is smaller than that of permanent ones. The average hourly wage for temporary-skilled workers is 5,900

[8] This categorization can be worthless if there is nearly perfect complementarity between skill-intensity and job-permanency so that most skilled workers are permanent workers. As can be seen in the Table 3, however, the number of skilled workers is not just slanted towards permanent workers. Permanent-unskilled and temporary-skilled workers account approximately 50% for total occupation. In addition, we examine the correlation between the skill-dummy (1 if one is a skilled worker) and permanency-dummy (1 if one is a permanent worker), and the result turns out to be 0.21, which implies that there is no perfect-coordinated moves between skill-intensity and job-permanency.

KRW and the average hourly wage for temporary-unskilled is 5,700 KRW. This indicates that skill-intensity does not play a significant role in terms of wage gap within these two groups.

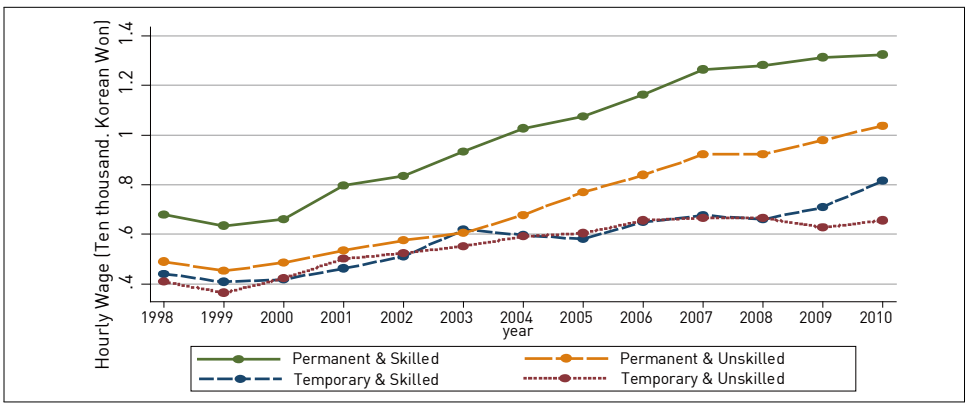
Table 3. Summary Statistics of Variables

	Obs.	Mean	Std. Dev.	Min	Max
Perm_Skilled	26768	1.02	0.98	0.00	44.96
Perm_Unskilled	14629	0.72	0.65	0.00	30.81
Temp_Skilled	5068	0.59	0.85	0.00	40.12
Temp_Unskilled	7425	0.57	0.39	0.00	9.30
OFDISH	39238	0.002	0.007	0.00	0.35
OECDSH	35989	0.0004	0.002	0.00	0.11
N.OECDSH	37308	0.001	0.006	0.00	0.24
R&D	40395	0.37	1.47	0.00	12.50

Note: i. All flow variables reflect real value (GDP deflator).
ii. Hourly wage of workers of every type is in ten thousands of won.
iii. R&D expenditure is in trillions of won.
iv. The number of observations spans a 13-year period (1998-2010).

Figure 4 clarifies the idea further. It shows that skill-intensity exerts noticeable influence on the wages of permanent workers and yet has little impact on those of temporary laborers. On top of that, the wage gap according to contract type widens as time goes by, whereas the gap created by skill-intensity remains almost unchanged. Therefore, it can be interpreted that wages are more subject to contract type than to skill-intensity.

Figure 4. The Hourly Wage of Workers by Four Types



Source: Korean Labor and Income Panel Study (http://www.kli.re.kr/)

Meanwhile, OFDI on average makes up 0.2% of industrial sales, and non-OECD countries attract more OFDI than OECD countries do. This suggests that the impact of OFDI on the labor market can be felt differently depending on the economic status of the subject—whether it is developing or developed (Ebenstein et al., 2012).

