ADBI Working Paper Series

GLOBALIZATION AND EQUALITY: A CROSS-COUNTRY ANALYSIS

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No. 1453
June 2024

Asian Development Bank Institute

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This paper was supported by JSPS KAKENHI Grant Number 22K13408.

Suggested citation:

Urata, S. and Y. Baek. 2024. Globalization and Equality: A Cross-Country Analysis. ADBI Working Paper 1453. Tokyo: Asian Development Bank Institute. Available: https://doi.org/10.56506/NXDT2483

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Abstract

Using a cross-sectional dataset of 13 manufacturing sectors in 27 Asian developing countries from 2008 to 2022, we investigated the impact of the presence of foreign firms on wages of workers from domestic firms. First, we found that the average wage of workers from foreign firms is higher than that of workers from domestic firms. This pattern is more pronounced in the cases of low-income countries and the service sector. Second, the average wage of workers from domestic firms that are exposed to foreign firms is higher than that of domestic firms without exposure to foreign firms, indicating a spillover of wages from foreign to domestic firms. Third, the presence of foreign firms is found to widen the wage gap between skilled and unskilled workers. Based on our findings, we argue that developing countries should improve their FDI environment to attract FDI and upgrade the quality of unskilled labor by providing education and training, in order to reduce the wage gap.

Keywords: foreign direct investment, wage spillovers, wage inequality

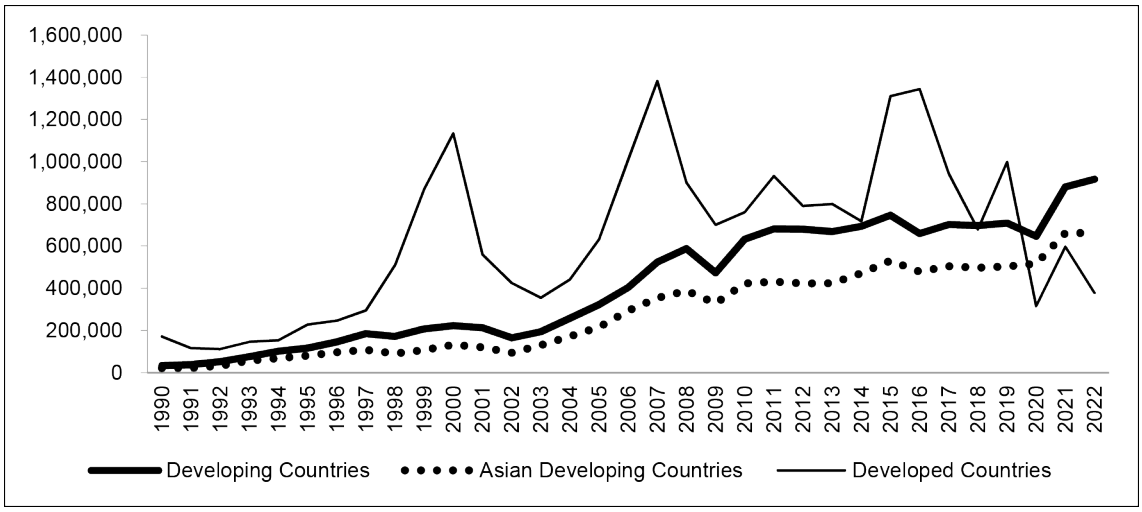
JEL Classification: D22, E24, F21, R1

Contents

1. INTRODUCTION

The globalization of economic activities through an expansion of cross-border movement of goods, services, capital, data, and people has contributed to economic growth in many countries/economies in the world, and in particular those in Asia, as globalization has contributed to improving the allocation of resources such as labor and capital in production and increasing productivity through intensified competition and promoting innovation (Urata 2022). Among various means of globalization, foreign direct investment (FDI) has played a particularly important role in promoting economic growth in developing countries, because FDI has not only generated international trade in goods and services but also facilitated the transfer of technology. Indeed, FDI inflows to developing countries, particularly those in Asia, continued to increase more or less consistently from the early 1990s through the early 2020s (Figure 1), when developing countries achieved high economic growth. A number of both supply-side and demand-side factors contributed to the continued expansion of FDI inflows to Asian countries. As regards the supply-side factors, an investment fund was abundantly available across the world, partly due to the expansionary monetary policy pursued by many developed countries and deregulation in the financial sector. Turning to the demand-side factors, the implementation of a pro-FDI policy such as the FDI liberalization policy and the provision of incentives by developing countries attracted FDI inflows.

Figure 1: Trends in Inward FDI Flows
(in Million USD)



Source: Authors' compilation, using data extracted from UNCTADstat.

Despite the beneficial impacts of globalization, negative impacts have emerged, resulting in an anti-globalization movement. Among the negative impacts, those on equality and the environment have received most attention. Many studies have examined the impacts of increased trade and FDI on inequality among and within countries. Findings from these studies show mixed results; that is, globalization either reduced or increased inequality or there was no discernible impact. Urata and Narjoko (2017) reviewed the empirical studies on the impact of international trade on inequality for developing countries and found mixed results. Similar mixed results have been found for the impact of FDI inflow on inequality by previous studies, which will be reviewed in the next section. The lack of consensus regarding the distributional effects

of FDI may be due to existing studies being limited to specific countries. In light of this observation, it is important to undertake a cross-country analysis covering a wider range of countries, in order to discern the presence of a general pattern. This study aims to fill this gap by comprehensively analyzing the impact of FDI on wages in host countries, utilizing firm-level data from the World Bank's Enterprise Surveys for 27 Asian developing countries.

The structure of our paper is as follows. Section 2 presents a brief literature review, summarizes the main findings of the previous studies, and identifies unsolved issues. Section 3 provides an overview of the sectoral distribution and wage levels of foreign and domestic firms in Asian developing countries. Section 4 outlines the methodology and data used for the analysis. Section 5 presents and discusses the estimation results. Finally, Section 6 concludes the paper.

