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How does FDI affect domestic firms' wages? Theory and evidence from Vietnam

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ABSTRACT

This paper explores the role of inward foreign direct investment (FDI) as a determinant of domestic firms' wages, namely wage spillovers. We first construct a theoretical model to demonstrate that the presence of FDI firms affects domestic firms' expected average wages via productivity spillovers and a cut-off capability. We then estimate FDI-induced wage spillovers by employing IV-GMM estimator with a five-year panel dataset of a growing service industry in Vietnam. Despite FDI firms on average pay 2.25 times that of domestic firms, they put a downward pressure on domestic firms' wages. A one percent increase in FDI presence causes domestic firms to cut average wages by 2.03 percent. The estimations also find that firm-specific features are attributable to significant differences in their wages as well as FDI-linked wage spillovers.

KEYWORDS: FDI, Wage spillovers, IV-GMM, Service industry, Vietnam

JEL CLASSIFICATION: D22, D62, F23, J20, J30

I. Introduction

The inflow of foreign direct investment (FDI) can exert considerable influence on various aspects of host economies, for example the labour market. The literature on the labour-market impact of FDI can be categorized into three main strands. The first strand focuses on the employment effect, namely foreign firms can create new jobs, directly and indirectly, for local workers (Axarloglou and Pournarakis 2007, Coniglio, Prota, and Seric 2015, Harding and Javorcik 2011). The second strand emphasizes the role of FDI in enhancing human capital accumulation and labour productivity of the host workforce (Newman et al. 2015, Javorcik 2004, Aitken, Harrison, and Lipsey 1996, Kathuria 2001). The third strand examines the impact of FDI firms on local wages, to which our study relates.

A substantial body of the FDI-wage literature investigates the wage gaps between foreign and domestic firms. Empirical evidence suggests that foreign firms tend to pay higher wages than domestic counterparts (Conyon et al. 2002, Görg, Strobl, and Walsh 2007, Huang and Zhang 2017). Foreign wage premium unambiguously benefits workers in FDI firms, particularly high-skilled labour (Chaudhuri and Banerjee 2010, Taylor and Driffield 2005, Anwar and Sun 2012). Nevertheless, whether workers in domestic firms (accounting for an overwhelming share of the local workforce) are better-off from the presence of FDI firms remains a significant knowledge gap in the FDI-wage literature.

This paper contributes to filling the gap by providing both theoretical and empirical evidence on the FDI impact on wages of workers in domestic firms, namely wage spillovers. The literature on FDI-induced wage spillovers shows scant and mixed evidence for both developed and developing host economies. In this study, we construct a theoretical model to illustrate channels that FDI-linked wage spillovers take place in the local labour market. The model shows that the presence of FDI firms affects domestic firms' expected wage rate, conditional on they enter the market, directly via productivity spillovers and indirectly via a

cut-off capability. The theoretical model provides a guidance for the subsequent empirical estimation and interpretation of the findings.

Furthermore, this study focuses on a service industry, which differs from the existing FDI literature that is largely devoted to manufacturing industries. According to UNCTAD (2017), global inward FDI in services surged fourfold from US\$4 trillion (in 2001) to US\$16 trillion (in 2015), accounting for about two-thirds of global FDI stock while primary and manufacturing sectors contributed 6 percent and 26 percent, respectively. Given the growing importance of the services sector and the increasingly dominant FDI inflows to services, it is of policy and analytical interest to investigate the impact of services FDI on the recipient economies in depth.

Our empirical analysis employs a firm-level panel dataset of Vietnam's tourism industry during 2009–2013. Owing to its rich natural, cultural, and human resources, Vietnam has become an increasingly attractive destination for both foreign investors and visitors. Notably, the country has been ranked the 12th in the world's top prospective host economies for 2017–2019 (UNCTAD, 2017) and the 10th in the top fastest growing destinations for leisure travel spending for 2016–2026 (WEF, 2017). Furthermore, this industry represents the second largest employer within the services sector of the country, following wholesale and retails (GSO, 2017). Therefore, Vietnam, particularly its tourism industry, offers an interesting case study and the empirical findings from this paper are expected to shed light on the wider impact of services FDI in host developing labour markets.

The remaining paper is organized as follows. Section II reviews the literature. Section III constructs a theoretical model to examine the impact of FDI on domestic firms' wages. Section IV presents the econometric specification and estimation strategy. Section V describes the data. Section VI provides empirical results and discussions. Section VII concludes the paper and discusses policy implications.

II. Related literature

The pioneering work on FDI-linked wage spillovers was conducted by Aitken, Harrison, and Lipsey (1996) for manufacturing sector in Mexico, Venezuela and the US. Although FDI firms pay higher wages in all three countries, wage spillovers only exist in the US. Two other related studies, namely Feliciano and Lipsey (2006) and Axarloglou and Pournarakis (2007), extend the analysis for the US, using different datasets. While the former suggests mixed findings during 1974-1994 (i.e., positive spillovers in the non-manufacturing and insignificant spillovers in manufacturing), the latter reveals weak effects of FDI on local wages in most states in the years 1987 and 1992. For the case of Mexico, Villarreal and Sakamoto (2011) provide more recent evidence that the increased presence of foreign firms leads to higher wages paid by domestic counterparts in the same regional labour markets.

With a similar attempt and approach, Girma, Greenaway, and Wakelin (1999) examine wage and productivity spillovers from FDI to UK manufacturing firms. Using firm-level data (1991-1996), the study finds five and 10 percent higher wages and labour productivity of FDI firms, respectively. Meanwhile, no wage and productivity spillovers are found. On the contrary, Driffield and Girma (2003) suggest evidence of positive wage spillovers from FDI to UK electronics firms during 1980-1992. Spillovers are uniformly distributed across regions for skilled workers and are more pronounced for unskilled workers in areas with high unemployment levels.

Barry, Gorg, and Strobl (2005) estimate the impact of FDI on wages of domestic exporters and non-exporters in Ireland's manufacturing industries, using firm-level data (1990-1998). The findings suggest negative spillovers to domestic exporting firms. The result is attributable to the crowding-out effect of FDI through the labour market, where FDI firms poach the best workers away from local counterparts using higher wages. Meanwhile, domestic non-exporting firms appear to neither benefit nor suffer from foreign presence.

Muñoz-Bullón and Sánchez-Bueno (2013) analyze the intra-industry wage spillovers in Spanish manufacturing industries, employing firm level panel data (1992-2008). The estimations reveal no significant evidence of wage spillovers from FDI at an aggregate level after controlling for firm specific characteristics. Further examination of labour skills of domestic firms shows that only workers in domestic firms that employs a highly skilled workforce will benefit from wage spillovers.

Pittiglio, Reganati, and Sica (2015) test for wage spillovers from FDI to Italian firms via horizontal and vertical channels. Using a firm-level dataset (2002-2007), the research fails to identify any spillovers from FDI by both channels. Nevertheless, significant vertical wage spillovers are found when technology gap (between domestic and foreign firms) is included. Accordingly, domestic firms with small or medium gaps benefit from wage spillovers while domestic firms with large gaps suffer.

The FDI-linked wage spillover effect is also mixed for host developing countries. Lipsey and Sjöholm (2004) test for wage spillovers from FDI to Indonesian manufacturing firms in 1996. The study takes into account the impact of workers' education levels. Significant positive wage spillovers are found for both white-collar and blue-collar workers. Tomohara and Takii (2011) also find the positive wage spillovers to Indonesian manufacturing firms, using a panel dataset from 1989 to 1996.