IV. Results and Discussion

Table 4 indicates the results of empirical analysis conducted on the effects of OFDI on wages, categorizing characteristics of laborers into four different types based on the entire data. Model (1) and Model (2) show the results of the analysis on the effects of the entire OFDI on wages, while Model (3) and Model (4) show the results of the analysis on the heterogeneous effects of OFDI in OECD countries and in non-OECD countries, respectively. The heterogeneous effect of OFDI on four different types of laborers, the primary subject of this study, is analyzed in Model (2) and Model (4). Model (2) and Model (4) include interaction terms between the variables of OFDI and the dummy variables that classify types of laborers in order to observe different responses from each laborer type in terms of wages. If there are heterogeneous effects on wages in each laborer type, the result of the interaction term will be significant.

Model (1) confirms that there is a positive (+) correlation between OFDI and wages of the entire group of laborers. This suggests that an increase in OFDI enables efficient redistribution of employment and creates favorable effects on domestic employment (Lipsey, Ramstetter, and Blomström, 2000b; Becker et al., 2008), which subsequently benefits all laborers in terms of wage increase. However, OFDI can have heterogeneous impact on wages by skill-intensity and contract type. Hence, Model (2) presents the estimated results, which include the interaction variables for OFDI and four different types of workers.[9] The OFDISH variable is negative with a significance level of 10%.

[9] Generally, when a dependent variable takes the form of a log, the coefficient value of a dummy variable refers to the percentage difference of the dependent variable according to the category of dummy variables, provided that other variables are fixed. For example, suppose we have the simple model below:

$$\ln Wage = \alpha + \beta_1 \ln OFDISH + \beta_2 Temp + \beta_3 \ln OFDISH * Temp + \epsilon$$

(a) $\ln Wage = \alpha + (\beta_1 + \beta_3) \ln OFDISH + \epsilon$

(b) $\ln Wage = \alpha + \beta_1 \ln OFDISH + \epsilon$

When the value of Temp Dummy is 1, the coefficient for the share of OFDI is given by $\beta_1 + \beta_3$,

This indicates that as the scale of OFDI increases by 1%, in the case of temporary-unskilled group, the wages decrease by 0.012%, whereas with the same increase in the scale, OFDI provides the permanent-skilled group with a 0.008% wage increase, following the permanent-unskilled group which receives a 0.015% wage increase. Because the interaction term does not appear to be statistically significant, for the temporary-skilled group it can only be said that the group could be subject to wage decrease if the scale of OFDI increased. Based on what has been presented so far, it appears that OFDI, in terms of wages, only benefits the permanent workers while it disadvantages the temporary workers. As well, skill-intensity does not play an important role in the effect of OFDI on wages. Thus, we can interpret that the effect of OFDI on wages is more subject to type of contract than to skill-intensity.

Meanwhile, the results of the analysis on the effects of OFDI in both OECD and non-OECD countries on wages reveal that OFDI in non-OECD countries has a positive impact on wages whereas OFDI in OECD countries has no significant meaning in terms of the wage effect according to Model (3), which does not apply the interaction terms.[10] This indicates that OFDI in non-OECD countries creates a positive impact on domestic productivity and the labor market as the investment is intended to relocate low-value-added businesses overseas for production cost reduction (Masso et al., 2008). Thus, it is affirmative that there is heterogeneous impact on the domestic labor market according to subject of OFDI. As OFDI in OECD and non-OECD countries can create different impacts on wages based on worker type, an empirical test is conducted in Model (4) with interaction terms of OFDI and labor types. It reveals that there is no significant impact of OFDI on wages detected in either OECD or non-OECD categories. That indicates that the effect of OFDI on the wages of the temporary-unskilled group is not statistically significant. The estimated results from interaction terms also tell us that OFDI in OECD countries does not have significant impact on wages. On the other hand, in the case of OFDI in non-OECD countries, per 1% investment growth, the wage increases for permanent-skilled and permanent-unskilled are 0.026% and 0.018% larger than the wage increases for temporary-unskilled, respectively. However, this also suggests that these results cannot afford to completely reject the hypothesis that

as in (a). On the other hand, when the value of Temp Dummy is 0 (base category), the coefficient for the share of OFDI is given by β_1, as in (b). This means that the effect of the share of OFDI changes depending on contract type, so there is no unique effect of the share of OFDI.

