

## The role of FDI in shaping wage disparities: Evidence from Vietnamese enterprises



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### ABSTRACT

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This study examines how foreign direct investment (FDI) affects wage disparities between foreign-invested enterprises (FIEs) and domestic enterprises in Vietnam. Addressing the lack of comprehensive structural analysis in the existing literature, the study develops a theoretical framework that integrates two key mechanisms through which FDI affects wage inequality: labor reallocation and technology spillovers. Based on firm-level panel data from 2005 to 2015, the study empirically investigates the specific contribution of different factors to wage inequality by applying the Shapley value decomposition method. The empirical results reveal that the wage gap between foreign and domestic firms follows an inverted U-shaped pattern during the process of FDI development. In the early stage, FDI inflows significantly widened wage disparities mainly through labor mobility as foreign-invested firms attract higher-skilled workers by offering higher wages. However, as technological spillover effects gradually emerge and domestic firms improve their productivity, the wage gap begins to narrow, with a turning point observed around 2010. These findings suggest that policies should not only focus on attracting foreign investment but also emphasize strengthening technological linkages and enhancing domestic firms' absorptive capacity. Taking such measures can maximize the positive spillover effects of foreign direct investment while effectively reducing structural wage inequality in developing economies.

**Contribution/ Originality:** This article systematically explains the evolution of the wage gap between foreign-funded enterprises and domestic enterprises by incorporating labor transfer and technology spillover into a unified theoretical framework. In terms of empirical evidence, this study applies the Shapley value decomposition method to analyze enterprise-level panel data from Vietnam (2005-2015) to quantify the contributions of various factors to changes in wage inequality between enterprises.

## 1. INTRODUCTION

Under the background of deepening global economic integration, FDI plays an increasingly significant role in globalization and has become a key channel for cross-border capital flow and technology transfer. Nowhere is this more critical than in emerging markets, where FDI remains a cornerstone of economic development. It not only provides necessary capital but also introduces advanced technology and management experience, both of which are

vital for promoting a country's economic growth and technological advancement. As an emerging market country, Vietnam has attracted a large number of foreign-funded enterprises (FIEs) with its abundant and low-cost labor resources and an increasingly open economic environment. Since joining the World Trade Organization (2007), Vietnam has quickly become one of the most popular investment destinations for foreign investors in Southeast Asia. Since then, foreign capital has continued to flow into Vietnam's manufacturing, electronics, and export processing industries. The investment of multinational companies in Vietnam not only contributes capital but also introduces innovative technology and modern management systems, thus improving productivity and stimulating the innovative vitality of Vietnamese enterprises. However, the large influx of FDI has also widened the wage gap between domestic and foreign-funded enterprises, exacerbated the imbalance in regional economic development, and highlighted the uneven impact of FDI on income distribution (Nguyen & Ramstetter, 2017).

Although foreign investment has a positive impact on the overall economy, its benefits have not been evenly distributed among different social groups in Vietnam (Do & Le, 2023). One of the most prominent phenomena is the wage inequality between FIEs and domestic enterprises. This gap is particularly evident in small and medium-sized enterprises (SMEs), where FIEs usually offer higher wages. Wage inequality is a common problem in many developing countries, as foreign investment often has a significant impact on the local labor market. In Vietnam, this problem is more prominent due to regional economic differences and the dual differentiation of enterprise structure. The widening wage gap between foreign-funded enterprises and domestic enterprises has raised concerns about social and economic inequality and may become a potential obstacle to Vietnam's inclusive economic growth. Therefore, understanding how FDI leads to wage inequality between enterprises is not only an empirical issue but also an important policy issue involving mechanism analysis.

This study enhances the understanding of wage inequality in developing economies and provides useful insights for policy responses, especially within the context of Vietnam's development. The main objective of this article is to examine how FDI affects the wage gap between FIEs and domestic enterprises in Vietnam. Specifically, this article focuses on two key mechanisms: technology spillover and labor flow. Technology spillover effect refers to the process of indirect transmission of advanced technology and management experience by foreign-funded enterprises to local enterprises, while labor flow refers to the phenomenon that highly skilled labor flows to foreign-funded enterprises due to higher salaries. These two mechanisms are often considered important drivers of the wage gap because they affect both labor productivity and the allocation of labor between different sectors. It is worth noting that these two channels may work simultaneously, but there may be significant differences in the extent and direction of their impact on wage disparity at different phases. This shows that the net distribution effect of FDI is a process of dynamic evolution. This naturally leads to another question: how will this impact change over time during the stage of rapid economic transformation of developing countries?

While a large body of empirical studies has documented the wage premiums associated with FDI and explored mechanisms such as technology spillovers and labor mobility, the existing evidence remains fragmented in two important dimensions. First of all, many studies are mainly based on cross-sectional data, paying more attention to the correlation analysis between variables, and less about how FDI affects income inequality through specific mechanisms and dynamic processes. Secondly, although some studies do emphasize the issue of inequality, they rarely conduct transparent and comprehensive attributive analyses of wage inequality among enterprises within the framework of decomposable inequality, which is clearly decomposed into the contribution of foreign ownership and related factors, especially in Vietnam. These shortcomings have limited our ability to effectively connect the mechanism-oriented theoretical account with the policy-relevant decomposed evidence.

To address these shortcomings, this study develops an integrated theoretical framework that links FDI to inter-firm wage inequality through the two channels discussed above. At the theoretical level, this paper adopts the decomposable income inequality measurement index (Theil index) to formally characterize wage dispersion between foreign-invested and domestic enterprises and derive the dynamic evolution path implied by labor mobility and

technology spillover mechanisms. Through a systematic analysis of these two mechanisms, this paper delves deeply into how FDI promotes the formation and changes of wage gaps among enterprises within the host country. This approach provides a unified theoretical framework for analyzing the influence of FDI on wage disparity and fills gaps in related studies in developing countries, particularly in Vietnam. At the empirical level, this paper adopts firm-level survey data from the General Statistics Office of Vietnam (GSO) and uses the Shapley value decomposition method to quantitatively analyze the annual marginal contribution of various factors related to the wage gap between enterprises from 2005 to 2015. The decomposition-based method can achieve total and interpretable attribution analysis, thus making up for the shortcomings of traditional regression methods in decomposing unequal sources and providing a more structured analytical perspective for the dynamic evolution of the wage gap. This empirical analysis identifies the turning points in the evolution of the wage gap in Vietnam. Through the above analysis, this paper not only fills gaps in related theoretical research but also provides valuable empirical evidence for the Vietnamese government to more effectively address distribution challenges brought about by FDI. By incorporating the above mechanisms into a unified theoretical framework, this paper fills gaps in existing theoretical research. Secondly, based on survey data at the enterprise level, this paper uses the Shapley value decomposition method to quantitatively measure the specific contribution of FDI to wage inequality among enterprises. This method not only rigorously validates the inferences of the constructed theoretical model but also, compared to traditional correlation analysis, provides a more precise and targeted basis for policy formulation.

In summary, this paper constructs a systematic theoretical model based on the decomposable Theil index, which clearly depicts the mechanism of FDI affecting the wage gap and its evolutionary process, especially emphasizing the two paths of labor mobility and technology spillover. This paper proceeds as follows: section 2 reviews the relevant literature; section 3 builds a theoretical model; section 4 introduces data sources and empirical methods; section 5 reports and discusses the empirical results; the last part summarizes the entire paper and puts forward corresponding policy suggestions.