2. LITERATURE REVIEW

FDI can have both positive and negative impacts on wages in the host country. In terms of the positive impacts of FDI on wages, foreign firms can either increase the demand for labor or heighten competition in the labor market. Consequently, in a more competitive labor market, domestic firms face increased pressure on wages (Lipsey and Sjöholm 2004). Additionally, inward FDIs can promote the structural transformation of host countries' economy by creating not only new jobs but also "good" and high-paying jobs from the perspective of host countries and workers (Javorcik 2015). This is particularly the case in developing countries. Moreover, technology transfer from foreign to domestic firms occurs when workers, trained by multinational companies, are employed by domestic firms or start their own businesses (Görg and Strobl 2005; Balsvik 2011). This often leads to an increase in wages for workers in domestic firms.

With regard to the negative effects of FDI on wages, foreign firms might recruit the most skilled and presumably high-wage-earning workers from domestic firms, or they might acquire local firms that pay high wages. Therefore, the inflow of foreign firms could result in a reduced scale of production and lower productivity in domestic firms, resulting in lowering the wages of workers in domestic firms (Aitken and Harrison 1999). Additionally, foreign firms attract many high-skilled workers due to their high technological level, advanced management system, and high wage level. This dynamic further widens the wage gap between foreign and domestic firms in the host country (Feenstra and Hanson 1997).

The objective of this study is to examine the following three hypotheses. In the rest of this section, we will review relevant empirical studies related to these hypotheses to set the stage for our analysis.

Hypothesis 1: Wages are higher in foreign firms than in domestic firms.
Hypothesis 2: In the sectors with a high presence of foreign firms, domestic firms tend to have higher wages than those in the sectors with a low presence of foreign firms, suggesting the presence of wage spillover.
Hypothesis 3: FDI widens the wage gap between skilled and unskilled labor.

Firstly, reviewing the earlier empirical studies on Hypothesis 1, Chen, Ge, and Lai (2011) found that the average wage in foreign firms is higher than that in domestic firms, using firm-level data from Chinese manufacturing for the period covering 1998–2007. Girma, Görg, and Kersting (2019) observed that ownership by foreign firms positively affects wages, as shown in their analysis of Chinese manufacturing data from 2003 to 2006.

Secondly, upon examining the empirical studies on the wage spillover for Hypothesis 2, Chen, Ge, and Lai (2011) found that the presence of foreign firms had negative impacts on the wages and wage growth rates of domestic firms in Chinese manufacturing sectors. Conversely, Lipsey and Sjöholm (2004), analyzing Indonesia's manufacturing industry in 1996, concluded that the presence of foreign firms had positive impacts on the wages of domestic firms, with the wage increase effect being almost the same for both blue-collar and white-collar workers. Hale and Long (2011) analyzed firms in the People's Republic of China (PRC) using 2002 Enterprise Survey data and found that the presence of foreign firms did not affect the wages of production workers but had a positive effect on the wages of engineers and managers. Saucedo, Ozuna, and Zamora (2020) used Labour Force Surveys from Mexico spanning 2005 to 2018 for their analysis, discovering that the inflow of FDI positively affected only the wages of low-skilled workers in the manufacturing sector, without impacting the wages of high-skilled workers in manufacturing or workers in the service sector. Girma, Görg, and Kersting (2019) also examined the Chinese manufacturing industry from 2003 to 2006, finding that wage spillover effects varied depending on the ratio of foreign share in a given cluster (province × industry). For instance, they discovered that a foreign share ratio in a cluster of less than 21% had a positive impact on wages, whereas a ratio exceeding 21% had a negative impact. Nguyen, Sun, and Beg (2019) analyzed the Vietnamese tourism industry from 2009 to 2013 and reported a negative impact: A 1% increase in the presence of FDI led to a 2.03% decrease in average wages for domestic firms. The study by Coniglio, Prota, and Seric (2015) is the only one, to the best of our knowledge, to have conducted a cross-country analysis, examining 19 sub-Saharan African countries in 2010. They found that the presence of foreign firms had a positive effect on the wages of domestic firms. This impact was mainly due to FDI from developed countries.

Finally, we present some empirical studies related to Hypothesis 3, which focuses on wage inequality. Feenstra and Hanson (1997) analyzed the Mexican manufacturing industry from 1975 to 1988 and found that growth in FDI was positively correlated with the relative demand for skilled labor. Lee and Wie (2015) analyzed the Indonesian manufacturing industry from 2000 to 2009 and found that the increase in FDI had a positive effect on the relative demand for, and wages of, skilled workers. These two studies found that an increase in FDI leads to a widening of the wage gap by analyzing the change in the wage ratio of skilled workers to total wages. There are some studies that show different results. Saucedo, Ozuna, and Zamora (2020) found that in Mexico's manufacturing industry, FDI positively affects only the wages of low-skilled workers. In Indonesia, Lipsey and Sjöholm (2004) observed that FDI increases wages for both low-skilled and high-skilled workers. According to these findings, FDI did not contribute to an increase in wage inequality.

To summarize the empirical studies reviewed above, only Hypothesis 1, which posits that foreign firms have higher wages than domestic firms, has been consistently confirmed by earlier studies. In contrast to Hypothesis 1, there is no consensus on Hypotheses 2 and 3 regarding wage spillover and wage inequality, respectively, as the findings on these hypotheses vary among the earlier studies. This lack of consistency appears to reflect different situations in different countries, and it may indicate the absence of general patterns concerning wage spillover and wage gap. For example, there are differences in the absorptive capabilities of workers in different countries. In light of the differences in the previous empirical results on the hypotheses we posited among different countries, we attempt to identify the presence or absence of general patterns by conducting a cross-country analysis covering Asian countries that have received a relatively large inflow of FDI compared to the countries in other regions. In addition, recognizing that earlier studies analyzed the effect of FDI on wages by

focusing solely on horizontal FDI, we also analyze the effects of vertical (forward and backward) FDI on the wages of domestic firms, in addition to horizontal FDI.