[10] We categorize all OFDI as either OFDI in OECD countries or OFDI in non-OECD countries.

temporary workers are subject to heterogeneous effects according to their skill-intensity when ODFI grows. Through the results, two conclusions can be drawn. First, as Models (1) and (2) suggest, the impact of OFDI on wages is more subject to contract type than to skill-intensity. This is because the interaction variables are significant for permanent workers but not for temporary ones. Second, the effect of OFDI on wages is not only subject to contract type but also to the nature of the investing country. Based on the estimated results from Models (3) and (4), it can be seen that OFDI in non-OECD countries causes bigger changes in wages than OFDI in OECD countries. This supports the conclusions of previous researches that claim that the effects of OFDI on wages can be heterogeneous according to the nature of the investing country (Ebenstein et al., 2012).

It turns out that wages are still more subject to contract type even though the impact of OFDI is under control. Permanent-skilled workers attain bigger wage increases—ranging from 15.4 to 32.6% more—than the temporary-unskilled group who are also outperformed by permanent-unskilled workers whose wage increase is 9.7-32.6% higher. But no significant wage gap between the temporary-skilled and the temporary-unskilled is found.

Also, we control industry-inherent elements as well as individual factors included as independent variables to restrain their potential influence on wages. Following that, an analysis is conducted to determine whether the designated control variables such as R&D expense, marriage, residence, labor union, education, and firm size have any impact on wages. It reveals that R&D expense does play a role, increasing wages to within a 1% significance level. This implies that technical progress creates positive impact on wages with the perception of increased investment in R&D as a proxy for evaluating technical progress in each industry (Lee and Lee, 2013). The married make 12.3-13.6% more than the unmarried, but the effect of residence on wages is unclear. In addition, it can be observed that wages increase as companies become larger, which indicates that larger companies pay their employees more,[11] while education demonstrates no significant impact on wages. This explains why the impact of education on wages is not significant when skill-intensity is controlled (Machin, Ryan, and Van Reenen, 1996; Berman, Bound, and Machin, 1998). Labor unions do not provide statistical significance either, suggesting that wage premiums generated by the bargaining power of labor unions are not visible.

[11] The dummy variable of firm size is calculated by the number of employees.

Table 4. Fixed-Effects Estimates of Wage Determinants by Four-Type Workers

	MODEL			
	(1)	(2)	(3)	(4)
log(OFDISH)	0.007*** (3.933)	-0.012* (-2.575)		
log(OECDSH)			-0.001 (-0.476)	-0.002 (-0.273)
log(N.OECDSH)			0.008*** (3.853)	-0.011 (-1.740)
Perm_Skilled * log(OFDISH)		0.020*** (3.677)		
Perm_Unskilled * log(OFDISH)		0.027*** (5.328)		
Temp_Skilled * log(OFDISH)		-0.003 (-0.348)		
Perm_Skilled * log(OECDSH)				-0.006 (-0.892)
Perm_Unskilled * log(OECDSH)				0.008 (1.185)
Temp_Skilled * log(OECDSH)				0.001 (0.112)
Perm_Skilled * log(N.OECDSH)				0.026*** (3.804)
Perm_Unskilled * log(N.OECDSH)				0.018** (2.664)
Temp_Skilled * log(N.OECDSH)				0.000 (0.035)
Perm_Skilled	0.166*** (9.341)	0.326*** (6.846)	0.154*** (8.266)	0.323*** (5.550)
Perm_Unskilled	0.103*** (6.843)	0.316*** (7.382)	0.097*** (6.145)	0.326*** (6.174)
Temp_Skilled	-0.010 (-0.415)	-0.077 (-0.824)	-0.038 (-1.550)	-0.064 (-0.528)
log(R&D)	0.007*** (4.036)	0.007*** (4.019)	0.008*** (4.209)	0.008*** (4.253)
Married	0.123*** (9.245)	0.125*** (9.378)	0.135*** (9.673)	0.136*** (9.688)
Residence	0.045* (1.986)	0.044 (1.941)	0.045 (1.911)	0.041 (1.783)