Hale and Long (2011) examine wage spillovers from FDI to Chinese firms in manufacturing and service industries, using a dataset of 1,500 firms in 2001. The estimation results show that foreign presence positively affects domestic private firms' wages while exerts no impact on state-owned firms' wages. Elliott and Zhou (2015) also investigate the case of China but focus on manufacturing firms only. Using cross-sectional data in 2004, the paper supports the results by Hale and Long (2011).

Chidambaran Iyer (2012) contributes to the FDI-linked wage spillover literature by analysing the case of Indian manufacturing firms from 1989 to 2004. While foreign presence measured at the three-digit level shows negative wage spillovers, measurement at the four-digit level indicates a positive effect on domestic firms' average wages. Also enriching the literature on this strand, Srithanpong (2014) explores the role of inward FDI as a determinant of pay levels by manufacturing firms in Thailand. The estimations based on the sectoral data in 2007 support positive wage spillovers from foreign firms at both regional and industry levels.

To the best of our knowledge, Hoi and Pomfret (2010) is the only study examining FDI-linked wage spillovers for the case of Vietnam. The paper focuses on private firms in the manufacturing industries, using data from 2000 to 2010. The findings indicate significant positive wage spillovers from FDI to domestic counterparts. While horizontal spillovers occur regardless of labour market conditions and firms' characteristics, vertical spillovers depend on firms and industries' characteristics. Only domestic firms in the low technology industries, of small and medium size, and with training can benefit from vertical spillovers.

[Insert Table 1 here]

As summarized in Table 1, existing studies find rather mixed evidence on FDI-induced wage spillovers in both developed and developing economies. The inconclusive results might be due to that most studies are country-specific and employ different subsets of data over different periods. While a metadata analysis can provide deeper insights into the role of development status, the reviewed papers seem to suggest that FDI firms tend to generate more significant wage spillovers in host developing countries than in developed ones. Notably, empirical studies predominantly focus on manufacturing industries whereas none of them is dedicated to a service industry. This paper extends the literature by constructing a theoretical model to illustrate channels of wage spillovers from FDI and then applying to a rich panel dataset of firms in the rising tourism service industry in Vietnam over the period 2009-2013.

III. Theoretical model

Labour demand

In a monopolistically competitive product market, firms employ workers from the local labour market to produce outputs. On the demand side of the product market, a representative consumer has the following constant elasticity of substitution (CES) utility function:

$$U = \left[\int_{\omega \in \Omega} q(\omega)^\rho d\omega \right]^{\frac{1}{\rho}} \quad (1)$$

where ω indexes the products; Ω refers to the set of all available products; q is the quantity of consumption. All products are substitutes for each other ($0 < \rho < 1$) and have a constant elasticity of substitution of $\frac{1}{1-\rho}$. Maximization of utility function, subject to a budget constraint, yields the following demand function:

$$q = \Phi p^{\frac{1}{\rho-1}} \quad (2)$$

where p is the price; $\Phi \equiv \frac{Y}{\int_{\omega \in \Omega} p(\omega)^{\frac{\rho}{\rho-1}} d\omega}$ measures the level of aggregate demand; and Y is the consumer's income. Each firm takes Φ as given because they are small in sizes relative to the industry. Therefore, the impact of a change in each firm's output on the industry's aggregate demand (Φ) is negligible.

On the production side, the industry consists of both domestic and FDI firms located in different regions of the country, where γ measures the level of foreign presence in the industry-region ($0 \leq \gamma \leq 1$). Upon entry into the industry, each firm pays a fixed entry cost, including costs of business registration and market research. After entering the industry and paying the fixed cost of production (f) (e.g., setting up plant and purchasing machine), firms employ one unit of labour to produce s units of output.

The production process can be described by the production function $F(l) = sl$, where l is labour used and s is labour productivity. Labour productivity (s) depends on firm-specific

observed characteristics (η) (for example, size, ownership, age and capital intensity)¹ and unobserved capability endowment (θ). The capability endowment is randomly drawn from a Pareto distribution upon entry, with the probability density function given by:

$$g(\theta) = \begin{cases} \frac{\mu \theta^\mu}{\theta^{\mu+1}}, & \theta \geq \underline{\theta} \\ 0, & \theta < \underline{\theta} \end{cases} \quad (3)$$

where μ is a shape parameter and $\underline{\theta}$ is the minimum value of θ .

Moreover, the FDI literature suggests that the presence of FDI firms with advantageous assets (such as technological know-how, managerial and marketing skills, export experience and reputation) can affect labour productivity of domestic firms, causing productivity spillovers (Newman et al. 2015, Javorcik 2004, Kathuria 2001). Thus, labour productivity of domestic firm i depends on the firm characteristics (η), capability endowment (θ), and foreign presence (γ) as follows:

$$s = \eta \theta e^{\alpha \gamma}$$

where parameter α captures the sign and the magnitude of the FDI-induced productivity spillover effect. A positive value of this parameter implies that FDI firms enhance the productivity of domestic firms. On the contrary, the negative value of this parameter suggests that FDI firms adversely affect productivity of domestic counterparts.

Given that $\frac{1}{s}$ units of labour are employed to produce one unit of output, the marginal cost of production for domestic firm i can be written as:

$$MC = \frac{w}{s} = \frac{w}{\eta \theta e^{\alpha \gamma}}$$

where MC represents marginal cost of production and w denotes the firm's wage offer. If the productivity spillover is positive, an increase in foreign presence reduces domestic firms' marginal cost of production, everything else being equal.

¹ For simplicity, a vector of firm-specific characteristics can be expressed as: $\eta = x_1^{\lambda_1} x_2^{\lambda_2} x_3^{\lambda_3} x_4^{\lambda_4}$

Given the MC, the profit of domestic firm i can be written as follows:

$$\pi = \left(p - \frac{w}{\eta\theta e^{\alpha\gamma}} \right) q - f \quad (4)$$

The first-order condition of the profit maximization problem is as below:

$$p^* = \frac{w}{\rho\eta\theta e^{\alpha\gamma}}$$

Substituting this condition into the profit function, the optimal profit for firm i can be obtained as follows:

$$\pi^* = \frac{1-\rho}{\frac{\rho}{\rho^{\rho-1}}} \Phi \left(\frac{w}{\eta\theta e^{\alpha\gamma}} \right)^{\frac{\rho}{\rho-1}} - f \quad (5)$$

The firm will enter the industry if it makes non-negative profit ($\pi^* \geq 0$). The condition $\pi^* = 0$ defines a cut-off capability (θ^*), which can be written as below:

$$\theta^* = \frac{1}{\rho(1-\rho)^{\frac{1-\rho}{\rho}}} \Phi^{\frac{\rho-1}{\rho}} w \eta^{-1} e^{-\alpha\gamma} f^{\frac{1-\rho}{\rho}} \quad (6)$$

Equation (6) implies that if FDI-induced productivity spillover effect is positive ($\alpha > 0$), an increase in foreign presence leads to a decrease in the cut-off capability of domestic firms. Subsequently, the lower cut-off capability allows more firms to enter and survive in the industry. Given the demand function and optimal pricing, the optimal quantity produced by firm i is derived as below:

$$q^* = \Phi \left(\frac{w}{\rho\eta\theta e^{\alpha\gamma}} \right)^{\frac{1}{\rho-1}}$$

Using the production function ($F(l) = sl$), we can obtain the labour demand (l^d) of domestic firm i as follows:

$$l^d = \Phi \rho^{\frac{1}{1-\rho}} w^{\frac{1}{\rho-1}} \eta^{\frac{\rho}{1-\rho}} \theta^{\frac{\rho}{1-\rho}} e^{\left(\frac{\rho}{1-\rho}\right)\alpha\gamma}$$

Therefore, the aggregate demand can be written as:

$$L^d(w) = \frac{\mu\theta^\mu}{\mu - \frac{\rho}{1-\rho}} \rho^\mu (1-\rho)^{\frac{1-\rho}{\rho}\mu-1} \Phi^{\frac{1-\rho}{\rho}\mu} w^{-1-\mu} e^{\alpha\mu\gamma} f^{1-\frac{1-\rho}{\rho}\mu} \int \eta^\mu \tilde{g}(\eta) d\eta \quad (7)$$

where $\tilde{g}(\eta)$ is the probability density function of η ; and $\mu > \frac{\rho}{1-\rho}$.