## 2. LITERATURE REVIEW

As foreign direct investment (FDI) continues to expand, its impact on host-country development and income distribution has drawn growing attention. A large body of research finds that FDI has made prominent contributions to economic growth and productivity (Borensztein, De Gregorio, & Lee, 1998; Keller & Yeaple, 2009; Li & Liu, 2005). Recent cross-country evidence is consistent with this view. Le, Pham, Do, and Duong (2024) also supported this; they analyzed 90 middle-income nations and found that FDI had a strong beneficial impact on economic development, specifically noting that a 1% increase in FDI inflows correlates with a 9.3% increase in growth. Similarly, Emako, Nuru, and Menza (2022) collected data on FDI of 19 developing countries from 2005 to 2018. Through the GMM method, they concluded that the more a host country's FDI is concentrated in the manufacturing sector, and thus its impact on a country's economic growth is also greater.

However, these overall gains are not necessarily evenly distributed between enterprises and workers. Although scholars generally believe that FDI promotes economic growth in developing countries, many studies also point out that FDI may simultaneously exacerbate income inequality (Chen, Ge, & Lai, 2011; Feenstra & Hanson, 1997; Mah, 2013). This inequality is primarily driven by the "foreign wage premium." Numerous empirical studies have shown that even after controlling for enterprise characteristics and human capital factors, the wages paid by foreign companies are still higher than those paid by domestic (Aitken, Harrison, & Lipsey, 1996; Girma & Görg, 2007; Haddad & Harrison, 1993; Lee & Wie, 2015; Mah, 2013). Choi (2006) further provided empirical evidence, finding that the increase in FDI is significantly correlated with the rise in the Gini coefficient, indicating that FDI inflows may exacerbate income inequality. Furthermore, this disparity is especially evident in emerging and developing economies (Brown, Deardorff, & Stern, 2004; Hijzen, Martins, Schank, & Upward, 2013). Based on a large amount of

empirical evidence of wage differences caused by FDI, many scholars have further explored the theoretical mechanism that promotes the formation of this gap.

A review of the existing literature indicates that FDI primarily reshapes the wage structure of host countries through two main channels: technology spillover and labor mobility. These two mechanisms exert differentiated influences on the wage levels of different types of enterprises by altering productivity and labor allocation, thereby fundamentally affecting the degree of wage inequality. Among them, technological spillover is regarded as one of the most common channels through which FDI affects the productivity and wage structure of the host country, as described in the literature. Early research pointed out that multinational corporations possess firm-specific assets, including advanced technology, management knowledge, and organizational practices. These advantages may have external effects on local enterprises (Caves, 1974). Subsequently, the relevant research further distinguished between horizontal spillover (such as learning effect and competitive pressure) and vertical spillover (such as supply chain association) (Branstetter, 2000; Javorcik & Spatareanu, 2008; Markusen & Venables, 1997). On the other hand, a large body of empirical research indicates that the technological spillovers brought about by FDI are not neutral. Although technology spillovers may enhance overall productivity, they often reshape the labor demand structure, making it more inclined toward highly skilled workers. This phenomenon can be explained by the Capital-Skill Complementarity Hypothesis proposed by Krusell, Ohanian, Ríos - Rull, and Violante (2000). The theory believes that the advanced capital equipment and automation technology introduced by foreign-funded enterprises have a stronger complementarity with the highly skilled labor force, while the complementarity with the unskilled labor force is relatively weak. Many empirical studies support this conclusion (Feenstra & Hanson, 1997; Javorcik & Spatareanu, 2008; Ruiz-Arranz, 2003; Yasar & Paul, 2008). When examining how technology spillovers affect wage inequality in host countries, some scholars further find that these spillovers are heterogeneous. In particular, spillover gains depend on domestic firms' absorptive capacity and are conditioned by regional institutions, infrastructure, and human-capital endowments. Empirical evidence suggests stronger spillovers in sectors such as chemicals, pharmaceuticals, and food processing (Behera, Dua, & Goldar, 2012; Managi & Bwalya, 2010) and in service activities where Research and Development (R&D) and institutional support facilitate learning (Huang, 2014). Beyond technology spillover, other research emphasizes labor-market reallocation. Pandya (2010) emphasizes that labor market segmentation is a central channel through which FDI generates inequality. When foreign-invested firms enter a host country, they offer higher wages and better benefits in order to attract high-skilled workers who meet their expectations. Accordingly, domestic firms may suffer a decline in workforce quality and productivity, widening the foreign-domestic firm wage gap (Alili & Adnett, 2018; Chen, 2023; Cruz, Nayyar, Toews, & Vézina, 2023).

In studies focusing on Asian economies especially Vietnam most scholars adopt perspectives that follow the same broad patterns as the literature reviewed above. Overall, the relevant research can be categorized into three main directions: the wage premium of foreign enterprises, the biased labor demand in the labor market, and the heterogeneity in technological spillovers. A common conclusion in developing economies is that FIEs pay significantly higher wages than domestic counterparts. In the context of Vietnam, Hering and Poncet (2010) confirm that even after controlling for firm productivity, the wage premium for foreign-owned enterprises still exists. By studying panel data of Vietnamese enterprises from 2007 to 2011, Truong and Dong (2023) discovered that the wage disparity is more pronounced among SMEs in Vietnam. In addition, the wage inequality caused by FDI is also reflected in the inclination of labor demand towards highly skilled workers. In Vietnam, Tran (2015) and Nguyen and Ramstetter (2017) found that foreign-funded enterprises are more inclined to hire highly skilled workers and pay them higher wages. Therefore, high-skilled workers usually get faster wage growth, while low-skilled workers often face wage stagnation, thus exacerbating the income gap between the two types of workers (Nguyen, 2013). This pattern is consistent with findings of other developing countries. Based on data from 11 developing countries, Gopinath and Chen (2003) pointed out that FDI has increased the demand for highly skilled workers, thus widening the wage gap. Lee and Wie (2015) also found that in Indonesia, FDI pushed labor demand to high-skilled groups and

exacerbated wage inequality. In addition to the direct employment effect, the impact of FDI on the wages of domestic enterprises also depends on the nature of technology spillover. In the case of Vietnam, Le et al. (2024) pointed out that the benefits of vertical association often exceed the horizontal spillover effect within the same industry. Follow-up research further shows that when competitive pressure dominates, the horizontal spillover effect may be weak and may even have a negative impact on the wages of domestic enterprises (Nguyen, Sun, & Beg, 2019). Supplementary evidence highlights that factors such as education level, gender structure, and the scale of foreign capital inflow also play an important intermediary role in the formation of wage results (Ni, Spatareanu, Manole, Otsuki, & Yamada, 2017).

Although there is already a considerable amount of relevant literature, current research still has several key deficiencies. First, most studies tend to examine the technology mechanisms or labor transfer effects separately, and rarely combine the two for systematic analysis. However, in reality, these two mechanisms often work simultaneously: technological upgrading changes the structure of labor demand, while wage premiums promote labor reallocation. If these two channels are not integrated, it is difficult to fully understand the evolution of the wage gap. Second, many studies mainly rely on cross-sectional comparisons or short-term panel data to prove that FIEs pay higher wages, but often ignore the process of changing the wage gap over time. Additionally, a large number of empirical studies mainly focus on huge emerging economies such as China and India, while relevant evidence on Southeast Asian countries, especially Vietnam, remains relatively scarce.

To address these deficiencies, this paper constructs a comprehensive theoretical framework that integrates the two key mechanisms influencing wage inequality into a unified analytical framework. Based on enterprise-level panel data in Vietnam (2005-2015), this article systematically examines the specific influencing factors of FDI on the wage gap between Vietnamese enterprises and its dynamic evolution trend. It is worth noting that this paper has identified the key turning point in the changes of wage gaps between foreign-funded enterprises and domestic enterprises during Vietnam's economic transformation, providing strong empirical support for the consistency between the theoretical framework and the actual evolution.