3. SECTORAL DISTRIBUTION AND WAGES OF FOREIGN AND DOMESTIC FIRMS IN ASIAN DEVELOPING COUNTRIES

We present some basic information about domestic and foreign firms in 27 developing countries in Asia, based on the data from the World Bank's Enterprise Survey, which is used for our analysis. Examining the sectoral distribution of firms in Table 1, we find that the total number of manufacturing firms is 28,403, accounting for 65.5% of the overall count, while the number of service sector firms stands at 14,957, representing 34.5%. A comparison of the sectoral distribution of domestic and foreign firms reveals that 64.9% of domestic firms are engaged in the manufacturing sector, and 35.1% are in the service sector, while 75% of foreign firms are engaged in manufacturing and only 25% in the service sector. This indicates that foreign firms have a relatively higher proportion in manufacturing than domestic firms. Among subsectors, domestic firms have the highest proportion in retail (14.4%), followed by food products, beverages, and tobacco (13.4%), and textiles, apparel, and leather (12.9%). In contrast, for foreign firms, textiles, apparel, and leather (16.1%) hold the highest proportion, followed by food products, beverages, and tobacco (12.4%) and electronics (11.5%), indicating that foreign firms have a considerably larger share in electronics than domestic firms.

Table 1 also shows the sectoral FDI share, which is constructed by computing the proportion of workers employed by foreign firms relative to the total workforce within each sector. The FDI share is relatively higher in the manufacturing sector (13.8%) than in the service sector (8.2%). Among the sectors, electronics has the highest FDI share at 31.8%, followed by precision instruments (17.6%) and textiles, apparel, and leather (17.5%). Additionally, other sectors involved in raw material processing, such as refined petroleum products, rubber and plastic products, nonmetallic mineral products, and fabricated metal products, also show a high FDI proportion, each exceeding 13%.

Comparing the average wages of domestic and foreign firms shows that on average, wages in foreign firms are 1.9 times higher than those in domestic firms. The difference is greater in manufacturing than in services. Average wages in foreign firms are higher in all the subsectors except construction, where the average wage in foreign firms is lower by 8%. Among the subsectors, we observe particularly high wages in foreign firms compared to those in domestic firms in the following subsectors: hotels and restaurants (3.12 times higher), electronics and machinery and equipment (2.62 times higher), and basic metals (2.32 times). Furthermore, average wages in foreign firms are more than double those of domestic firms in fabricated metal products, precision instruments, and transport equipment.

To summarize, in Asian developing countries, foreign firms have a large share in manufacturing sectors, especially in sectors where regional global value chains are well developed, such as electronics, precision instruments, and textiles, apparel, and leather. It has also been demonstrated that average wages in foreign firms are higher than those in domestic firms across almost all sectors.

Table 1: Number of Firms and Average Wages by Sector

	Number of Firms						FDI Share	Average Wages			
	Total		Domestic		Foreign		by Sector	Total	Domestic	Foreign	Foreign/ Domestic
	Number	(%)	Number	(%)	Number	(%)	(%)	USD	USD	USD	
Manufacturing	**28,403**	(65.5)	**26,465**	(64.9)	**1,938**	(75.0)	**13.8**	**3,041**	**2,861**	**5,507**	**1.92**
Food products, beverages, and tobacco	5,771	(13.3)	5,450	(13.4)	321	(12.4)	12.5	2,691	2,617	3,950	1.51
Textiles, apparel, and leather	5,682	(13.1)	5,265	(12.9)	417	(16.1)	17.5	2,521	2,489	2,925	1.18
Wood, paper products, and printing	1,466	(3.4)	1,414	(3.5)	52	(2.0)	8.1	2,376	2,315	4,032	1.74
Refined petroleum products	78	(0.2)	74	(0.2)	4	(0.2)	15.4	3,116	3,077	3,839	1.25
Chemicals	2,161	(5.0)	1,999	(4.9)	162	(6.3)	11.6	3,677	3,393	7,188	2.12
Rubber and plastic products	2,225	(5.1)	2,019	(5.0)	206	(8.0)	14.1	3,196	3,072	4,422	1.44
Other nonmetallic mineral products	2,645	(6.1)	2,494	(6.1)	151	(5.8)	14.2	2,749	2,698	3,602	1.34
Basic metals	1,507	(3.5)	1,446	(3.5)	61	(2.4)	5.9	3,553	3,372	7,836	2.32
Fabricated metal products	2,239	(5.2)	2,097	(5.1)	142	(5.5)	13.6	3,368	3,155	6,512	2.06
Machinery and equipment	1,736	(4.0)	1,668	(4.1)	68	(2.6)	7.5	3,206	3,014	7,906	2.62
Electronics	1,568	(3.6)	1,272	(3.1)	296	(11.5)	31.8	5,131	3,931	10,287	2.62
Precision instruments	125	(0.3)	108	(0.3)	17	(0.7)	17.6	3,683	3,224	6,577	2.04
Transport equipment	1,200	(2.8)	1,159	(2.8)	41	(1.6)	6.9	2,926	2,821	5,881	2.08
Service	**14,957**	(34.5)	**14,310**	(35.1)	**647**	(25.0)	**8.2**	**3,468**	**3,350**	**6,085**	**1.82**
Construction	2,318	(5.3)	2,252	(5.5)	66	(2.6)	4.8	4,672	4,682	4,305	0.92
Hotels and restaurants	2,523	(5.8)	2,400	(5.9)	123	(4.8)	10.1	2,271	2,058	6,424	3.12
IT	633	(1.5)	583	(1.4)	50	(1.9)	9.7	5,574	5,203	9,894	1.90
Retail	6,077	(14.0)	5,860	(14.4)	217	(8.4)	7.6	3,080	2,957	6,403	2.17
Transport service	1,309	(3.0)	1,242	(3.0)	67	(2.6)	9.0	4,863	4,792	6,180	1.29
Wholesale	2,097	(4.8)	1,973	(4.8)	124	(4.8)	10.6	3,195	3,110	4,550	1.46
Total	**43,360**	(100)	**40,775**	(100)	**2,585**	(100)	**11.9**	**3,189**	**3,033**	**5,652**	**1.86**

Note: Wages are expressed in constant 2007 US dollars, obtained by using nominal exchange rates and the US GDP deflator.
Source: Authors' estimation, using the Enterprise Surveys (World Bank).