Labour supply

In each region, workers are faced with job offers from firms in the region. If a worker rejects job offers, s/he will enjoy leisure. The value of such leisure is the worker's reservation wage (w^r), and a job offer will only be accepted if it is higher than the worker's reservation wage. The reservation wage depends on various factors. For example, individuals with high qualifications or having children might have higher reservation wages. In addition, job seekers in a region with high unemployment rate might have lower reservation wages because of the unfavourable job market. We assume the reservation wage is exogenously distributed, with a distribution function being $g(w^r)$.

Each region has a labour endowment, namely \bar{L} . For simplicity, we assume that workers make decision on whether to accept a job offer in a first-come-first-accept manner, namely they will accept a job offer as long as its wage rate is higher than their reservation wage, and will not hold an acceptable job offer to wait for better offers. This non-strategic behaviour facilitates the formulation of labour supply function, and it is the case when firms' job offers require workers to make decisions in a very short time frame.

Subsequently the aggregate labour supply with which firms are faced is the labour endowment in the region, times the probability that the firm's job offer is accepted, as follows:

$$L^s(w) = \bar{L} \text{Prob}(w \geq w^r) = \bar{L} \int_0^w g(w^r) d w^r \quad (8)$$

Assume that w^r is uniformly distributed over the interval $[0, \bar{w}^r]$ with \bar{w}^r is the upper bound of the reservation wage in region j , the labour supply facing domestic firm i can be expressed as below:

$$L^s(w) = \bar{L} \frac{w}{\bar{w}^r} \quad (9)$$

Note that the term $\frac{\bar{L}}{\bar{w}^r}$ is region specific and does not vary across firms.

The equilibrium

Equating the aggregate demand of labour (L^d) with the aggregate supply of labour (L^s), we can derive the equilibrium wage rate (w^*) as follows:

$$w^* = \left[\frac{\mu \theta^\mu}{\mu - \frac{\rho}{1-\rho}} \rho^\mu (1-\rho)^{\frac{1-\rho}{\rho} \mu - 1} f^{1 - \frac{1-\rho}{\rho} \mu} \frac{\bar{w}^r}{L} \int \eta^\mu \tilde{g}(\eta) d\eta \right]^{\frac{1}{2+\mu}} \Phi^{\frac{1-\rho}{\rho} \frac{\mu}{2+\mu}} e^{\frac{\mu}{2+\mu} \alpha \gamma} \quad (10)$$

Later in our empirical estimation, the equilibrium wage rate is unobserved. Instead, we have data of firm average wage. Motivated by the equilibrium wage rate in equation (10), we specify the average wage function as below:

$$\ln \bar{w} = \tilde{\beta}_0 + \tilde{\beta}_1 \ln \Phi + \tilde{\beta}_2 \ln \frac{\bar{w}^r}{L} + \tilde{\beta}_3 \ln \eta + \tilde{\beta}_4 \gamma + \tilde{\beta}_5 \ln \theta \quad (11)$$

where \bar{w} represents average wage and $\tilde{\beta}$ s are coefficients. Note that the equilibrium wage in equation (10) has industry-region-time variations while the firm average wage has firm-industry-region-time variations. Accordingly, we add firm characteristics and capability endowment to capture the firm-level variations in the data.

The firm will only survive in the industry and pay wages to employees, if it makes profit. That is, firms are observed in the sample only if its capability endowment is higher than the cut-off level ($\theta \geq \theta^*$). Therefore, the conditional expectation of the firm's average wage can be derived as follows:

$$E[\ln \bar{w} | \theta \geq \theta^*] = \tilde{\beta}_0 + \tilde{\beta}_1 \ln \Phi + \tilde{\beta}_2 \ln \frac{\bar{w}^r}{L} + \tilde{\beta}_3 \ln \eta + \underbrace{\tilde{\beta}_4 \gamma}_{\text{Direct}} + \underbrace{\tilde{\beta}_5 E[\ln \theta | \theta \geq \theta^*]}_{\text{Indirect}} \quad (12)$$

Equation (12) indicates that the expected average wage by domestic firm i depends on aggregate demand level (Φ), regional fixed effect ($\frac{\bar{w}^r}{L}$), firm's characteristics (η), capability endowment and foreign presence (γ). Note that FDI presence affects the firm's average wage through two channels: (i) direct impact via productivity spillovers ($\tilde{\beta}_4$ which is a monotone increasing function of α) and (ii) indirect impact via the cut-off capability (θ^*).

Using the Pareto distribution given in equation (3), we can derive the conditional probability density function of the firm capability endowment as follows:

$$g(\theta|\theta \geq \theta^*) = \begin{cases} \frac{\mu(\theta^*)^\mu}{\theta^{\mu+1}}, & \theta \geq \theta^* \\ 0, & \theta < \theta^* \end{cases}$$

Therefore, the conditional expectation of the firm capability endowment can be written as:

$$E[\ln\theta|\theta \geq \theta^*] = \mu(\theta^*)^\mu \int_{\theta^*}^{\infty} \theta^{-(\mu+1)} \ln\theta d\theta = \mu^2 \ln \frac{1}{\rho(1-\rho)^{\frac{1-\rho}{\rho}}} + \mu^2 \left(\frac{\rho-1}{\rho}\right) \ln\Phi + \mu^2 \ln w - \mu^2 \ln \eta - \mu^2 \alpha \gamma + \mu^2 \left(\frac{1-\rho}{\rho}\right) \ln f + \mu \quad (13)$$

By differentiating equation (12) with respect to γ given the information in equation (13), we can derive the marginal impact of foreign presence on the expected equilibrium wage rate of domestic firm i as follows:

$$\frac{\partial E[\ln\bar{w}|\theta \geq \theta^*]}{\partial \gamma} = \underbrace{\tilde{\beta}_4}_{Direct} + \underbrace{\tilde{\beta}_5 \frac{\partial E[\ln\theta|\theta \geq \theta^*]}{\partial \gamma}}_{Indirect} = \underbrace{\tilde{\beta}_4}_{Direct} - \underbrace{\tilde{\beta}_5 \frac{2\mu^2}{2+\mu} \alpha}_{Indirect} \quad (14)$$

Equation (14) illustrates that foreign presence impacts the expected average wage via two contrasting channels. For instance, if positive productivity spillovers exist (i.e., $\alpha > 0$ or $\tilde{\beta}_4 > 0$), the direct effect of an increase in FDI presence on the domestic firm's wage is positive. Meanwhile, the indirect effect is negative as it decreases the cut-off capability, putting a downward pressure on the expected average wage (i.e., $-\tilde{\beta}_5 \frac{2\mu^2}{2+\mu} \alpha < 0$). The ultimate impact of FDI presence on the firm wage depends on the relative strength of these two channels².