	MODEL			
	(1)	(2)	(3)	(4)
Union	0.010 (0.915)	0.011 (0.971)	0.005 (0.456)	0.005 (0.464)
Firm size (100-300)	0.064*** (6.005)	0.065*** (6.035)	0.060*** (5.390)	0.060*** (5.395)
Firm size (300-500)	0.073*** (4.260)	0.073*** (4.271)	0.071*** (4.017)	0.071*** (4.007)
Firm size (500-1000)	0.120*** (6.845)	0.120*** (6.834)	0.115*** (6.258)	0.114*** (6.205)
Firm size (over 1000)	0.121*** (8.902)	0.122*** (8.931)	0.122*** (8.439)	0.122*** (8.438)
Middle school	-0.038 (-0.490)	-0.027 (-0.349)	-0.028 (-0.337)	-0.012 (-0.143)
High school	-0.035 (-0.380)	-0.022 (-0.239)	0.036 (0.378)	0.054 (0.567)
College	0.036 (0.362)	0.044 (0.441)	0.057 (0.555)	0.072 (0.691)
Undergraduate	0.092 (0.924)	0.102 (1.023)	0.150 (1.445)	0.164 (1.576)
Graduate	0.190 (1.712)	0.196 (1.771)	0.220 (1.909)	0.227* (1.971)
Constant	8.153*** (87.568)	7.987*** (80.017)	8.108*** (82.096)	7.921*** (72.866)
Time effect	Yes	Yes	Yes	Yes
Observation	21,015	21,015	19,476	19,476
R-squared	0.239	0.241	0.229	0.231
Number of individuals	6,390	6,390	6,144	6,144

Note: i. t-Statistics are in parentheses.
ii. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.
iii. The dummy variables for gender education and year are included.

Based on these results, it can be seen that the effects of OFDI on wages demonstrate more elastic responses to contract type than to skill-intensity. If this estimated result is valid, the interaction term of the variables of OFDI and the temporary will present negative (-) significance with laborers categorized into either the temporary or the permanent. If laborers are categorized into the skilled and the unskilled, however, it is unlikely that the result will show the significance that the previous comparison did. A supplementary empirical analysis with

consolidated categorization of laborers is implemented to confirm this.

Table 5 shows the results of the effects of OFDI when laborers are divided into the permanent and the temporary. Model (1) verifies that the wages of the entire workforce increase by 0.007% with a 1% increase in OFDI. If the interaction terms were included, however, the wages of the permanent would increase by 0.009% whereas the temporary would suffer a 1% drop in wages if OFDI increased by 1%. Model (3) determines that OFDI in OECD countries does not create a significant impact on the wages of all laborers while investment in non-OECD countries helps increase wages for all laborers. With the interaction terms taken into account, Model (4) reveals that OFDI in non-OECD countries increases the wages of the permanent by 1% while the same investment

Table 5. Fixed-Effects Estimates of Wage Determinants by Contract Types

	MODEL			
	(1)	(2)	(3)	(4)
log(OFDISH)	0.007*** (3.630)	0.009*** (4.745)		
log(OECDSH)			-0.001 (-0.588)	-0.001 (-0.366)
log(N.OECDSH)			0.008*** (3.763)	0.010*** (4.339)
Temp * log(OFDISH)		-0.019*** (-4.504)		
Temp * log(OECDSH)				-0.005 (-0.833)
Temp * log(N.OECDSH)				-0.011* (-2.186)
Temp	-0.134*** (-10.871)	-0.295*** (-7.788)	-0.135*** (-10.440)	-0.289*** (-6.086)
Constant	8.274*** (90.086)	8.289*** (90.248)	8.216*** (84.411)	8.229*** (84.524)
Time effect	Yes	Yes	Yes	Yes
Observation	21,013	21,013	19,475	19,475
R-squared	0.238	0.239	0.227	0.228
Number of individuals	6,389	6,389	6,144	6,144