4. METHODOLOGY AND DATA

In this section, we describe the methodology used to estimate wage spillovers and the wage inequality between skilled and unskilled labor resulting from FDI. For wage spillovers from foreign firms to domestic firms to occur, it is a fundamental prerequisite that the wages of foreign firms exceed those of domestic firms (Hypothesis 1). Therefore, we utilize Equation 1 to validate this necessary condition for wage spillover.

$$lnwage_{isct} = \alpha + \beta foreign_{isct} + \gamma Z_{isct} + FE_{cs} + FE_{st} + \epsilon_{isct}, \quad (1)$$

where $lnwage_{isct}$ is the logarithm of the average wage of firm *i* in sector *s* of country *c* in year *t*, $foreign_{isct}$ represents either a dummy variable for foreign firms[1] or the share of foreign ownership, and Z_{isct} denotes characteristics of a firm that impact its wage levels, such as firm size (lnsize), age, activities in exporting and importing (export, import, and global value chain (gvc)), and the possession of quality certifications (qualitycert). We control for country-sector fixed effects and sector-year fixed effects. ϵ is an error term.

Next, to test Hypothesis 2, we empirically investigate whether there are wage spillover effects on domestic firms from foreign firms. Specifically, we estimate the following equation:

$$lnwage_{isct} = \alpha + \beta FDI_{sct} + \gamma Z_{isct} + FE_{cs} + FE_{st} + \epsilon_{isct,}) \quad (2)$$

where FDI_{sct} represents horizontal, forward, or backward FDI interchangeably, as explained below, in sector *s* of country *c* in year *t*, respectively. To define three FDI linkages in country *c*, we refer to Javorcik (2004) as follows[2]. First, horizontal FDI captures the extent of foreign presence in sector *s* at time *t* and is defined as the employment share of foreign firms in total employment in sector *s*, as represented in Equation 3. Horizontal FDI is used to examine the intra-industry spillover effects. We may expect a positive effect from horizontal FDI if the presence of foreign firms imposes competitive pressure in hiring workers in the same industry.

$$Horizontal_{st} = \frac{Employment^{F}_{st}}{Employment_{st}} \quad (3)$$

Second, forward FDI is defined as the weighted share of foreign firms' presence in upstream sectors of sector *s*. α_{sk} is the ratio of intermediate goods purchased from sector *k* to the total intermediate goods purchased by sector *s*. In other words, forward FDI spillover considers the effect when domestic firms purchase intermediate goods from foreign firms. One possible reason for a positive spillover from forward FDI is that domestic firms need to employ high-quality, high-wage workers in order to use high-quality intermediate goods purchased from foreign firms effectively.

$$Forward_{st} = \sum_{k \neq s} \alpha_{sk} Horizontal_{kt} \quad (4)$$

[1] A foreign firm is defined as one with a foreign ownership share of 10% or more.

[2] The discussions on three FDI variables are adopted from Urata and Baek (2022), who examined technology spillovers of FDI. In contrast to Urata and Baek (2022), who employed firm sales to measure the foreign presence in the domestic sector, we employed a firm's employment.

Finally, backward FDI is defined as the weighted share of foreign firms' presence in downstream sectors of sector *s*. β_{sm} is the ratio of intermediate goods supplied by sector *s* to the total intermediate goods purchased by sector *m*. In other words, the backward FDI spillover concerns the effect when domestic firms supply intermediate goods to foreign firms. We may expect a positive spillover from backward FDI if domestic firms need to employ high-quality, high-wage workers in order to successfully sell their intermediate goods to foreign firms, which require high-quality intermediate goods.

$$Backward_{st} = \sum_{m \neq s} \beta_{sm} Horizontal_{mt} \tag{5}$$

Both α_{sk} and β_{sm} are taken from Eora National Input-Output Tables. In addition, since forward and backward FDI are vertical FDI[3], intermediate goods purchased within the same sector are excluded from both forward and backward FDI.

Lastly, to test Hypothesis 3, we examine the impact of FDI on wage differentials between skilled and unskilled labor. This analysis employs an interaction term that multiplies the proportion of skilled labor by each instance of FDI, as shown in Equation 6.

$$lnwage_{isct} = \alpha + \beta FDI_{sct} + \delta(FDI_{sct} \times Skilled\ labor_{isct}) + \gamma Z_{isct} + FE_{cs} + FE_{st} + \epsilon_{isct,} \tag{6}$$

where $Skilled\ labor_{isct}$ represents the proportion of nonproduction workers to the total workforce in firm *i*, which consists of both production and nonproduction workers. Therefore, the coefficient of interest is δ. A positive and statistically significant coefficient implies that FDI favors the wage premium of skilled labor (nonproduction workers) over unskilled labor (production workers), which in turn widens the wage gap.

In estimating the spillover effects of FDI, it is essential to address the potential endogeneity issue caused by reverse causality: Foreign firms tend to move to more productive, faster-growing, and profitable economies (Rodrik 1999), and high-productivity sectors or firms may attract foreign firms to the same location, yielding a positive relationship between them even without spillovers taking place (Rojec and Knell 2018). Therefore, to address the bias from the reverse causality, Equations 2 and 6 are estimated using the instrumental variable (IV) method. Following Urata and Baek (2022), we aggregate firms' responses to a question on "senior management's time spent on dealing with regulations" in the World Bank's Enterprise Survey at the sectoral level and use them as an instrument for our IV estimation. The sector-level instrument does not exert a direct influence on the average wage of the firms[4]; however, it is highly correlated with the three types of FDI variables.