IV. Econometric specification and estimation strategy

Econometric specification

The theoretical model in Section II indicates that domestic firms' average wage depends on the presence of FDI firms (i.e., wage spillovers) and a set of other factors, including firm-

² Given the Pareto distribution, the impact of FDI presence on domestic firms' equilibrium wage depends on the shape parameter μ .

specific characteristics. In order to estimate wage spillovers, we further expand equation (12) as follows:

$$\begin{aligned}
\ln \bar{w}_{ikjt} = & \beta_0 + \beta_1 \ln \text{Size}_{ikjt} + \beta_2 \text{Ownership}_{ikjt} + \beta_3 \ln \text{Age}_{ikjt} \\
& + \beta_4 \ln K_intensity_{ikjt} + \beta_5 \text{TechGap}_{ikjt} + \beta_6 \text{Herfindahl}_{kjt} \\
& + \beta_7 \text{FDI}_{kjt} + \beta_8 d\text{Industry}_k + \beta_9 d\text{Region}_j + \beta_{10} d\text{Time}_t + \varepsilon_{ikjt}
\end{aligned} \tag{15}$$

In equation (15), the average wage (\bar{w}_{ikjt}) of domestic firm i in three-digit industry k in region j at time t is calculated as total wages (TW) divided by total employment (L), then transformed to logarithmic form ($\ln \bar{w}_{ikjt}$). Moreover, the dependent variable is restricted to domestic firms to capture FDI impact on domestic firms' wages and eliminate possible bias due to foreign wage premium (Aitken, Harrison, and Lipsey 1996, Barry, Gorg, and Strobl 2005, Pittiglio, Reganati, and Sica 2015).

The theoretical model shows that the expected average wage of a domestic firm is a function of FDI presence (γ), firm-specific characteristics (η), aggregate demand level (Φ), regional fixed effect ($\frac{\bar{w}^r}{L}$), and the cut-off capability (θ^*)³. Of these, foreign presence (FDI) is the variable of interest and is measured by the employment share of FDI firms as follows:

$$\text{FDI}_{kjt} = \frac{\sum_{i \in F_{kjt}} y_{ikjt}}{\sum_{i \in F_{kjt} \cup D_{kjt}} y_{ikjt}}$$

where y is the total employment of firm i in three-digit tourism industry k in region j at time t , F is the set of foreign firms and D is the set of domestic firms.

³ The impact of aggregate demand (Φ) is captured by time dummies and regional fixed effect ($\frac{\bar{w}^r}{L}$) is controlled by the fixed effects in the regression. Equation (6) suggests that the cut-off capability is a function of a set of explanatory variables, including firm characteristics, which is absorbed into the explanatory variables in equation (14). Elasticity of substitution (ρ) is an underlying structural parameter embedded in the reduced-form parameters (β_i) in the empirical model. Estimating unobserved structural parameters is not the objective of this paper.

Empirical evidence suggests considerable influence of firm characteristics on wage differences among domestic firms as well as between domestic and foreign firms (Aitken, Harrison, and Lipsey 1996, Hoi and Pomfret 2010, Feliciano and Lipsey 2006, Driffield and Girma 2003, Elliott and Zhou 2015, Brown and Medoff 2003). Thus, a vector of firm-level variables is included to control for the impact of firm heterogeneity.

Firm size (*lnSize*) is measured by a domestic firm's total sales in natural logarithm form. Empirical evidence generally finds a positive impact of firm size on wages (Hoi and Pomfret 2010, Girma, Greenaway, and Wakelin 1999, Sjöholm and Lipsey 2006, Villarreal and Sakamoto 2011, Pittiglio, Reganati, and Sica 2015). Compared to small firms, larger firms are more financially capable and have well-established compensation policies, allowing them to offer better wages.

The impact of *Ownership* on wages is controlled by including a dummy variable with the value of 1 for privately-owned and 0 for state-owned. State-owned firms generally have strong finances for funding wage systems, but are faced with constraints in wage settings. Meanwhile, privately-owned firms have considerable flexibility in determining wage structures and incentive policies, which may also be subject to unexpected changes due to poor financial conditions. Empirical findings show that state-owned firms tend to pay higher than non-state counterparts (Hale and Long 2011, De Fraja 1993).

Firm age (*lnAge*), measured by years of operation in natural logarithm, can exert a contrasting impact on wage determination. On the one hand, newer firms are more likely to have higher labour productivity, which may enable them to pay higher wages (Aitken, Harrison, and Lipsey 1996). On the other hand, older firms tend to establish a solid foothold in the market and are usually larger, which may signal capability to offer higher wages (Villarreal and Sakamoto 2011, Hoi and Pomfret 2010, Brown and Medoff 2003).

Capital intensity ($\ln K_intensity$) is the ratio of fixed assets to total employment. Higher capital intensity implies a lower labour cost share in the total cost structure, which may induce firms to meet high wage demands and employ competent high-paid workers. Empirical findings support a positive correlation between capital intensity and average wages (Hoi and Pomfret 2010, Sjöholm and Lipsey 2006, Villarreal and Sakamoto 2011, Muñoz-Bullón and Sánchez-Bueno 2013).

Technology gap ($TechGap$) can capture the impact of technological differences on wages. We define technology gap as the difference in labour productivity levels between each domestic firm and that of average FDI firms in the three-digit industry⁴. Domestic firms may hardly compete and benefit from FDI presence given a large technology gap, which may then lower their wages (Hoi and Pomfret 2010). Meanwhile, domestic firms are less likely to gain positive spillovers from FDI given a small technological gap due to minimal learning potential. Therefore, technology gap is expected to influence wages but the impact direction is mixed (Pittiglio, Reganati, and Sica 2015, Conyon et al. 2002).

The level of product market competition in each industry can contribute to wage differences among firms, which is captured by the *Herfindahl* index (Hoi and Pomfret 2010). In equation (15), regional dummies ($dRegion$), industry dummies ($dIndustry$) and year dummies ($dTime$) are included to allow average wages to vary across regions, industries and years⁵, and ε_{ikjt} is an error term.

Estimation strategy

⁴ Following the literature, technology gap is proxied by labour productivity gap as an FDI firm's higher labour productivity level is arguably associated with technological differences between foreign and domestic firms.

⁵ Note that all domestic firms are subject to the same macroeconomic environment in the host economy, hence the effects of macroeconomic factors are captured by the time dummies in the econometric model.

The FDI variable is likely to be endogenous due to possible bi-directional causality. To address this potential problem, our research employs the feasible two-step generalized method of moment estimator with instrumental variable (IV-GMM). It is critical to find appropriate instruments that are correlated with the endogenous variable and uncorrelated with the error term. We thus construct two instruments. The first instrument, IV1, is the employment share of FDI firms in the leather and related products manufacturing industry in region j (a region different from where the firm is located) at time t , and the second, IV2, is the employment share of FDI firms in the computer, electronic and optical products manufacturing industry in region j at time t . These two instruments of FDI shares in these distinctive manufacturing industries are matched with tourism FDI presence across the same year t and different regions (namely the FDI presence of tourism industry in region j is instrumented by the FDI presence of the two manufacturing industries in a region that does not neighbour j). For example, tourism FDI in region 1 (i.e., Red River Delta) is instrumented by leather FDI (IV1) and electronics FDI (IV2) in region 4 (i.e., Central Highlands). The remaining matched regions include: 2-5; 3-6; 4-1; 5-2; and 6-3 (see Appendix for the regional map).

The two IVs are expected to be closely correlated with the potentially endogenous variable (i.e., FDI presence in tourism). Inward FDI in manufacturing and services sectors largely share common macro-level determinants at the host economy of Vietnam, including a growing domestic market, preferential tax rates, political and macroeconomic stability, strategic geographical location, and abundant and cost-competitive workforce.