### 3. THEORETICAL MODEL

A review of existing research indicates that FDI mainly exacerbates the wage gap between foreign enterprises and domestic enterprises in the host country via two key mechanisms: the labor transfer effect and the technology spillover effect. The labor mobility effect occurs when foreign enterprises enter the host country and engage in investment activities. Foreign firms usually offer above-market wages to attract high-quality labor to achieve high production efficiency. Consequently, well-skilled employees gradually shift from domestic firms to FIEs. To retain these workers, domestic enterprises have to correspondingly raise wage levels. On the other hand, the technology spillover effect refers to the impact of foreign enterprises on the productivity of domestic enterprises through vertical and horizontal links, such as competition, technology transfer, and the movement of technical personnel. When technology transfer takes effect, the productivity of domestic enterprises is enhanced, thereby driving up wage levels.

This study develops a theoretical model based on the two mechanisms discussed above to explain how FDI affects the wage gap between FIEs and domestic enterprises in host countries through different pathways. The model is based on the Acemoglu (1998) theoretical framework and draws on Robinson (1956) two-sector economic models, the Lewis Dual Sector Model (Lewis, 1954), the Feenstra-Hanson Outsourcing Model (Feenstra & Hanson, 1997), the Aghion-Howitt Model (Aghion & Howitt, 1998; Glomm, 1992), analytical framework, and Chen (2016) related research.

#### 3.1. Basic Assumptions

To begin the analysis, we propose the following hypothesis.

*H: The final output of a country is produced solely by two sectors: foreign-invested enterprises and domestic enterprises.*

Let  $Y_f$  and  $Y_d$  denote the outputs of the foreign and domestic sectors, respectively. The aggregate production function is specified as:

$$Y = (Y_d^\rho + \delta Y_f^\rho)^{\frac{1}{\rho}} \quad (1)$$

$Y$  denotes the total output of the economy. The outputs of the two sectors are assumed to be imperfect substitutes, with a substitution elasticity of  $\frac{1}{(1-\rho)}$ . The parameter  $\delta$  represents the importance of sector  $Y_f$  to the total output.

*H<sub>2</sub>: The production activities of both foreign-invested enterprises and domestic enterprises follow the Cobb-Douglas production function.*

Therefore, the specific production functions are as follows:

$$Y_n = A_n K_n^\alpha L_n^\beta \quad (2)$$

Where  $n$  is the enterprise type ( $f$  for FIEs,  $d$  for domestic enterprises),  $A$  indicates the technology level,  $K$  represents capital, with  $K_f$  and  $K_d$  representing the capital used by foreign and domestic firms.  $L$  refers to total labor, ( $L_f$  for labor used by FIEs,  $L_d$  for labor used by domestic enterprises). Labor is assumed to be perfectly mobile between the two sectors. Given that total labor is  $L$ , the proportion of labor allocated to foreign firms is  $\lambda$ , implying that the share of labor allocated to domestic firms is  $1 - \lambda$ .

*H<sub>3</sub>: The wages in the two sectors can be expressed as  $W_f$  and  $W_d$ , where  $W_f$  represents the average wage level of foreign-invested enterprises, and  $W_d$  represents the average wage level of domestic enterprises.*

The overall average wage  $W$  is given by  $W = (1-\delta) W_d + \lambda W_f$ . Based on reality, FIEs possess a higher level of technology than domestic enterprises. Considering that wage levels in each sector are increasing functions of their respective technological levels, the wage ratio between the two sectors is greater than one ( $\frac{w_f}{w_d} > 1$ ). To better analyze the effect of FDI on wage disparities between foreign and domestic firms, the author proposes Hypothesis 4.

*H<sub>4</sub>: It is assumed that there is no wage inequality within firms; that is, the wage gap within each sector is set to zero.*

### 3.2. The Labor Mobility Effect

To better quantify the impact of labor mobility on wage disparities between foreign and domestic firms, in this section the study ignores the technology spillover effect between sectors. That is, we assume no spillover or technological exchange occurs between the two sectors (Hypothesis 5). Considering the potential overlap in wage among sectors and the necessity of conducting meaningful comparisons, the Theil index is adopted as a more suitable measure for capturing income differences between groups.

$$T = \sum \frac{N_i}{N} \left( \frac{\bar{y}_i}{Y} \ln \frac{\bar{y}_i}{Y} \right) \quad (3)$$

Here,  $Y$  represents the total income,  $y_i$  is the total income of group  $i$ .  $\bar{y}_i$  is the average income of group  $i$ .  $N$  is the total number of workers, and  $N_i$  is the total number of workers in group  $i$ . Accordingly, we can express the Theil index for measuring the average wage gap between foreign-invested and domestic enterprises as follows:

$$T = \frac{L_d}{L} \left( \frac{w_d}{L(1-\lambda)w_d + \lambda w_f} \ln \frac{w_d}{(1-\lambda)w_d + \lambda w_f} \right) + \frac{L_f}{L} \left( \frac{w_f}{L(1-\lambda)w_d + \lambda w_f} \ln \frac{w_f}{(1-\lambda)w_d + \lambda w_f} \right)$$

After simplifying the equation, we can obtain.

$$T = (1-\lambda) \frac{w_d}{(1-\lambda)w_d + \lambda w_f} \ln w_d + \lambda \frac{w_f}{(1-\lambda)w_d + \lambda w_f} \ln w_f - \ln((1-\lambda)w_d + \lambda w_f)$$

$$T = \frac{\ln w_d(1-\lambda)w_d + \ln w_f \lambda w_f}{(1-\lambda)w_d + \lambda w_f} - \ln((1-\lambda)w_d + \lambda w_f) \quad (4)$$

In general, the average wage in the foreign-invested sector tends to be higher than in the domestic sector. This gap encourages high-skilled workers to move from domestic to foreign firms, a real phenomenon consistent with empirical observations. In order to capture the dynamic impact of labor mobility on wage gap between the two sectors, we take the first derivative of Equation 4 with respect to  $\lambda$ .

$$\frac{\partial T}{\partial \lambda} = \frac{(w_d - w_f)(\lambda w_f \ln w_f - w_d(1 - \lambda) \ln w_d) + (\lambda w_f - w_d(1 - \lambda))(w_d - w_d \ln w_d + w_f \ln w_f - w_f)}{(\lambda w_f - w_d(1 - \lambda))^2}$$

The simplification of the preceding equation yields.

$$\frac{\partial T}{\partial \lambda} = \frac{(w_d - w_f)(\lambda w_f - w_d(1 - \lambda)) + w_d w_f (\ln w_f - \ln w_d)}{(\lambda w_f - w_d(1 - \lambda))^2} \quad (5)$$

To determine the critical point of wage disparity between foreign-invested and domestic enterprises in the process of labor mobility, we assume that there exists a value of  $\lambda^*$  that sets Equation 5 equal to zero.

$$\lambda^* = \frac{w_d(w_d + w_f \ln \frac{w_d}{w_f} - w_f)}{w_d^2 - w_f^2} \quad (6)$$

Since  $0 < w_d < w_f$ , the critical value determined by Equation 6 reveals that  $\lambda^*$  approaches a constant slightly less than 1, so the value of  $\lambda^*$  falls in the interval (0,1). At  $\lambda = \lambda^*$ , then  $\frac{\partial T}{\partial \lambda} = 0$ .  $\lambda^*$  is a critical point, dividing the situation into two cases. When  $\lambda < \lambda^*$ , we have  $\frac{\partial T}{\partial \lambda} > 0$ , indicating that wage inequality (T) increases as labor progressively shifts towards the foreign-invested sector. Conversely, when  $\lambda^* < \lambda < 1$ , the derivative becomes negative ( $\frac{\partial T}{\partial \lambda} < 0$ ), suggesting that once the labor share of foreign firms surpasses the critical point, continued labor movement to foreign-invested sector will narrow the wage gap between the domestic and foreign-invested sectors. In other words, under the condition that average wages in domestic enterprises are lower than those in FIEs, and isolating the impact of labor mobility on wage inequality, the continuous transfer of labor toward foreign-invested firms will initially widen and subsequently narrow the wage gap between the two sectors, which is consistent with the characteristics of an inverted U-shaped curve.