We use a cross-sectional dataset of 13 manufacturing sectors[5] in 27 Asian developing countries[6] from 2008 to 2022 for investigating the impact of horizontal FDI on wages[7].

[3] Note that forward and backward FDI here are defined based on the sector with foreign firms' presence.

[4] Across all estimation models, the correlation coefficients between $lnwage$ and the instrumental variable fall below 0.1.

[5] For details on the sample sectors, see Appendix Table 2.

[6] For a list of countries, see Appendix Table 1.

[7] For basic statistics regarding Hypotheses 1, 2, and 3, see Appendix Tables 3, 4, and 5, respectively.

For investigating the impact of forward and backward FDI on wages, we use a cross-sectional dataset of seven sectors in 27 Asian developing countries from 2008 to 2016, in accordance with the sector classification of the Eora National Input-Output Tables. All domestic currency units sourced from the World Bank's Enterprise Surveys are converted to USD using the official exchange rate. Subsequently, they are adjusted to real values using the GDP deflator of the United States.

5. ESTIMATION RESULTS

We used ordinary least squares (OLS) to estimate Equation 1, confirming the prerequisites for wage spillover, with the results shown in Table 2. In all columns, the coefficients of the foreign firm are positive and statistically significant. Additionally, in Column 2, the foreign share also has positive results. These findings indicate that foreign firms offer higher wages than domestic firms by approximately 20%–24%, suggesting the potential for wage spillovers from foreign to domestic firms. For the control variables, all the variables except for government ownership and firm age are found to be positive and statistically significant as expected. In other words, firms of a larger size, those engaged in exporting, importing, or both (GVC firms), as well as those possessing internationally recognized quality certifications, are found to offer higher wages. The estimated coefficients for government ownership and age are shown to be positive and negative, respectively, but without statistical significance.

Table 2: Wage Comparisons between Foreign and Domestic Firms

	(1)	(2)	(3)	(4)	(5)	(6)
foreign firm	0.195***		0.195***	0.218***	0.191***	0.188***
	[0.035]		[0.035]	[0.035]	[0.035]	[0.034]
foreign share		0.003***				
		[0.000]				
government share			0.000			
			[0.001]			
lnsize	0.022**	0.022**	0.021**	0.031***	0.024**	0.010
	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.009]
export	0.124***	0.124***	0.124***		0.124***	0.107***
	[0.019]	[0.020]	[0.019]		[0.020]	[0.020]
import	0.144***	0.144***	0.144***		0.142***	0.129***
	[0.022]	[0.022]	[0.022]		[0.022]	[0.021]
gvc				0.145***		
				[0.032]		
age					-0.001	
					[0.001]	
qualitycert						0.156***
						[0.018]
Number of observations	43,360	43,360	43,359	43,360	42,975	42,561
Adjusted R-squared	0.243	0.243	0.243	0.240	0.242	0.249

Note: The dependent variable is the logarithm of the average wage. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. Standard errors are clustered by country-sector and presented in parentheses. In all specifications, we control for country-sector fixed effects and sector-year fixed effects.

Source: Authors' estimation, using the Enterprise Surveys (World Bank).

Table 3: Wage Comparisons between Foreign and Domestic Firms, by Income Level

	(1)	(2)	(3)	(4)	(5)	(6)
			Low-income			
foreign firm	0.217***		0.218***	0.232***	0.209***	0.218***
	[0.044]		[0.044]	[0.044]	[0.045]	[0.045]
foreign share		0.002***				
		[0.001]				
government share			0.002			
			[0.001]			
lnsize	0.030**	0.031**	0.029**	0.038***	0.032**	0.014
	[0.012]	[0.012]	[0.013]	[0.012]	[0.013]	[0.012]
export	0.128***	0.132***	0.128***		0.130***	0.100***
	[0.026]	[0.026]	[0.026]		[0.026]	[0.026]
import	0.130***	0.133***	0.131***		0.132***	0.126***
	[0.021]	[0.021]	[0.021]		[0.021]	[0.021]
gvc				0.179***		
				[0.039]		
age					–0.001*	
					[0.001]	
qualitycert						0.167***
						[0.021]
Number of observations	27,786	27,786	27,785	27,786	27,660	27,432
Adjusted R-squared	0.178	0.177	0.178	0.175	0.178	0.184
	(7)	(8)	(9)	(10)	(11)	(12)
			Middle-income			
foreign firm	0.184***		0.183***	0.220***	0.186***	0.172***
	[0.046]		[0.046]	[0.046]	[0.045]	[0.043]
foreign share		0.003***				
		[0.001]				
government share			–0.001			
			[0.001]			
lnsize	0.007	0.007	0.007	0.019	0.006	0.003
	[0.013]	[0.014]	[0.013]	[0.014]	[0.014]	[0.014]
export	0.119***	0.115***	0.119***		0.117***	0.121***
	[0.031]	[0.032]	[0.031]		[0.032]	[0.030]
import	0.169***	0.166***	0.169***		0.164***	0.143***
	[0.045]	[0.045]	[0.045]		[0.044]	[0.043]
gvc				0.106*		
				[0.056]		
age					0.001*	
					[0.001]	
qualitycert						0.131***
						[0.029]
Number of observations	15,564	15,564	15,564	15,564	15,305	15,121
Adjusted R-squared	0.270	0.271	0.270	0.267	0.270	0.277

Note: The dependent variable is the logarithm of the average wage. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. Standard errors are clustered by country-sector and presented in parentheses. In all specifications, we control for country-sector fixed effects and sector-year fixed effects.