Note: i. t-Statistics are in parentheses.
ii. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.
iii. The dummy variables on R&D expenses, individual characteristics, and year are included similarly to in Table 4.

does the opposite for the temporary, decreasing their wages by 0.001%. Putting the effects of OFDI on wages under control, the temporary still make 13.5-29.5% less than the permanent, which, to a degree, echoes the estimated results in Table 4.

Table 6 presents the results of the analysis on the effects of OFDI by skill-intensity. Similar to the results in Table 5, they show that OFDI increases the wages of all the workers, and although it does not have a significant impact on all wages in OECD countries, in non-OECD countries investment certainly increases them. As Model (2) shows, however, there is no noticeable difference in wages between the skilled and the unskilled, which emphasizes that the

Table 6. Fixed-Effects Estimates of Wage Determinants by Skill-intensity

	MODEL			
(1)	(2)	(3)	(4)	
log(OFDISH)	0.009*** (4.835)	0.007** (2.971)		
log(OECDSH)			-0.001 (-0.407)	-0.007** (-2.581)
log(N.OECDSH)			0.010*** (4.679)	0.015*** (5.362)
Unskilled * log(OFDISH)		0.004 (1.108)		
Unskilled * log(OECDSH)				0.013*** (3.305)
Unskilled * log(N.OECDSH)				-0.011** (-2.681)
Unskilled	-0.059*** (-4.695)	-0.028 (-0.917)	-0.050*** (-3.774)	-0.019 (-0.502)
Constant	8.330*** (89.984)	8.314*** (88.681)	8.278*** (84.286)	8.253*** (82.454)
Time effect	Yes	Yes	Yes	Yes
Observation	21,015	21,015	19,476	19,476
R-squared	0.233	0.233	0.222	0.223
Number of individuals	6,390	6,390	6,144	6,144

Note: i. t-Statistics are in parentheses.
ii. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.
iii. The dummy variables on R&D expenses, individual characteristics, and year are included similarly to in Table 4.

influence of OFDI on wages is not considerably subject to skill-intensity, as explained above. However, the reason for the insignificance can be explained as Model (4) classifies investing countries into OECD and non-OECD. As OFDI in OECD countries rises by 1%, the unskilled enjoy 0.006% wage increase whereas the skilled suffer a 0.007% drop. With the non-OECD group, however, 1% increase in OFDI benefits the skilled with 0.015% wage increase, while it rewards the unskilled with a minor increase of 0.004%. As a result, it is appropriate to believe that OFDI in OECD and non-OECD countries creates opposite impacts on the wages of both the skilled and the unskilled and that in Model (2) interaction terms are not significant because those confrontational impacts are offset.

V. Concluding Remarks

This paper is primarily aimed at analyzing the heterogeneous impact of OFDI on wages according to labor type. In order to avoid certain limitations observed in previous researches, such as overly simplified categorizations, and to attain more accurate outcomes, this study classified laborers into four different groups. The primary results of this paper are as follows.

First, OFDI creates positive influences on the wages of all laborers. However, heterogeneous impact can be observed according to skill-intensity and the type of contract in terms of the influences of OFDI. In short, permanent-unskilled benefits from OFDI the most followed by permanent-skilled. As for temporary-workers, it turns out that the effects of OFDI by skill-intensity are insignificant and they sometimes even decrease. Accordingly, the research demonstrates that the contract-type group bears greater responsibility for the effects of OFDI on wages than skill-intensity does.[12]

Second, with categorization of OFDI by OECD and non-OECD, the research demonstrates that OFDI in OECD countries does not have a significant impact on wages while OFDI in non-OECD countries demonstrates heterogeneous impact on permanent workers according to skill-intensity. As for the temporary, the effects of OFDI on wages by skill-intensity are not considerable. As a result,