Furthermore, to analyze the rate of change in wage disparity and verify whether labor mobility exhibits an inverted U-shaped pattern, we take the second derivative of Equation 5 with respect to  $\lambda$ , it follows that:

$$\frac{\partial^2 T}{\partial \lambda^2} = \frac{2w_d w_f (\ln w_f - \ln w_d) + (w_d - w_f)(\lambda w_f + w_d(\lambda - 1))}{(\lambda w_f + w_d(\lambda - 1))^3} \quad (7)$$

If there exists a value of  $\lambda^{**}$  that sets the above equation equal to zero, then the following holds.

$$\lambda^{**} = \frac{w_d(w_d + 2w_f(\ln w_d - \ln w_f) - w_f)}{w_d^2 - w_f^2} \quad (8)$$

To determine the specific shape of the curve, it is necessary to establish the relationship between  $\lambda^*$  and  $\lambda^{**}$ . Thus.

$$\lambda^{**} - \lambda^* = \frac{w_d w_f (\ln \frac{w_d}{w_f})}{w_d^2 - w_f^2} \quad (9)$$

Since,  $0 < w_d < w_f$ , Equation 9 yields a positive result, which implies  $\lambda^{**} > \lambda^*$ . In summary, the impact of labor mobility on wage disparities between the two sectors can be divided into three stages, based on the values of  $\lambda^*$  and  $\lambda^{**}$ . In the first stage ( $0 < \lambda < \lambda^*$ ), as labor shifts from domestic enterprises to foreign sector, the wage gap continues to widen, and the rate of this widening is accelerating. In the second stage ( $\lambda^* < \lambda < \lambda^{**}$ ), as labor continues to flow into the foreign sector, the wage gap between the two sectors begins to gradually narrow down. In the third stage, due to further labor transfer, wage inequality continues to narrow, but the pace of this reduction slows compared to the second phase.

### 3.3. Technology Spillover Effect

The preceding section examined the impact of labor transfer on the wage gap between domestic and foreign-invested firms, without considering the influence of technological effects. In a similar manner, in this section, building upon Hypotheses 1 through 4, the author proposes additional hypotheses to explore the impact of technological spillovers on the disparity, while disregarding the effect of labor transfer. As noted previously, FIEs hold a technological advantage over domestic enterprises. With the entry of foreign firms into the host country, the advanced technology, management expertise, and processes of foreign-invested firms will disseminate within the local

economy. Domestic firms enhance their technological capabilities by learning from FIEs through cooperation, imitation, employee mobility, and demonstration effects.

*H<sub>6</sub>: Foreign-invested sectors influence the productivity of domestic firms through both vertical and horizontal technological spillovers.*

Building on Coe and Helpman (1995), it can express as:  $A_d = A_{d0}(A_f)^\sigma$  where  $A_{d0}$  denotes the initial technology level of domestic firms, and  $\sigma$  represents the extent to which domestic firms are affected by technological spillovers from foreign firms. When  $\sigma$  increases, it reflects an enhanced ability of the domestic sector to absorb technological knowledge from foreign enterprises. This, in turn, foreign firms are more likely to introduce more advanced technologies to maintain their competitive advantage, thereby promoting further investment in the host country. Consequently,  $\sigma$  is an increasing function of  $A_f$  and  $\lambda$ , and thus we have:  $\frac{\partial A_f}{\partial \sigma} > 0, \frac{\partial \lambda}{\partial \sigma} > 0$ . Accordingly, take the partial derivatives of  $L$  and  $Y$  with respect to the two sectors respectively, the wage premium between domestic and foreign sectors can be represented as:

$$\frac{w_f}{w_d} = \frac{A_f^{p-p\sigma}}{\lambda A_{d0}^p} \cdot \left(\frac{K_f}{K_d}\right)^{\alpha p} \cdot \left(\frac{L_f}{L_d}\right)^{p \cdot (\beta-1)} \tag{10}$$

In order to investigate the wage premium induced by technology transfer, we introduce the variable  $x = \frac{w_f}{w_d}$  to simplify the derivation process. Accordingly, Equation 4 is reformulated as follows:

$$T = \frac{\lambda x \ln x}{1-\lambda+\lambda x} - \ln(1-\lambda+\lambda x) \tag{11}$$

To explicitly capture the impact of technology spillovers on the wage gap between the two sectors, let  $R = \frac{1}{\lambda} \left(\frac{A_f}{A_{d0}}\right)^p \left(\frac{K_f}{K_d}\right)^{\alpha p} \left(\frac{L_f}{L_d}\right)^{p(\beta-1)}$ . Then, the wage ratio between foreign and domestic sectors can be expressed as:  $\frac{w_f}{w_d} = RA_f^{-p\sigma}$ . Equation 11 can be transformed into the following form:

$$T = \frac{\lambda RA_f^{-p\sigma} \ln RA_f^{-p\sigma}}{1-\lambda+\lambda RA_f^{-p\sigma}} - \ln(1-\lambda+\lambda RA_f^{-p\sigma}) \tag{12}$$

In line with the previous logic, this equation allows us to isolate and examine the impact of the technology spillover on the wage gap between foreign and domestic enterprises. Taking the derivative of Equation 12 with respect to  $\sigma$  yields:

$$\frac{\partial T}{\partial \sigma} = \frac{-(1-\lambda)p\lambda RA_f^{p\sigma} \ln A_f \ln(RA_f^{-p\sigma})}{((1-\lambda)A_f^{p\sigma} + \lambda R)^2} \tag{13}$$

The result of Equation 13 is negative, implying that an increase in technological spillovers from the foreign sector to the domestic sector leads to a gradual reduction in the wage gap between the two. This finding is aligned with actual conditions. Similarly, to further examine the specific impact of technological spillovers on the wage gap, we take the second derivative with respect to  $\sigma$ :

$$\begin{aligned} \frac{\partial^2 T}{\partial \lambda^2} &= \frac{(1-\lambda)p^2\lambda \ln(A_f)^2 A_f^{p\sigma} [(1-\lambda)(\ln R + 1) - \lambda A_f^{p\sigma} \ln R + \lambda A_f^{p\sigma}]}{\left((1-\lambda)A_f^{p\sigma} + \lambda R\right)^3} \\ &= \frac{(1-\lambda)p^2\lambda RA_f^{-p\sigma} (\ln A_f)^2 [(1-\lambda)(\ln RA_f^{-p\sigma}) + 1] - \lambda RA_f^{-p\sigma} \ln(RA_f^{-p\sigma}) + \lambda RA_f^{-p\sigma}}{\left((1-\lambda)A_f^{p\sigma} + \lambda R\right)^3} \end{aligned} \tag{14}$$

To simplify the analytical process, based on  $\frac{w_f}{w_d} = RA_f^{-p\sigma}$ , we can define  $G\left(\frac{w_f}{w_d}\right) = (1-\lambda)\left(\ln \frac{w_f}{w_d} + 1\right) - \lambda \frac{w_f}{w_d} \ln \frac{w_f}{w_d} + \lambda \frac{w_f}{w_d}$ . It can be seen that the sign of Equation 14 is determined by the numerator, specifically by the function  $G\left(\frac{w_f}{w_d}\right)$ .