Source: Authors' estimation, using the Enterprise Surveys (World Bank).

Equation 1 is estimated in Tables 3 and 4 using a dataset divided based on the income level of the countries (low-income vs. middle-income) and by sector (manufacturing vs. service). Table 3 shows that foreign firms' wage premiums in low-income countries exceed those in middle-income ones. This finding may indicate that the gap in the technology and management levels between foreign and domestic firms is greater in low-income countries, assuming that wages reflect the technology and management

level of workers. Table 4 shows that the wage premiums in the service sector for foreign firms exceed those in the manufacturing sector. This finding is not consistent with an earlier casual observation based on average wages in Table 1 and indicates that a simple comparison without considering various factors affecting wages may give misleading information.

Table 4: Wage Comparisons between Foreign and Domestic Firms, by Sector

	(1)	(2)	(3)	(4)	(5)	(6)
			Manufacturing			
foreign firm	0.146***		0.146***	0.175***	0.141***	0.142***
	[0.044]		[0.044]	[0.044]	[0.044]	[0.042]
foreign share		0.002***				
		[0.001]				
government share			–0.000			
			[0.001]			
lnsize	0.027**	0.027**	0.027**	0.040***	0.030**	0.011
	[0.012]	[0.012]	[0.012]	[0.012]	[0.013]	[0.012]
export	0.122***	0.122***	0.122***		0.124***	0.101***
	[0.020]	[0.020]	[0.020]		[0.020]	[0.020]
import	0.135***	0.135***	0.135***		0.134***	0.121***
	[0.024]	[0.024]	[0.024]		[0.024]	[0.023]
gvc				0.129***		
				[0.036]		
age					–0.001	
					[0.001]	
qualitycert						0.184***
						[0.018]
Number of observations	28,403	28,403	28,402	28,403	28,174	27,904
Adjusted R-squared	0.231	0.231	0.231	0.228	0.231	0.240
	(7)	(8)	(9)	(10)	(11)	(12)
			Service			
foreign firm	0.326***		0.326***	0.331***	0.323***	0.317***
	[0.048]		[0.048]	[0.048]	[0.048]	[0.048]
foreign share		0.005***				
		[0.001]				
government share			0.002			
			[0.001]			
lnsize	0.01	0.011	0.009	0.012	0.011	0.008
	[0.012]	[0.012]	[0.013]	[0.012]	[0.012]	[0.012]
export	0.130**	0.135**	0.130**		0.128**	0.131**
	[0.056]	[0.056]	[0.056]		[0.056]	[0.059]
import	0.186***	0.190***	0.185***		0.185***	0.171***
	[0.044]	[0.043]	[0.044]		[0.043]	[0.040]
gvc				0.184***		
				[0.067]		
age					0.000	
					[0.001]	
qualitycert						0.073**
						[0.028]
Number of observations	14,957	14,957	14,957	14,957	14,801	14,657
Adjusted R-squared	0.263	0.263	0.263	0.262	0.263	0.265

Note: The dependent variable is the logarithm of the average wage. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. Standard errors are clustered by country sector and presented in parentheses. In all specifications, we control for country-sector fixed effects and sector-year fixed effects.

Source: Authors' estimation, using the Enterprise Surveys (World Bank).

Table 5: Wage Spillover, IV Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Horizontal FDI				
FDI	0.029**	0.030**	0.032**	0.028**	0.022***	0.023***	0.024***	0.021***
	[0.013]	[0.013]	[0.014]	[0.011]	[0.006]	[0.006]	[0.006]	[0.006]
lnsize	0.033***	0.046***	0.036***	0.016***	0.029***	0.049***	0.035***	0.004
	[0.005]	[0.005]	[0.005]	[0.005]	[0.007]	[0.007]	[0.007]	[0.007]
export	0.130***		0.131***	0.106***	0.189***		0.191***	0.164***
	[0.018]		[0.018]	[0.018]	[0.023]		[0.023]	[0.023]
import	0.124***		0.123***	0.114***	0.147***		0.147***	0.136***
	[0.017]		[0.017]	[0.017]	[0.022]		[0.023]	[0.022]
gvc		0.132***				0.165***		
		[0.026]				[0.035]		
age			–0.001***				–0.002***	
			[0.000]				[0.001]	
qualitycert				0.179***				0.235***
				[0.014]				[0.019]
Number of observations	26,458	26,458	26,250	26,040	17,224	17,224	17,046	16,933
Number of industries	13	13	13	13	7	7	7	7
Underidentification test	22.872	22.866	21.285	35.53	134.403	134.457	129.984	127.366
Weak identification test	24.463	24.454	22.742	40.7	92.339	92.381	88.335	87.641

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
		Forward FDI				Backward FDI		
FDI	0.017***	0.016**	0.018***	0.019***	0.070**	0.069**	0.077***	0.078***
	[0.006]	[0.006]	[0.006]	[0.006]	[0.028]	[0.028]	[0.029]	[0.030]
lnsize	0.023***	0.043***	0.029***	–0.001	0.027***	0.046***	0.034***	0.004
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.008]	[0.008]
export	0.193***		0.197***	0.166***	0.199***		0.204***	0.172***
	[0.024]		[0.024]	[0.024]	[0.025]		[0.025]	[0.025]
import	0.169***		0.169***	0.158***	0.154***		0.152***	0.140***
	[0.023]		[0.023]	[0.023]	[0.025]		[0.025]	[0.025]
gvc		0.203***				0.204***		
		[0.035]				[0.036]		
age			–0.002***				–0.003***	
			[0.001]				[0.001]	
qualitycert				0.238***				0.235***
				[0.019]				[0.020]
Number of observations	16,465	16,465	16,302	16,203	16,465	16,465	16,302	16,203
Number of industries	7	7	7	7	7	7	7	7
Underidentification test	533.317	533.135	526.591	507.491	26.84	26.889	25.358	23.637
Weak identification test	553.686	553.315	540.584	528.144	24.449	24.503	23.047	21.567

Note: The dependent variable is the logarithm of the average wage. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. Robust standard error is in parentheses. In all specifications, we control for country-sector fixed effects and sector-year fixed effects. In underidentification and weak identification tests, we report Kleibergen-Paap rk LM statistic and Kleibergen-Paap rk Wald F statistic, respectively.