[12] The average monthly income of permanent workers was 1.771 million KRW in 2004, which was 1.54 times larger than the average income of temporary workers, 1.152 million KRW. That gap has grown even larger, with serious indications of greater wage inequality. At present, the average income of permanent workers is 2.533 million KRW, 1.8 times larger than temporary workers' average income of 1.412 million KRW (DB from Department of Labor and Employment).

the effect of OFDI on wages can vary according to contract type as well as investment subject. The effects can be more subject to type of contract than to skill-intensity.

Third, the empirical analysis conducted with such control variables as industrial characteristics and human attributes affirms that an increase in R&D investment as a proxy for estimating the level of technological developments in each industry creates positive influences on the labor market, which could contribute to a wage increase in favor of the labor side.

The married enjoy a huge benefit of wage increases. The research affirms that wages grow in proportion to the residential closeness to the capital area and to the size of firm. However, the effects of different educational backgrounds have not been investigated, nor have labor union premiums.

In an attempt to overcome the limitations of simplified categorization that the previous researches had to face, this study is designed to empirically analyze the effects of OFDI on wages by using more detailed and accurate classifications on which the significance of the study lies. Since definitions and classifications of permanent/temporary workers differ from country to country, there exist certain limitations. In terms of definition and classification of permanent and temporary workers, each country has its own criteria. Further studies will have to fill in these blanks.

Appendix

Table A suggests empirical results adopting alternative approach. Model (1) and (2) show the results when using the level of education as alternative measure of skill-intensity. As previously discussed, the skill-intensity of workers can be represented by their ability as well, so we use the level of education as a proxy of skill-intensity. College graduates (or more) are regarded as skilled worker here, and the overall results look quite similar to previous ones.

Model (3) and (4) demonstrate the estimate of interaction term between OFDI and R&D with the awareness of the fact that the effects of OFDI may depend on industrial attributes. The positive sign of the estimate implies that the negative impact of OFDI on wages can be offset by R&D expenditure. However, the estimates are significant only at 10% significance level, and its scale is small compared to other ones. Therefore, we conclude that the effect of OFDI depending R&D is not large enough to dominate the impact of OFDI itself.

Table A. Fixed-Effects Estimates of Wage Determinants using Alternative Approach

	MODEL			
	(1)	(2)	(3)	(4)
log(OFDISH)	0.007*** (3.555)	-0.012* (-2.600)	-0.017 (-1.681)	-0.038*** (-3.404)
Perm_Skilled * log(OFDISH)		0.018*** (3.344)		0.019*** (3.635)
Perm_Unskilled * log(OFDISH)		0.024*** (5.102)		0.027*** (5.399)
Temp_Skilled * log(OFDISH)		-0.010 (-0.900)		-0.002 (-0.258)
Perm_Skilled	0.211*** (5.708)	0.356*** (6.101)	0.164*** (9.247)	0.322*** (6.766)
Perm_Unskilled	0.108*** (7.547)	0.307*** (7.366)	0.102*** (6.743)	0.317*** (7.410)
Temp_Skilled	0.004 (0.104)	-0.131 (-1.141)	-0.011 (-0.455)	-0.069 (-0.743)
log(R&D)	0.007*** (4.030)	0.007*** (4.076)	0.018*** (3.685)	0.018*** (3.766)
log(R&D)*log(OFDI)			0.001* (2.448)	0.001* (2.540)

	MODEL			
	(1)	(2)	(3)	(4)
Constant	8.141*** (180.042)	7.990*** (141.830)	7.944*** (62.906)	7.769*** (59.083)
Time effect	Yes	Yes	Yes	Yes
Observation	21018	21018	21015	21015
R-squared	0.256	0.257	0.239	0.241
Number of individuals	6,391	6,391	6,390	6,390

Note: i. t-Statistics are in parentheses.
ii. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

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