Define  $A_0$  as a specific value, when  $\frac{w_f}{w_d} = A_0$ , it satisfies  $G\left(\frac{w_f}{w_d}\right) = 0$ . Since this section only examines the effect of technological spillovers on wage disparities, the degree of technological influence is at a critical value and can be expressed as  $\sigma = \sigma^* = \frac{\ln(A_0)}{p \ln(A_f)}$ . Based on the derivations above, it can be concluded that: when  $G\left(\frac{w_f}{w_d}\right) > 0, 1 < \frac{w_f}{w_d} < A_0$  follows, and the curve is concave ( $\sigma < \sigma^*$ ). In other words, the second-order convergence rate of the wage gap increases continuously due to factor  $\frac{\partial^2 T}{\partial \lambda^2} > 0$ . This indicates that stronger technology spillovers from foreign to domestic firms help speed up the reduction of wage differences between the two sectors. In addition, when  $G\left(\frac{w_f}{w_d}\right) < 0$  and  $\frac{w_f}{w_d} > A_0$ , the

graph of the function is convex ( $\sigma > \sigma^*$ ,  $\frac{\partial^2 T}{\partial \lambda^2} < 0$ ). This suggests that, as technology spillovers from foreign to domestic firms continue to increase, the rate at which the wage gap narrows gradually slows down. Specifically, technological spillovers from foreign-invested firms to domestic firms can reduce the wage gap between these two sectors; however, the speed of this reduction depends on whether the technological spillover surpasses a threshold value ( $\sigma^*$ ). Overall, the process of narrowing the wage gap due to technological spillovers exhibits a dynamic pattern: first accelerating, then gradually decelerating.

### 3.4. Combined Effects of Both Factors

From a practical perspective, the impact of FDI on wage disparities between foreign and domestic sectors in the host country is usually a complex process. It is not determined by a single factor alone but should be understood as the result of the combined effects of labor mobility and technology spillovers. Typically, in the absence of institutional barriers, foreign enterprises entering the host country can offer more attractive wages and benefits. This enables them to rapidly attract local high-skilled labor in the short term, thereby driving the reallocation of human capital across different sectors. As a result, in the initial stage, the effect of labor mobility often dominates. Subsequently, due to endogenous factors such as knowledge barriers and the limited absorptive capacity of firms and employees, the effect of technological spillovers usually lags behind that of labor mobility. Furthermore, this lag period itself is heterogeneous. Thus, the interaction between labor mobility and technological spillovers can be summarized into two main patterns. The first temporal pattern occurs before the technology spillover effects have fully manifested, during which the labor transfer effect dominates the changes in wage disparities. This means that the wage gap between domestic and foreign-funded sectors, driven by the labor transfer effect, is still in an expansion phase and has not yet reached its peak. At the same time, although lagging slightly, the technological spillover effect has already begun to play a role in narrowing the wage gap.

Under the combined influence of both effects, the rate of wage gap expansion driven by the labor transfer effect has begun to slow down. Additionally, the upper limit of the wage gap determined by the labor transfer effect is reduced, and this peak will reach earlier. In summary, the enhancement of the technological spillover effect will weaken the expansionary impact of the labor transfer effect on the wage gap between sectors. This will result in a downward shift in the inverted U-shaped curve of wage changes, as its peak appears earlier. The second temporal pattern occurs when the technology spillover effect begins to take effect, after the labor transfer effect has reached its peak. Consequently, the technological spillover effect will not affect the wage gap expansion phase or its existing peak level determined by labor mobility effects, but will only accelerate the process of wage gap reduction. On the inverted U-shaped curve, this is reflected in a steeper downward slope in the latter half. In summary, after FIEs enter the host country, they will simultaneously trigger labor mobility effects and technology spillover effects. These two mechanisms jointly drive the formation of the wage gap between the foreign-funded sector and the domestic sector.

According to the theoretical model derived above, in the case where the wage gap between domestic and foreign-funded sectors is driven solely by labor mobility effects, the wage gap will exhibit an inverted U-shaped dynamic evolution trend, first widening and then narrowing. In contrast, the technology spillover effect helps to narrow the wage gap between the two sectors.

Subsequently, this research will employ Vietnamese firm-level survey data and utilize the Shapley value decomposition method to quantitatively evaluate the contribution and dynamic role of FDI at different stages in the formation of wage disparities among Vietnamese enterprises.

## 4. EMPIRICAL METHODOLOGY AND DATA

### 4.1. Model Specification

To quantify the contribution of each explanatory variable to the wage disparity, this paper adopts the unbiased and symmetric decomposition framework proposed by Shorrocks (1999). This method can measure the average

marginal contribution of each factor to overall wage inequality. The basic idea of this method is to create counterfactual scenarios by either keeping or excluding each factor in turn. It then calculates how much the total wage level changes before and after a given factor is included across different combinations of variables. More specifically, the method assesses each factor's contribution by estimating its marginal impact on the income inequality index across all possible combinations of variables. This characteristic eliminates the problem of path dependence, so that the contribution distribution of covariates to inequality is unbiased and symmetrical. In this article, wage inequality is measured by the Theil index. This indicator has scale invariance, so it is suitable for decomposition analysis.

Although the theoretical framework emphasizes the dynamic adjustment process (e.g., in the early stages, the effect of labor mobility is dominant, while over time, the effect of technological spillovers gradually strengthens), the empirical strategy of this article does not structurally estimate the complete dynamic system (such as ECM/ARDL). Instead, we specify a static reduced-form panel wage equation to estimate the average partial association between theory-consistent proxies and firm-level wages, conditional on fixed effects and controls. The evolution of mechanisms over time is then captured by conducting the Shapley decomposition year by year, allowing the contribution of each factor to vary across the decade.

Based on the theoretical discussion and in order to provide inputs for the Shapley decomposition, we derive the following wage determination equation.

$$\ln W_{it} = \alpha + \beta_{1t}FT_{it} + \beta_{2t}Sca_{it} + \beta_{3t}TG_{it} + \beta_{4t}CL_{it} + \beta_{5t} \ln k\_int_{it} + \beta_{6t}DR_{it} + \varepsilon_{it} \quad (15)$$

In this model,  $W$  denotes the average annual wage of firm employees.  $FT$  is a dummy variable, where 1 indicates a foreign-invested enterprise and 0 indicates a domestic enterprise.  $Sca$  (Firm size) is measured by the natural logarithm of the annual sales, reflecting operational scale and market capacity; larger firms can easily attract or retain higher-skilled labor and often pay efficiency wages.  $TG$  (Tech gap) denotes the technology gap, which is the firm's labor productivity relative to the industry mean. This variable captures the firm's absorptive capacity and technological level, indicating a firm's access to advanced technologies and equipment and its level of technological efficiency. It becomes negative when a firm's labor productivity is below the industry benchmark in the same industry and year. In our theoretical framework, this variable proxies for the Technology Spillover ( $\sigma$ ). It captures the firm's relative efficiency position and its 'catch-up potential' to the foreign frontier within the same competitive environment. Because firms that are technologically closer to the frontier are more capable of learning from, adopting, and diffusing foreign technologies, spillovers can materialize into higher productivity and wages.  $CL$  (Capital-labor) refers to the total capital-labor ratio, reflecting whether a firm is labor-intensive or capital-intensive.  $Ink\_int$  ( $Ink\_intensity$ ) is measured as net fixed assets per worker, capturing the degree of mechanization and capital deepening in production. It represents material equipment and technical conditions possessed by each worker. In our framework, this variable is relevant to the labor-allocation channel because a higher  $Ink\_intensity$  ratio increases the marginal product of labor, thereby creating wage differentials that drive the optimal allocation of workers ( $\lambda$ ) toward more capital-intensive sectors.  $DR$  (Debt ratio) is used to measure a company's financing ability in its business activities. This indicator reflects the firm's budget constraints and financing ability, which can influence the company's wage-setting behavior independent of productivity. Additionally, to control for heterogeneity in economic development levels across different regions, the model includes regional dummy variables, using one of the regions as a benchmark for comparison. The inequality index used in this paper (Theil index) is scale-invariant, ensuring that multiplying incomes by a constant does not alter the index value. This feature ensures that the inclusion of an intercept term and time dummy variables in the model does not affect the measurement of inequality. Based on the above income determination equation, the wage decomposition model is as follows:

$$I = f(W_i) = Theil(W) \\ W_i = \exp(\alpha) \times \exp(\beta_i X_i) \times \exp(T) \times \exp(u) \quad (16)$$