Source: Authors' estimation, using the Enterprise Surveys (World Bank).

Table 5 shows the results of estimating Equation 2 to examine wage spillover effects using the IV method. In Table 5, the test statistics for both underidentification and weak identification tests show reasonably high values. This suggests that the use of the IV method is appropriate. Table 5 presents the effects of three types of FDI on wages; horizontal FDI is covered in Columns 1 to 8, forward FDI in Columns 9 to 12, and backward FDI in Columns 13 to 16. As regards the results on the horizontal FDI,

Columns 1 to 4 utilize the 13 manufacturing sector classifications of the Enterprise Survey, while Columns 5 to 8 employ the seven manufacturing sector classifications of the Eora National Input-Output Tables. For both forward and backward FDI, seven manufacturing sector classifications are applied. Our findings indicate that all three types of FDI—horizontal, forward, and backward—positively affect wage levels. In particular, the coefficients of backward FDI are observed to be higher than those of other FDIs, indicating that wages in domestic firms that supply intermediate goods to foreign firms tend to be higher than those in other domestic firms. In other words, domestic firms tend to be influenced significantly by foreign firms to which domestic firms sell their products. This may reflect the fact that foreign firms demand the delivery of high-quality intermediate goods from domestic firms, and domestic firms require the use of high-quality, high-wage workers to meet the demand of foreign firms.

These findings emphasize the presence of wage spillover effects, underscoring the beneficial role of FDI in developing countries. The results suggest that FDI not only contributes to economic growth but also plays an important role in improving wage standards in developing countries.

Lastly, Table 6 shows the results of the interaction term, multiplied by FDI and the ratio of skilled labor, and its impact on average wages. Finding that the coefficients of all interaction terms are positive and statistically significant, and the coefficients for each type of FDI are also positive, we conclude that all FDI types increase the wages of skilled labor compared to unskilled labor, suggesting that FDI widens wage disparities between skilled and unskilled labor in the host Asian developing countries. These findings indicate that foreign firms demand skilled labor relatively more than unskilled labor when compared to domestic firms, which may reflect the differences in technology and management know-how between these two types of firms.

Table 6: Wage Inequality, IV Results

	(1)	(2)	(3)	(4)
	Horizontal FDI		Forward FDI	Backward FDI
FDI	0.022	0.018***	0.011*	0.061**
	[0.014]	[0.007]	[0.007]	[0.028]
lnsize	0.036***	0.034***	0.027***	0.030***
	[0.005]	[0.007]	[0.007]	[0.007]
export	0.138***	0.190***	0.194***	0.199***
	[0.018]	[0.023]	[0.024]	[0.024]
import	0.119***	0.133***	0.159***	0.147***
	[0.018]	[0.024]	[0.024]	[0.025]
HFDI/FFDI/BFDI × Skilled labor	0.021***	0.020***	0.019***	0.021***
	[0.004]	[0.004]	[0.005]	[0.005]
Number of observations	24,214	16,813	16,088	16,088
Number of industries	13	7	7	7
Underidentification test	21.043	119.536	521.693	25.306
Weak identification test	11.42	40.77	255.814	11.559

Note: The dependent variable is the logarithm of the average wage. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. Robust standard error is in parentheses. In all specifications, we control for country-sector fixed effects and sector-year fixed effects. In underidentification and weak identification tests, we report the Kleibergen-Paap rk LM statistic and the Kleibergen-Paap rk Wald F statistic, respectively.

Source: Authors' estimation, using the Enterprise Surveys (World Bank).

6. CONCLUSIONS

Using a cross-sectional dataset of 13 manufacturing sectors in 27 Asian developing countries from 2008 to 2022, we investigated the impact of the presence of foreign firms on the wages of domestic firms. First, we found that the average wage of workers working for foreign firms is higher than that of those working for domestic firms. This pattern is more pronounced in the cases of low-income countries than in middle-income countries, and in the service sector than in the manufacturing sector. Second, the average wage of workers working for domestic firms that are exposed to foreign firms is higher than that of those working for domestic firms without exposure to foreign firms. The presence of a positive spillover in wages from foreign to domestic firms within the same industry appears to indicate that competition from foreign firms in hiring workers increases the wages of workers working for domestic firms, while the presence of a positive inter-industry spillover may be due to the need for high-quality, high-wage labor on the part of domestic firms that are engaged in inter-industry transactions with foreign firms. Third, the presence of foreign firms is found to widen the wage gap between skilled and unskilled workers.

Our findings indicate that foreign firms exert a beneficial impact on the wages of workers in FDI recipient countries. Workers working for foreign firms can obtain higher wages than those working for domestic firms, and those working for domestic firms that are exposed to foreign firms can expect higher wages than those working for domestic firms that are not exposed to foreign firms. Based on these findings, we argue that developing countries should improve their FDI environment to successfully attract FDI. The policy measures that may be effective in attracting FDI include the implementation of open trade and FDI policies, the improvement of soft and hard infrastructure such as educational and legal systems (soft infrastructure) and transportation and communication services (hard infrastructure), the adoption of sound macroeconomic policies, and the establishment of political and social stability.

One unfavorable impact of the presence of foreign firms is found to widen the wage gap between skilled and unskilled workers. One may incorrectly argue that the presence of foreign firms should be limited to reduce the wage gap. What needs to be done to reduce the wage gap is upgrading the skills of unskilled workers so that they become skilled workers. In upgrading the skills of workers, education and training, which may be effectively provided by the government, can contribute significantly.