Besides, the chosen IVs are unlikely to directly affect the equilibrium wages of domestic firms in the tourism industry (i.e., uncorrelated with ε_{ikjt}). Arguably, the leather and electronics manufacturing industries demand labour skill sets that are substantially different from those of the tourism industry. More importantly, the above-described IV construction ensures that FDI firms in these two manufacturing industries are located in a region non-adjacent to that of

tourism domestic firms. The matched regions are distinctive in various respects, including real wage differences as observed consistently in our sample for both domestic and FDI firms (see Table 4).

In the following analysis, the endogeneity test is implemented to verify whether FDI is endogenous or not. The test, based on the *C*-statistics, specifies a null hypothesis that the regressor can be treated as exogenous. A rejection of the null implies that the variable is endogenous. Then, the under-identification and over-identification tests are conducted to check whether the instruments are appropriate. The under-identification test is an LM test of whether the instruments are relevant (i.e., correlated with the endogenous regressor). For over-identification, the Sargan-Hansen test has a joint null hypothesis that the instruments are valid (i.e., uncorrelated with the error term). A rejection of the null in the under-identification test and a failure to reject the null in the over-identification test confirm the relevance and validity of the instruments.

V. Data

The empirical analysis uses a rich panel dataset of tourism firms in Vietnam during 2009–2013. As the tourism industry encompasses a diverse range of cross-cutting activities, this research focuses on firms categorised in Section I of Vietnam Standard Industrial Classification (VSIC), namely accommodation and food services. This section represents the core activities of the tourism industry (UNCTAD, 2007). The data were obtained from enterprise surveys commissioned by the National General Statistics Office (GSO). These surveys provide information on firms' characteristics and operation indicators, including location, ownership, sales, employment, costs, profits, and assets. The final dataset is a five-year unbalanced panel constructed after screening data for systematic missing values and outliers. Monetary variables are measured in the national currency (VND) and deflated to 2009 price using the CPI.

Table 2 presents the descriptive statistics. The figures suggest considerable variations within continuous variables, reflecting the heterogeneity of firms in the sample. Regarding the ownership structure, 98.60 percent of domestic firms are privately owned. The average Herfindahl index capturing the product market concentration is relatively low (0.03), hence tourism can be categorized as a monopolistically competitive industry⁶. Finally, FDI firms exhibit a reasonable presence, constituting 13.34 percent of employment in the industry-region. The maximum employment share of FDI firms is 38.01 percent, and the minimum share is zero, implying no FDI presence.

[Insert Table 2 here]

Table 3 shows average real wages of FDI, domestic and all firms across VSIC three-digit industries. The highest paying industry among FDI firms is short-term accommodation (including hotels and resorts), which is also the largest invested industry, comprising more than 55% of foreign firms in the sample. Notably, the foreign-domestic pay gaps across industries are significant at 2.96 times (short-term accommodation), 2.09 times (beverage serving activities), 1.56 times (event catering), and 1.38 times (restaurants and mobile food services). Overall, foreign firms pay considerably higher than domestic counterparts in FDI-present three-digit industries with an average wage premium of 2.25 times.

[Insert Table 3 here]

Table 4 reports the real wage differences between domestic and FDI firms across regions. Among FDI firms, the highest paying region is Southeast (including Ho Chi Minh City – the economic centre), and the lowest one is the Northern Midland and Mountain. Meanwhile,

⁶ Furthermore, to capture the level of labour market concentration in the examined industry, we calculated an index that is similar to the Herfindahl index, namely the sum of squared share of firm's employment (number of workers) in the industry. If the labour market is very different from being competitive, we shall observe a high value of this index (namely the market is highly concentrated). The calculated average value is notably low at 0.001, implying approximately perfect competition. Thus, the tourism industry can plausibly fit the framework constructed by the theoretical model in Section III.

domestic firms pay the highest and lowest in Red River Delta (including Hanoi – the capital city) and Mekong River Delta, respectively. Generally, FDI firms pay much higher than domestic counterparts, regardless of geographical locations. Nevertheless, the foreign-domestic pay gaps are more substantial compared to those across three-digit industries. The smallest gap is found in the Northern area where FDI firms pay approximately 1.5 times higher than domestic firms.

[Insert Table 4 here]

VI. Empirical results and discussions

Wage spillovers from FDI to domestic firms

The specified model is estimated using the dataset of firms in Vietnam's tourism industry from 2009 to 2013. The IV-GMM estimator is employed to deal with the possible endogeneity problem. Robust standard errors are computed to account for arbitrary heteroscedasticity. Table 5 reports the main estimation results, which include all explanatory variables in column (1). Furthermore, the model is re-estimated without capital intensity variable (*K_intensity*), which has the largest number of missing observations (as shown in Table 2) and the results are reported in column (2). Finally, to further capture spillovers at regional level, we include two additional variables (estimation in column (3)), namely regional training (*Regtrain*) (measured by percentage of trained employed workers at 15 years of age and above across regions and years) and regional market size (*Regsize*) (measured by average GDP per capita across regions and years). Overall, the signs of key explanatory variables, notably foreign presence (*FDI*), remain consistent and the coefficients are relatively close to each other across the three

estimations. Given the robustness of the result on FDI-linked wage spillovers, the following discussion is based on the estimation of the original model reported in column (1)⁷.

[Insert Table 5 here]

The *Wald* test for the overall model significance indicates that the coefficients are jointly significant at the one percent level with the F-statistic being 101.94. The concordance statistic *C* is 21.429 with the p-value < 0.01, indicating a rejection of the null hypothesis. This result suggests that foreign presence (*FDI*) is endogenous, hence the IV-GMM is an appropriate estimation approach. The under-identification test reports the Kleibergen-Paap rk LM test statistic of 665.8570 with p-value < 0.01. Therefore, we can reject the null hypothesis, namely excluded instruments are irrelevant. Moreover, the Hansen J statistic from the over-identification test is 0.004 with the p-value > 0.1. Thus, we fail to reject the null hypothesis that the selected instruments are valid and correctly excluded from the estimated equation.

The estimations confirm the existence of wage spillovers from FDI to domestic firms. While FDI firms pay much higher, they appear not to put upward pressure on average wages of domestic counterparts. The coefficient of foreign presence (*FDI*) is negative and statistically significant at one percent level. Accordingly, a one percent increase in FDI presence will lower domestic firms' average wages by 2.0339 percent. This finding is interesting since previous studies mostly suggest positive wage spillovers. One study revealing negative spillovers is Barry, Gorg, and Strobl (2005) for the case of domestic exporting firms in Ireland's manufacturing industry. The authors attribute the result to the labour market crowding out effect when FDI firms attract the best workers away from the local firms via higher wages.

⁷ We have conducted an additional estimation that controls for a major institutional factor in Vietnam's labour market, namely the minimum wage. Unsurprisingly, it is found to exert a positive impact on the local wages with a one per cent increase in the minimum wage causing domestic firms to raise average wages by 3.958 per cent. For the coefficient estimate of the variable of interest (foreign presence, *FDI*), it remains highly consistent with that of the estimation without the control of minimum wage, in terms of both sign and magnitude. To save space, we do not report the estimation results, which are available upon request.