Drawing on the regression results of the income decomposition model, this paper employs the Shapley value approach to decompose the inequality index for each year, quantifying the respective contributions of each explanatory factor.

#### 4.2. Data

This study uses panel data from the Vietnam Enterprise Survey covering 2005–2015. The data set covers enterprises in various regions of Vietnam, covering multiple industry categories divided according to the Vietnam Standard Industrial Classification (VSIC), focusing on manufacturing and catering services. The survey provides detailed firm-level information, including the year of registration, ownership type, industry classification, operational and financial status, employment information, and R&D investment. In terms of data processing, this research adopts the filtering method of Lu and Yu (2015) to remove invalid observations<sup>1</sup>. To account for price effects and given the focus on wage disparities, relevant variables are deflated using the Consumer Price Index (CPI), with 2005 as the base year. All financial figures are expressed in Vietnamese đồng (Million VND). Pearson correlation analysis was conducted to examine the relationships among the key variables. All coefficients are below 0.5, indicating that there is no serious multicollinearity issue. Descriptive statistics for all variables are reported in Table 1.

**Table 1.** Summary statistics of key variables.

Variables	Obs.	Mean	S.D	Min.	Median	Max.
Average wage	4396	24.100	25.210	0.138	18.000	594.000
ownership	4396	0.310	0.460	0.000	0.000	1.000
Tech gap	4396	65.000	150.000	-63.000	42.700	6,300.000
Capital labor	4396	347.000	617.000	0.260	173.000	14,745.000
Ink_intensity	4396	277.000	568.000	0.000	114.000	14,665.000
Debt ratio	4396	0.100	0.290	0.000	0.013	12.500
Firm size	4396	20.690	2.000	11.503	20.858	27.018

This study calculates the Theil index of average wages among Vietnamese enterprises, as well as the Theil index between foreign-invested and domestic firms. The Theil index of average wages across firms ranges from 0.19 to 0.27, indicating relatively significant wage inequality among enterprises in Vietnam.

Furthermore, to examine how wage disparities evolve in practice, in line with the theoretical model developed earlier, Table 2 reports the wage ratios ( $\frac{W_f}{W_d}$ ) between foreign-invested and domestic enterprises from 2005 to 2015. The table also includes the calculated threshold values of  $\lambda^*$  at which the labor mobility effect undergoes a turning point, the corresponding values of  $\lambda^{**}$ , and the labor share within the foreign-invested sector ( $\lambda$ ). As shown in Table 2, since 2011, the labor share in the foreign-invested sector has surpassed the threshold value ( $\lambda^*$ ), indicating that the wage gap between foreign and domestic sectors caused by the labor mobility effect under FDI began to decline around 2010–2011. In the early 2000s, following market liberalization, a large number of FIEs entered Vietnam. Foreign firms attracted skilled labor by offering superior wages and benefits, while domestic enterprises, particularly small and medium-sized ones, struggled with lower productivity and limited wage competitiveness. This led to an increasing wage gap between foreign and domestic enterprises. During the 2010–2011 period, as Vietnam's government labor policies and labor market mechanisms became more mature, structural changes in the labor market led to a narrowing of the wage gap between foreign and domestic enterprises, especially within the agriculture and manufacturing sectors. This implies that a turning point in wage inequality likely occurred around 2010 (Doan, Ha, Tran, & Yang, 2023). The next section conducts a quantitative decomposition to measure the extent to which FDI has played a role in narrowing the wage gap between the two sectors.

<sup>1</sup> Excluded observations include those with missing or non-positive key financial variables, as well as those that violate basic accounting principles (e.g., liquid assets exceeding total assets).

**Table 2.** Evolution of wage ratio and labor allocation dynamics (2005–2015).

Year	Wf / Wd	$\lambda$	$\lambda^*$	$\lambda^{**}$
2005	1.256	0.344	0.462	0.881
2007	1.241	0.348	0.464	0.883
2009	1.039	0.384	0.494	0.656
2011	1.186	0.479	0.472	0.888
2013	1.202	0.504	0.469	0.888
2015	1.294	0.508	0.457	0.874

**Note:** In Table 2, Wf/Wd denotes the ratio of average wages in foreign-invested enterprises to domestic enterprises.  $\lambda$  represents the actual share of labor employed in the foreign sector  $\lambda^*$  and  $\lambda^{**}$  are the theoretical critical thresholds derived in Equations 6 and 9.

## 5. EMPIRICAL RESULTS

### 5.1. Empirical Results of the Wage Determination Equation

To ensure the accuracy of variable estimation and decomposition for analyzing wage disparities, unit root tests were conducted to confirm the stationarity of the variables. Subsequently, a series of diagnostic steps were carried out to determine the appropriate model specification. The analysis first applied the LM test to detect the presence of significant individual effects. Subsequently, the Hausman test was conducted to compare the fixed effects (FE) and random effects (RE) models. The test results indicate that the mixed OLS regression model and the random effects model should be rejected. On this basis, a joint significance test of year dummy variables was conducted to examine whether time effects are significant. The results show that the year variable is overall significant. Therefore, it is necessary and reasonable to include time fixed effects in the model. Based on the comprehensive diagnostic test results, this paper ultimately employs a two-way fixed effects model that includes time effects for estimation. This method can simultaneously control for unobserved heterogeneity at both the individual and time dimensions, thereby enhancing the reliability and stability of the estimation results. To address potential heteroscedasticity and serial correlation in the model, this paper conducts the modified Wald test and the Wooldridge test, respectively. The results indicate that both issues are significantly present. To improve the robustness of the estimation results, the regression analysis uses a fixed effects model and clusters standard errors at the firm level, the model is further re-estimated using Driscoll-Kraay standard errors to correct for issues of autocorrelation, heteroscedasticity, and cross-sectional dependence within the panel. The corresponding estimation results are presented in Table 3.

**Table 3.** Estimation results of wage determination equation.

Variables	Two-way fixed effects model	DKSE
Ownership	0.1697***	0.1697**
Tech gap	0.00046***	0.00046**
Capital labor	0.000075**	0.000075
Ink_intensity	-0.000065***	-0.000065*
Debt ratio	0.0857***	0.0857***
Firm size	0.1276***	0.1276***
Area1	-0.0692***	-0.0692
Area2	-0.1621***	-0.1621**
_cons	6.4736***	6.4736***
Year	Yes	Yes
Region	Yes	Yes
N	4396	4396
R <sup>2</sup>	0.6044	0.6044
F	514.9038	167.9086

**Note:** t statistics in parentheses, \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01. The coefficients of year dummies are all significant at the 1% level after standard error correction. Due to space constraints, they are not listed in the table.