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APPENDIX

Appendix Table 1: Sample Countries

Low-Income	Middle-Income
Afghanistan	Armenia
Bangladesh	Azerbaijan
India	Bhutan
Kyrgyz Republic	PRC
Cambodia	Georgia
Lao People's Democratic Republic	Indonesia
Myanmar	Kazakhstan
Nepal	Sri Lanka
Pakistan	Malaysia
Tajikistan	Mongolia
Uzbekistan	Philippines
Viet Nam	Papua New Guinea
	Solomon Islands
	Thailand
	Timor-Leste

Note: A total of 27 low- and middle-income countries that are members of the Asian Development Bank (ADB) are used for horizontal, forward, and backward FDI spillover. High-income countries are excluded from the dataset based on the World Bank's list of economies (high-income: 2007 GNI per capita, $11,456 or more).

Source: Authors' compilation.

Appendix Table 2: Sample Sectors

	Enterprise Surveys Sector Name	Eora National Input-Output Tables Sector Name
Manufacturing	Food products, beverages, and tobacco	Food and beverages
	Textiles, apparel, and leather	Textiles and wearing apparel
	Wood, paper products, and printing	Wood and paper
	Refined petroleum products	Petroleum, chemical, and nonmetallic mineral products
	Chemicals	
	Rubber and plastic products	
	Other nonmetallic mineral products	
	Basic metals	Metal products
	Fabricated metal products	
	Machinery and equipment	Electrical and machinery
	Electronics	
	Precision instruments	
	Transport equipment	Transport equipment
Service	Construction	
	Hotels and restaurants	
	IT	
	Retail	
	Transport service	
	Wholesale	

Source: Authors' compilation.

Appendix Table 3: Basic Statistics for Hypothesis 1

	Obs	Mean	Std. Dev.	Min	Max
lnwage	43,360	7.408	1.040	3.216	14.591
foreign firm	43,360	0.060	0.237	0	1
foreign share	43,360	4.165	18.256	0	100
government share	43,359	0.663	6.395	0	99
lnsize	43,360	3.492	1.396	0	10.309
export	43,360	0.142	0.349	0	1
import	43,360	0.428	0.495	0	1
gvc	43,360	0.084	0.277	0	1
age	42,975	25.553	13.338	2	123
qualitycert	42,561	0.277	0.448	0	1

Source: Authors' compilation.

Appendix Table 4: Basic Statistics for Hypothesis 2

	13 Manufacturing Sectors				
	Obs	Mean	Std. Dev.	Min	Max
lnwage	26,460	7.376	0.998	3.216	14.591
HFDI	26,460	11.907	17.057	0	98.661
lnsize	26,460	3.679	1.358	0	10.309
export	26,460	0.153	0.360	0	1
import	26,460	0.232	0.422	0	1
gvc	26,460	0.074	0.262	0	1
age	26,252	26.854	13.900	2	123
qualitycert	26,040	0.330	0.470	0	1
regulation (HFDI)	26,458	7.444	5.502	0	87.5
	7 Manufacturing Sectors				
	Obs	Mean	Std. Dev.	Min	Max
lnwage	17,224	7.344	1.094	3.216	14.591
HFDI	17,224	14.854	18.792	0	93.168
FFDI	16,465	11.976	14.101	0	82.766
BFDI	16,465	12.422	15.583	0	85.502
lnsize	17,224	3.651	1.368	0	10.309
export	17,224	0.164	0.370	0	1
import	17,224	0.246	0.431	0	1
gvc	17,224	0.077	0.266	0	1
age	17,046	28.483	13.274	7	123
qualitycert	16,933	0.350	0.477	0	1
regulation (HFDI)	17,224	4.846	3.631	0	47.750
regulation (FFDI)	16,465	4.452	3.698	0.006	35.529
regulation (BFDI)	16,465	3.941	3.053	0.047	24.077

Source: Authors' compilation.

Appendix Table 5: Basic Statistics for Hypothesis 3

	13 Manufacturing Sectors				
	Obs	**Mean**	**Std. Dev.**	**Min**	**Max**
lnwage	24,214	7.354	1.007	3.216	14.591
HFDI	24,214	11.995	17.125	0	98.236
lnsize	24,214	3.720	1.364	0	10.309
export	24,214	0.160	0.366	0	1
import	24,214	0.227	0.419	0	1
regulation (HFDI)	24,214	6.918	5.268	0	87.500
HFDI × Skilled labor	24,214	2.783	5.416	0	86.887
regulation (HFDI) × Skilled labor	24,214	1.579	1.840	0.000	32.813
	7 Manufacturing Sectors				
	Obs	**Mean**	**Std. Dev.**	**Min**	**Max**
lnwage	16,813	7.340	1.090	3.216	14.591
HFDI	16,813	14.515	18.544	0	93.168
FFDI	16,088	11.717	14.020	0	82.766
BFDI	16,088	12.178	15.471	0	85.502
lnsize	16,813	3.668	1.368	0	10.309
export	16,813	0.166	0.372	0	1
import	16,813	0.229	0.420	0	1
regulation (HFDI)	16,813	4.844	3.616	0	47.750
regulation (FFDI)	16,088	4.450	3.692	0.006	35.529
regulation (BFDI)	16,088	3.946	3.047	0.047	24.077
HFDI × Skilled labor	16,813	3.312	5.907	0	70.389
FFDI × Skilled labor	16,088	2.690	4.416	0	48.493
BFDI × Skilled labor	16,088	2.796	4.950	0	55.100
regulation (HFDI) × Skilled labor	16,813	1.118	1.352	0	19.152
regulation (FFDI) × Skilled labor	16,088	1.035	1.368	0	28.512
regulation (BFDI) × Skilled labor	16,088	0.917	1.129	0	17.136

Source: Authors' compilation.