In fact, as shown in the theoretical model in Section III, it is possible that the impact of FDI is negative, as FDI presence generates two contrasting effects on the expected average wage. On the one hand, FDI affects domestic firms via productivity spillovers (a direct channel), and on the other hand, it also creates an indirect impact via the cut-off capability (an indirect channel). If FDI generates positive productivity spillovers (namely the direct channel being positive), which tends to increase firms' average wages due to increase in the marginal product of labour, it lowers the cut-off capability. Subsequently, firms that previously cannot survive will now enter the industry, which lowers firms' expected average wages. Similarly, if there are negative productivity spillovers that lower firms' average wages, the cut-off capability will be raised and expected firm average wages will be increased. The significantly negative estimate in Table 5 occurs as one channel dominates the other.

Table 5 also shows that most control variables have considerable influence on firms' wages. The coefficient of *lnSize* is positive and statistically significant at one percent level. Specifically, a one percent increase in firm size leads to a 0.1304 percent increase in average wages. Larger firms usually exhibit stronger financial capacity and adopt better compensation practices, which allow them to pay higher than smaller firms (Hoi and Pomfret 2010, Girma, Greenaway, and Wakelin 1999, Pittiglio, Reganati, and Sica 2015). Meanwhile, the coefficient of the variable *Ownership* is negative but statistically insignificant. This finding suggests that ownership structure is not a major determinant explaining differences in domestic firms' average wages in the examined industry.

Firm age also contributes to differences in domestic firms' wages. The coefficient of *lnAge* is positive and statistically significant. A one percent increase in firm age causes a 0.0232 percent increase in average wages. This finding is consistent with previous studies (Villarreal and Sakamoto 2011, Hoi and Pomfret 2010, Pittiglio, Reganati, and Sica 2015). Older firms tend to build up a well-established market share and be larger, which may signal capability to

pay higher. Similarly, the coefficient of $\ln K_intensity$ is positive and statistically significant. A one percent increase in this variable leads to a 0.0365 percent increase in average wages. Higher capital intensity implies a lower labour cost share in the total cost structure, which may enable firms to meet wage demands and employ more competent high-paid workers (Sjöholm and Lipsey 2006, Villarreal and Sakamoto 2011, Muñoz-Bullón and Sánchez-Bueno 2013).

In contrast, Table 5 shows that the technology gap (*TechGap*) and competition (*Herfindahl*) exert negative and statistically significant influence on domestic firms' average wages. Accordingly, a larger technology gap tends to induce domestic firms to pay lower on average as it implies weaker absorptive capacity to benefit from FDI. Nonetheless, the impact of *TechGap* seems modest with the coefficient being 0.0001. Competition has a more profound effect with a one percent increase in competitive pressure (i.e., decrease in Herfindahl index) putting upward pressure on domestic firms' average wages by 1.4675 percent. Arguably, domestic firms are driven to pay higher to attract and retain a productive workforce in a highly competitive product market. Similar results are found in Hoi and Pomfret (2010) for wage spillovers from FDI to Vietnam's manufacturing firms.

Equation (15) is also estimated for subgroups of firms to further examine the role of firm characteristics in determining wage spillovers. Arguably, domestic firms with different features will respond differently to foreign presence whereas FDI firms with different attributes will be likely to exert divergent influence on domestic firms (Nguyen and Sun 2012, Smeets 2008, Hoi and Pomfret 2010, Farole, Winkler, and World 2014). Therefore, further analysis of firm heterogeneity could provide deeper insights into the FDI impact on domestic firms' wages.

Privately-owned versus state-owned firms

Table 6 reports the estimations by domestic firms' ownership, indicating substantial wage spillovers to privately-owned firms. Meanwhile, state-owned firms' average wages appear not

to be affected by FDI firms. This finding can be attributed to the rigid wage setting of state-owned firms in Vietnam, which may reduce flexibility in wage adjustment. Furthermore, state-owned firms account for less than one percent and about 10 percent of total firm number and total employment in the examined industry, respectively. This modest presence together with fixed compensation mechanism makes state-owned firms, on average, less likely to face fierce competition from FDI counterparts, causing insignificant variation in their average wages.

[Insert Table 6 here]

Small versus large firms

Table 7 shows that both small and large firms' average wages experience negative wage spillovers from FDI, with a more pronounced effect on the former. Domestic firms of small scale are less likely to benefit from FDI-linked productivity spillovers and compete with higher-paying FDI firms (and large domestic firms alike) for competent workers in the local labour market (Pittiglio, Reganati, and Sica 2015, Sjöholm and Lipsey 2006, Villarreal and Sakamoto 2011). Hence, this group is more likely to be left with less skilled and lower paid workforce given increased FDI presence. The sample shows that small domestic firms are the lowest paying, with the average wage being nearly 38 percent of FDI firms, and 73 percent of large domestic firms.

[Insert Table 7 here]

Young versus old firms

Table 8 presents the estimations by market experience of domestic firms. While FDI presence exerts negative and significant influence on wages of both groups, the effects are more profound for newly established firms. Young firms tend to be more exposed to external forces, including the entry of foreign affiliates in the host labour market. They might be less able to compete with FDI firms (and well-established domestic firms) to attract and build up a

productive workforce via high wages. Besides, our data shows that on average, young domestic firms pay about 10 percent and 57 percent less than old domestic and FDI firms, respectively. These factors might explain stronger negative wage spillovers from FDI firms to young domestic counterparts.

[Insert Table 8 here]

Wholly foreign-owned versus partially foreign-owned firms

Table 9 reports the findings across two main types of FDI, namely the wholly foreign-owned and partially foreign-owned firms (or joint ventures with local partners). The estimations suggest that only wholly foreign-owned firms generate significant influence on domestic counterparts' average wages. Whereas, there is no evidence of such spillover effects from partially foreign-owned firms in the examined industry. Compared to joint ventures, firms with full foreign equity might possess greater ownership advantages (including superior management, marketing and hiring practices) extensively transferred from their parent companies, enabling them to compete and exert stronger impact on the host labour market. While this finding provides preliminary insights, more in-depth analysis is warranted to better understand the role of heterogeneous FDI in determining the extent of wage spillovers.

[Insert Table 9 here]

VII. Concluding remarks

This paper explores the role of FDI as a determinant of domestic firms' average wages. We construct a theoretical model to demonstrate different spillover channels. Then, we estimate the econometric model, using firm-level data of Vietnam's tourism industry during 2009–2013. The sample shows that FDI firms pay much higher wages than domestic counterparts with an average wage gap of 2.25 times. However, the estimation suggests negative wage spillovers

with a one percent increase in FDI presence lowering domestic firms' expected average wages by 2.03 percent. Furthermore, domestic and foreign firms' characteristics are found to play an important role in determining the magnitude of wage spillovers. Three major implications can be drawn from the findings.

First, domestic firms are likely to experience two contrasting situations given the increased FDI presence in the industry and region. On the one hand, they can benefit from the negative wage spillovers since lower average wages indicate lower labour costs. On the other hand, they might encounter intense competition from higher paying FDI firms in the local labour market. Consequently, domestic firms may struggle to attract high-quality workers. Affected firms are recommended to take advantage of the first positive situation to reduce production costs and increase profitability. This may then enable domestic firms to overcome the adverse impact of the second situation effectively in the long run.

Second, local workers in FDI firms are unambiguously better-off when they are paid much higher than their fellow workers in domestic firms. However, a large proportion of the local workforce appears to suffer from the foreign presence. In fact, FDI firms account for nearly 13.5 percent of total employment in the industry-region while the rest of the workforce is employed in domestic firms. Therefore, a negative wage spillover effect is likely to exert a considerable impact on the majority of the local labour force in the tourism industry. Nonetheless, the ultimate outcome of the FDI impact on local wages is undetermined yet.