As shown in Table 3, after correcting the standard errors, key explanatory variables such as foreign ownership, technology gap, debt-to-asset ratio, firm size, and regional location still remain statistically significant. In particular, the coefficient on foreign ownership is significant at the 1% level after controlling for industry, region, firm size, and year effects, indicating that FDI has a significant impact on wage levels of Vietnamese enterprises. Table 3 shows that, after controlling for observable characteristics of the firms, FIEs pay an average wage about 17% higher than

that of domestic enterprises. This indicates that the wage premium is formed conditional on firm characteristics, rather than merely arising from unconditional differences between foreign-invested and domestic-funded enterprises.

The results are generally consistent with the empirical findings of the International Labour Organization (2019) and the GSO (2018). By incorporating stricter control variables and adopting a more refined econometric model, this paper provides a relatively stable and more conservative estimate, thus more accurately identifying the net wage effect of foreign ownership. Unlike descriptive statistics that only reflect unconditional wage differences, the 17% wage premium estimated in this paper is obtained after controlling for observable characteristics at the firm level.

Therefore, although it is relatively conservative, it is methodologically more rigorous and reliable. Consequently, this result not only aligns with observed phenomena in the real labor market but also provides a more robust and methodologically rigorous empirical assessment of the wage premium in foreign-invested enterprises in Vietnam. Beyond the main influencing factors, other variables also show strong statistical significance. Technical capability, as a core component of corporate competitiveness, has a significant impact on corporate performance and wage levels. Companies with higher technological levels typically have stronger innovation capabilities and higher productivity, thus being more capable of paying higher wages to their employees.

From an economic perspective, given that the standard deviation of the technology gap is 150 million VND (as shown in Table 1), its estimated coefficient (0.00046) implies that when a company's technology level increases by one standard deviation, the average wage implies an approximately 6.9% ( $0.00046 * 150$ ) increase in average wages. This variable remained statistically significant after taking Driscoll-Kraay standard errors (DKSE) estimation, indicating that the level of technology is also a crucial determinant of wage levels. Similarly, a higher capital-labor ratio (CL) means higher marginal productivity of labor, hereby enabling enterprises to pay higher wages. Quantitatively, an increase of one standard deviation in capital intensity will lead to an approximate 4.6% increase in wages ( $0.000075 * 617$ ).

Besides, a higher debt-to-asset ratio usually indicates that the company is in an expansion phase and is accompanied by significant capital investment. In these situations, companies tend to attract and retain highly skilled talent by increasing salary levels. Furthermore, based on economies of scale and talent attraction mechanisms, large enterprises usually have higher production efficiency and tend to pay efficiency wages, thus being more capable of offering higher compensation. Consequently, both the leverage ratio and firm size have a significant and positive impact on wage levels. Consistent with existing empirical research findings, there are also significant differences in wage levels between different regions.

Specifically, firms in Ho Chi Minh City and Hanoi (south regions as the reference group) pay significantly higher wages than other regions. The wage levels in the central region are slightly lower than those in the southern region, while the northern region, which is relatively underdeveloped in terms of the Vietnamese economy, lags significantly behind the southern region in wage levels (approximately 14.96% lower). This observed regional significance may be related to the smaller sample sizes in some areas and the fact that the majority of enterprises within the region under study are local businesses.

## 5.2. Results From the Decomposition of Wage Inequality Across Firms

Table 4, based on the regression results of the income decomposition equation, reports the Shapley value decomposition of the Gini coefficient and the Theil index for the period 2005 to 2015. Overall, the model's total explanatory power for the wage inequality index remains stable between 40% and 50%, and the decomposition results for both indices were highly consistent, indicating that the estimated results have strong stability and reliability.

Table 4. Results of the decomposition of wage differentials across firms.

	2005		2007		2009	
	Gini	Theil	Gini	Theil	Gini	Theil
Ownership2	13.01	8.35	12.19	8.92	14.02	7.42
Tech gap	1.56	0.35	0.19	0.92	0.02	0.02
Capital labor	4.40	4.27	5.14	12.60	6.80	3.35
Ink_intensity	4.47	4.52	5.19	8.71	2.54	3.73
Debt ratio	5.02	4.93	5.38	6.78	5.89	3.99
Firm size	5.30	5.20	6.03	5.27	2.90	3.99
Area1	10.32	6.69	13.81	7.00	11.31	8.57
Area2	11.67	7.55	10.26	8.92	8.67	7.66
Total variance explained	55.75	41.86	58.19	57.28	53.15	39.73
	2011		2013		2015	
	Gini	Theil	Gini	Theil	Gini	Theil
Ownership2	9.19	5.04	12.54	8.19	11.54	9.25
Tech gap	0.19	0.04	0.54	0.19	0.54	0.25
Capital labor	1.41	2.70	1.58	2.37	2.35	2.86
Ink_intensity	1.64	2.90	1.66	2.46	2.48	2.94
Debt ratio	4.20	3.23	6.82	4.54	5.98	3.23
Firm size	2.55	3.42	1.82	2.53	5.16	4.36
Area1	8.67	6.24	13.20	6.95	9.02	2.89
Area2	12.97	7.24	9.89	5.08	7.42	2.12
Total variance explained	40.82	30.81	48.05	31.31	44.49	28.90

Table 4 describes the contribution of the main variables examined in this study to the wage gap between FIEs and domestic enterprises from 2005 to 2015, as well as their dynamic trends. Over time, the explanatory power of these factors for the wage gap has shown a declining trend. This trend may be attributed to significant economic events that Vietnam experienced during the sample period, such as joining the World Trade Organization (WTO), the global financial crisis, and fluctuations in domestic inflation. On the other hand, the Vietnamese government has promoted a series of reform measures aimed at enhancing national economic efficiency. These institutional and structural adjustments may have altered the mechanisms through which relevant factors affect wage disparities, thereby weakening their explanatory power.

In terms of other control variables, regional differences are the second most important factor affecting the wage gap between foreign-funded enterprises and domestic enterprises. Although the contribution of regional factors showed a certain downward trend over time due to increased inter-regional labor mobility and government policy interventions, the gap persists, indicating that regional economic imbalance is still a structural problem in Vietnam. The southern region of Vietnam, represented by Ho Chi Minh City and Binh Duong Province, has long been the economic engine of the country, especially after joining the WTO. After 2010, the number of newly established foreign-funded projects in southern Vietnam accounted for more than 50% of the national total. In contrast, Vietnam's central region (for example, Quang Nam, Ha Tinh, Thua Thien Hue) has experienced relatively slower economic growth. Because this area was reliant on the tourism and services industries, it attracted comparatively less foreign investment and fewer enterprises. Although regional factors also play a significant role, foreign ownership remains the single largest firm-level determinant of wage disparities in most observed years (e.g., 2005, 2009, 2015). This decomposition result corroborates the regression finding of a significant wage premium associated with foreign ownership, confirming that the structural difference in ownership is the primary driver of inter-firm wage inequality in Vietnam. The sustained contribution of regional variables further indicates that labor reallocation occurs not only between different ownership types of enterprises but also along spatial lines. FDI-intensive areas attract cross-regional labor inflows by providing higher wages, making regional factors the second most important structural determinant after ownership.

The capital-labor ratio and firm size have a moderate explanatory power for the wage gap. Larger-scale enterprises and enterprises with higher capital-labor ratios usually have stronger profitability and operational efficiency, and require higher standards for employee performance, so they are more willing to provide better compensation to attract talent. The contribution of the two control variables, technology gap and capital intensity, has remained stable but relatively low for a long time, usually accounting for only 1% to 4%. This suggests that although these production characteristic variables are statistically significant in the wage-determining equation, they are not the main drivers of the wage gap between foreign-funded and domestic-funded enterprises compared to the dominant role played by ownership factors. The contribution of technological disparities to wage inequality has remained at a relatively low level for a long time, indicating that technological factors more often function as a balancing force of "catch-up and diffusion," rather than being the main structural source of wage differentiation among enterprises. This finding is consistent with the spillover hypothesis in the theoretical framework: technological spillovers are more likely to exert a convergent effect by enhancing the absorptive capacity and production efficiency of domestic enterprises, rather than widening wage gaps. Therefore, although technical variables are statistically significant in the wage-determining equation, their explanatory power for the unequal structure between domestic and foreign-funded enterprises is relatively limited. At the same time, the contribution of the  $\ln k\_intensity$  and  $capital\_labor$  variables has shown a decline trend year by year, indicating that the wage gap is increasingly less driven by differences in capital structure. This is consistent with the trend that the production structures of domestic and foreign-funded enterprises have gradually become similar. Such structural convergence can be regarded as an indirect result of technological spillover. For instance, domestic enterprises achieved equipment upgrading and capital deepening through imitation and learning. However, this phenomenon may also be influenced by factors such as the macro-financial environment and adjustments in industrial policies, so the causal relationship between it and technological spillover still needs to be cautiously defined.

## 6. CONCLUSION

### 6.1. Concluding Remarks

This study integrates a theoretical framework that simultaneously encompasses labor mobility and technology spillover effects, and conducts empirical analysis based on firm-level data from a survey of Vietnamese enterprises. By employing the Shapley value decomposition method, this paper quantifies the impact of FDI on the wage gap between foreign and domestic enterprises in Vietnam. Unlike existing research that mainly focuses on the positive macro-level effects of FDI on economic growth, employment, productivity enhancement, and job creation (Görg & Strobl, 2005; Javorcik, 2004). This paper, however, focuses on the micro-level of Vietnamese small and medium-sized enterprises, offering deeper theoretical insight into the mechanistic. Furthermore, by quantifying the marginal contributions of different factors, this paper provides targeted policy insights and theoretical support for Vietnam and other developing countries committed to achieving inclusive and sustainable development.

This research reveals three critical findings on the impact of FDI on wage disparities in developing countries. First, the theoretical framework demonstrates that the interaction of the two effects (labor mobility and technological spillovers) leads to an overall inverted U-shaped pattern in wage disparities, characterized by an initial widening followed by a gradual narrowing. From a theoretical perspective, in the initial stages of entry, FIEs adopted a high-salary strategy and offered superior career development prospects to attract skilled labor from domestic firms, creating a "talent siphoning" phenomenon and exacerbating wage disparities in the short term. Subsequently, technological spillovers began to take effect. As foreign-funded enterprises promoted technology diffusion and deepened industrial links (such as technical cooperation between upstream and downstream enterprises), the labor productivity of domestic enterprises gradually increased. This process ultimately weakened the wage premium effect, thus reducing overall wage inequality. Second, during the study period, the sample data showed that the average salary of employees of foreign-funded enterprises is about 17% higher than that of employees of domestic-funded

enterprises. More importantly, the empirical analysis identified a turning point in the wage gap between 2010 and 2011. This finding indicates that the technological spillover effects caused by FDI began to emerge around 2010 and, to some extent, offset the trend of the widening wage gap. The identification of this turning point provides strong empirical support for the discussion of the dynamic evolution path of the wage gap in the theoretical framework. Moreover, throughout the observation period, the study found significant structural imbalances in the drivers of wage inequality. FDI was consistently the primary contributor to the wage gap over the decade, accounting for approximately 25% to 30% of the explained variance. In comparison, the contribution of the technology gap to wage inequality was only 1%-4%, while the explanatory proportion of regional differences was significantly higher, consistently maintained between 8%-13% over the long term. However, the regression results demonstrate that technological advancement could lead to approximately a 6.9% increase in wages, suggesting that technology spillovers theoretically have the potential to narrow the wage gap. The difference between the two indicates that the spillover mechanism faced a "bottleneck" in reality: the theoretical effectiveness of technology in reducing inequality is currently constrained by persistent regional barriers and labor market segmentation. For example, barriers to cross-regional labor mobility, local protectionist policies, and differences in infrastructure further reinforce the regional heterogeneity of the impact of FDI. Overall, the findings of this study indicate that the wage disparity between foreign and domestic sectors associated with FDI has entered the declining phase of an inverted U-shaped curve, providing an important opportunity for Vietnam to achieve a balance between utilizing foreign investment and optimizing income distribution.

### *6.2. Policy Recommendations*

Since regional variables explain a substantial portion of inequality, the government should prioritize eliminating barriers to labor mobility among the north, central, and south. The persistent wage gap in the Southern Economic Zones indicates that labor has not yet achieved full mobility, making it difficult to achieve wage equilibrium through market mechanisms. To address this, Vietnam should prioritize the integration and unification of social security systems across provinces and increase investment in inter-regional transportation and infrastructure connectivity. Government policies should incentivize FDI inflows and quality job creation in the central and northern regions and guide foreign investment toward less developed areas. By improving connectivity and the local business environment, Vietnam can reduce spatial concentration and narrow regionally wage disparities without compromising the country's overall FDI attractiveness. Additionally, our regression results indicate that technology is a powerful driver of higher income (yielding a 6.9% wage increase). Based on the current situation in Vietnam, the spillover mechanism is currently inefficient or limited due to the weak absorptive capacity of domestic enterprises. Therefore, policy should shift from offering tax incentives for mere FDI entry to funding supplier development programs. The government should introduce policy initiatives to attract FIEs with advanced technological content (like the digital economy and high-end manufacturing) and incentivize FIEs to source locally and provide technical training to domestic suppliers. Vietnam can gradually narrow the wage gap between FIEs and domestic enterprises by continuously strengthening the technology spillover effect to enhance the productivity of local enterprises. Third, and also the most fundamental yet challenging task, is to enhance the competitiveness of Vietnamese domestic enterprises. Since ownership is still the main driving force of inequality, the key to narrowing the gap is to improve the overall competitiveness of local enterprises in terms of management efficiency, resource allocation efficiency, and profitability, not just to improve their level of technology. Therefore, at the policy level, efforts should be made to improve the access to finance for local enterprises and strengthen the mechanisms for cultivating and attracting local talent (Nguyen, 2023). These measures will help to comprehensively improve the productivity of Vietnamese domestic enterprises, thus promoting fairer and more sustainable wage growth and economic development.

### 6.3. Limitations and Future Research

While this paper has made some progress in research, there are still several limitations. First, the data used only cover up to 2015 and do not capture the new phase after the implementation of the Trans-Pacific Partnership (TPP) and the free trade agreements (such as CPTPP and EVFTA). Future research could incorporate longer time-series data to conduct more comprehensive analyses. Second, existing models have not yet included some key micro-level variables of enterprises, such as the level of management practices, the skill structure of employees, and specific industry characteristics. Future studies could consider including these factors to enhance the explanatory power and its practical significance for policy-making. Third, the subject of this study is limited to Vietnam. Future research could expand the scope of analysis to other emerging economies in Southeast Asia, comparing wage gaps across countries with varying degrees of foreign investment dependence and across different industrial sectors. At the same time, longitudinal data after 2015 could be used to include more enterprise-level variables, such as the level of management practices and the skill structure of the workforce, and further explore the issue of wage inequality across different industries. With these improvements, future research could shed further light on the complex interaction between FDI and wage inequality in emerging economies.

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