Third, the empirical results imply significant heterogeneity of wage spillovers from FDI firms in the examined industry. Notably, spillover effect is found only for privately-owned firms but not for state-owned ones. Furthermore, compared to large and well-established domestic firms, small and newly-established domestic firms encounter more pronounced negative wage spillovers from FDI. Additional analysis reveals that fully foreign-owned firms are the key players in affecting local firms' wages whereas joint ventures show insignificant impact. These heterogeneous effects

highlight the relevance and importance of a firm-level approach in quantifying FDI-induced wage spillovers and formulating FDI policies related to local labour markets.

This study has attempted to make both theoretical and empirical contributions to the literature on FDI-linked wage spillovers. With the availability of relevant data, future work would be able to extend the empirical exercise by exploring the role of worker characteristics, such as skill, tenure, age, gender, and occupation, in influencing local wages, as well as spillover channels.

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Appendix: Regional map of mainland Vietnam

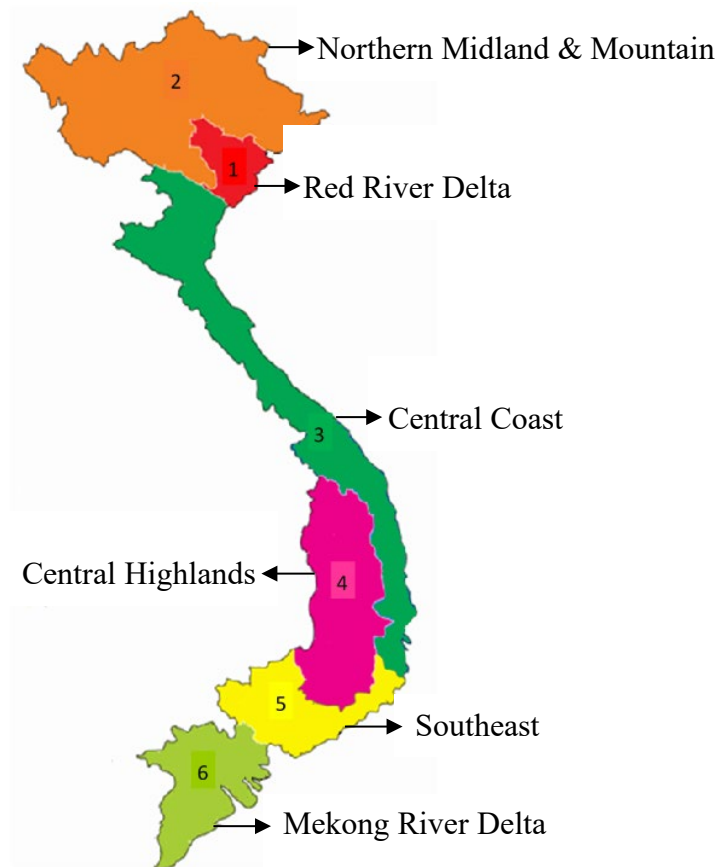


Table 1. Summary of related literature.

Study	Country	Level of analysis	Study period	Sector	Main findings of FDI-induced wage spillovers
Aitken, Harrison, and Lipsey (1996)	Mexico, Venezuela, the US	Industry-level, country-specific	Mexico (1984-1990) Venezuela (1977-1989) The US (1987)	Manufacturing	- Insignificant for Mexico and Venezuela - Positive for the US
Feliciano and Lipsey (2006)	The US	Firm-level, country-specific	1987, 1992	Manufacturing and non-manufacturing	- Insignificant for manufacturing - Positive for non-manufacturing
Axaroglou and Pournarakis (2007)	The US	Industry-level, country-specific	1974-1994	Manufacturing	- Overall weak spillovers - Effects vary across industries and states
Girma, Greenaway, and Wakelin (1999)	The UK	Firm-level, country-specific	1991-1996	Manufacturing	- Insignificant
Driffield and Girma (2003)	The UK	Firm-level, country-specific	1980-1992	Electronics manufacturing	- Positive
Barry, Gorg, and Strobl (2005)	Ireland	Firm-level, country-specific	1990-1998	Manufacturing	- Negative for domestic exporting firms - Insignificant for domestic non-exporting firms
Muñoz-Bullón and Sánchez-Bueno (2013)	Spain	Firm-level, country-specific	1992-2008	Manufacturing	- Insignificant
Pittiglio, Reganati, and Sica (2015)	Italy	Firm-level, country-specific	2002-2007	Manufacturing	- Insignificant
Villarreal and Sakamoto (2011)	Mexico	Firm-level, country-specific	2001	Manufacturing	- Positive
Lipsey and Sjöholm (2004)	Indonesia	Firm-level, country-specific	1996	Manufacturing	- Positive
Tomohara and Takii (2011)	Indonesia	Firm-level, country-specific	1989-1996	Manufacturing	- Positive
Hale and Long (2011)	China	Firm-level, country-specific	2001	Manufacturing and services	- Positive for domestic privately owned firms - Insignificant for domestic state owned firms
Elliott and Zhou (2015)	China	Firm-level, country-specific	2004	Manufacturing	- Positive
Chidambaran Iyer (2012)	India	Firm-level, country-specific	1989-2004	Manufacturing	- Positive for FDI measured at four-digit level - Negative for FDI measured at three-digit level
Srithanpong (2014)	Thailand	Firm-level, country-specific	2007	Manufacturing	- Positive
Hoi and Pomfret (2010)	Vietnam	Firm-level, country-specific	2000-2010	Manufacturing	- Positive

Table 2. Summary statistics of key variables.

Variable	Obs	Mean	S.D	Min	Max
Average wage ($\ln\bar{w}$)	33,211	2.7876	0.5279	-4.2658	6.5977
Foreign presence (FDI)	33,738	0.1334	0.0981	0.0000	0.3801
Firm size ($\ln Size$)	33,195	6.2469	1.7391	-1.5578	14.6265
Ownership structure (Own)	33,211	0.9860	0.1175	0	1
Firm age ($\ln Age$)	32,313	1.4383	0.7505	0.0000	4.1897
Capital intensity ($\ln K_intensity$)	24,970	3.8370	1.8750	-4.1825	11.3806
Technology gap ($TechGap$)	32,694	154.0922	660.7731	-99427.35	590.0299
Competition ($Herfindahl$)	33,738	0.0288	0.0723	0.0059	0.6347

Table 3. Average real wage by three-digit industry and ownership.

VSIC code	Three-digit industry	Average real wage (FDI firms)	Average real wage (Domestic firms)	Average real wage (All firms)
I551	Short-term accommodation	53.6834	18.1556	18.7151
I559	Other accommodation	N.A.	24.1005	24.1005
I561	Restaurants and mobile food services	26.0139	18.9142	19.0314
I562	Event catering	33.3975	21.4494	21.6097
I563	Beverage serving activities	36.0214	17.2545	17.2805
	Total	41.7492	18.5724	18.9345

Table 4. Average real wage by region and ownership.

No.	Region	Average real wage (FDI firms)	Average real wage (Domestic firms)	Average real wage (All firms)
1	Red River Delta	41.1582	20.8046	21.5386
2	Northern Midland & Mountain	26.7577	17.9042	18.0468
3	Central Coast	29.4456	16.5769	16.7448
4	Central Highlands	29.5450	17.6969	17.7525
5	Southeast	53.3053	19.1587	19.4809
6	Mekong River Delta	46.2324	15.6672	15.7769
	Total	41.7492	18.5724	18.9345

Table 5. Estimation results for FDI-linked wage spillovers.

Variable	(1)		(2)		(3)	
	Coef.	S.E	Coef.	S.E	Coef.	S.E
Foreign presence (<i>FDI</i>)	-2.0339***	0.3840	-1.6897***	0.3260	-2.4625***	0.7590
Firm size (<i>lnSize</i>)	0.1304***	0.0054	0.1411***	0.0048	0.1295***	0.0055
Ownership structure (<i>Own</i>)	-0.0090	0.0501	-0.0137	0.0492	-0.0112	0.0502
Firm age (<i>lnAge</i>)	0.0232***	0.0089	0.0231***	0.0076	0.0236***	0.0089
Capital intensity (<i>lnK_intensity</i>)	0.0365***	0.0036	No		0.0363***	0.0037
Technology gap (<i>TechGap</i>)	-0.0001***	0.0000	-0.0001***	0.0000	-0.0001***	0.0000
Competition (<i>Herfindahl</i>)	-1.4675***	0.3117	-1.7379***	0.2783	-1.5255***	0.3271
Regional training (<i>Regtrain</i>)	No		No		0.0017	0.0068
Regional market size (<i>Regsize</i>)	No		No		-0.0040	0.0027
Regional dummies (<i>dRegion</i>)	Yes		Yes		Yes	
Industry dummies (<i>dIndustry</i>)	Yes		Yes		Yes	
Year dummies (<i>dTime</i>)	Yes		Yes		Yes	
<i>Kleibergen-Paap rk LM statistic</i>	665.8570***		1107.2080***		223.3440***	
<i>Hansen J statistic</i>	0.0040		1.3680		2.0140	
<i>C-statistic</i>	21.4290***		19.1640***		9.1980***	
<i>F-value</i>	101.9400***		148.8500***		91.3600***	
<i>Obs</i>	20,715		28,484		20,715	

Notes: (i) Results (1) include all explanatory variables; (2) exclude *lnK_intensity*; and (3) include additional regional variables; (ii) *** denotes one percent level of significance.

Table 6. FDI wage spillovers by ownership structure of domestic firms.

Variable	Privately-owned firms		State-owned firms	
	Coef.	S.E.	Coef.	S.E.
Foreign presence (<i>FDI</i>)	-2.0791***	0.3878	-3.7271	2.4269
Firm size (<i>lnSize</i>)	0.1301***	0.0055	0.0214	0.0429
Firm age (<i>lnAge</i>)	0.0232**	0.0091	-0.0449	0.0442
Capital intensity (<i>lnK_intensity</i>)	0.0363***	0.0037	0.0180	0.0243
Technology gap (<i>TechGap</i>)	-0.0001***	0.0000	-0.0011***	0.0003
Competition (<i>Herfindahl</i>)	-1.5482***	0.3165	-0.0262	2.3844
Regional dummies (<i>dRegion</i>)	Yes		Yes	
Industry dummies (<i>dIndustry</i>)	Yes		Yes	
Year dummies (<i>dTime</i>)	Yes		Yes	
<i>Kleibergen-Paap rk LM statistic</i>	656.3360***		27.178***	
<i>Hansen J statistic</i>	0.0820		0.0240	
<i>C-statistic</i>	22.1600***		0.9660	
<i>F-statistic</i>	105.4900***		5.700***	
<i>Obs</i>	20,251		426	

Notes: *** and ** denote one and five percent levels of significance, respectively.

Table 7. FDI wage spillovers by size of domestic firms.

Variable	Small firms		Large firms	
	Coef.	S.E.	Coef.	S.E.
Foreign presence (<i>FDI</i>)	-3.4280***	1.1357	-1.3101***	0.3916
Ownership structure (<i>Own</i>)	-0.3851	0.2428	-0.0547	0.0553
Firm age (<i>lnAge</i>)	0.0416***	0.0145	0.0273**	0.0125
Capital intensity (<i>lnK_intensity</i>)	0.0101*	0.0060	0.0509***	0.0053
Technology gap (<i>TechGap</i>)	-0.0039***	0.0003	-0.0002***	0.0000
Competition (<i>Herfindahl</i>)	-0.8820	0.9381	-0.8017**	0.3810
Regional dummies (<i>dRegion</i>)	Yes		Yes	
Industry dummies (<i>dIndustry</i>)	Yes		Yes	
Year dummies (<i>dTime</i>)	Yes		Yes	
<i>Kleibergen-Paap rk LM statistic</i>	243.1580***		375.0010***	
<i>Hansen J statistic</i>	0.1190		2.1980	
<i>C-statistic</i>	4.6450**		10.1940***	
<i>F-statistic</i>	43.8300***		39.2700***	
<i>Obs</i>	8,492		10,313	

Notes: (i) A small firm has the size of less than or equal to the sample mean; (ii) A large firm has the size greater than the sample mean; (iii) *** and ** denote one and five percent levels of significance, respectively.

Table 8. FDI wage spillovers by age of domestic firms.

Variable	Young firms		Old firms	
	Coef.	S.E.	Coef.	S.E.
Foreign presence (<i>FDI</i>)	-3.3704***	0.9277	-1.3748**	0.5483
Firm size (<i>lnSize</i>)	0.1285***	0.0106	0.1265***	0.0070
Ownership structure (<i>Own</i>)	0.1206	0.1818	-0.0454	0.0551
Capital intensity (<i>lnK_intensity</i>)	0.0369***	0.0068	0.0340***	0.0050
Technology gap (<i>TechGap</i>)	-0.0002***	0.0001	-0.0002***	0.0000
Competition (<i>Herfindahl</i>)	-0.6093	0.8251	-1.1590***	0.3909
Regional dummies (<i>dRegion</i>)	Yes		Yes	
Industry dummies (<i>dIndustry</i>)	Yes		Yes	
Year dummies (<i>dTime</i>)	Yes		Yes	
<i>Kleibergen-Paap rk LM statistic</i>	147.7190***		281.2820***	
<i>Hansen J statistic</i>	0.3580		0.2920	
<i>C-statistic</i>	10.1290***		4.6490**	
<i>F-statistic</i>	33.8300***		54.0100***	
<i>Obs</i>	7,213		10,728	

Notes: (i) A young firm has the age of less than or equal to the sample mean; (ii) An old firm has the age greater than the sample mean; (iii) *** and ** denote one and five percent levels of significance, respectively.

Table 9. FDI wage spillovers by type of foreign firms.

Variable	Wholly foreign-owned firms		Partially foreign-owned firms	
	Coef.	S.E.	Coef.	S.E.
Foreign presence (<i>FDI</i>)	-2.7831***	0.6424	0.1717	0.1198
Firm size (<i>lnSize</i>)	0.1302***	0.0061	0.1323***	0.0054
Ownership structure (<i>Own</i>)	-0.0330	0.0567	-0.0154	0.0486
Firm age (<i>lnAge</i>)	0.0083	0.0106	0.0253***	0.0089
Capital intensity (<i>lnK_intensity</i>)	0.0367***	0.0041	0.0390***	0.0036
Technology gap (<i>TechGap</i>)	-0.0002***	0.0001	-0.0001***	0.0000
Competition (<i>Herfindahl</i>)	-0.9899***	0.3620	-1.4546***	0.3168
Regional dummies (<i>dRegion</i>)	Yes		Yes	
Industry dummies (<i>dIndustry</i>)	Yes		Yes	
Year dummies (<i>dTime</i>)	Yes		Yes	
<i>Kleibergen-Paap rk LM statistic</i>	69.3310***		751.3710***	
<i>Hansen J statistic</i>	2.2660		26.907***	
<i>C-statistic</i>	26.3020***		2.9820	
<i>F-statistic</i>	86.1900***		101.340***	
<i>Obs</i>	20,715		20,715	

Note: *** and ** denote one and five percent levels of significance, respectively.