

## **EXAMINING FDI SPILLOVER EFFECTS ON PRODUCTIVITY GROWTH: FIRM-LEVEL EVIDENCE FROM VIETNAM**

PHUONG V. NGUYEN, KHOA T. TRAN,  
NGA THUY THANH LE AND HOA DOAN XUAN TRIEU

*International University, Vietnam National University Ho Chi Minh City, Vietnam*

The relationship between foreign direct investment (FDI) and firm productivity still greatly concerns many researchers. Even though this topic has provided rich insight into the impacts of FDI spillovers, limited empirical research has been conducted to figure out the heterogeneous impact of such spillovers in the case of Vietnam. In this study, which employs the generalized methods of moments to investigate a sample of 537,772 enterprises operating in Vietnam in the period from 2007 to 2015, we examine how spillovers occur and how they can affect domestic firms' productivity. Intra-industrial and regional spillovers impact negatively on the productivity of domestic firms. Regarding intra-industrial spillovers, only backward ones positively affect local productivity.

*Keywords:* Total Factor Productivity, Horizontal Spillovers, Technology Gap, Vertical Spillovers,

*JEL Classification:* F21, F23

### 1. INTRODUCTION

The rapid increase in foreign direct investment (FDI) inflows in the last two decades has resulted in a long- and much-debated research topic regarding the costs and benefits of this capital source (Batten and Vo, 2009; Bui et al., 2018; Vo, 2010). Besides being favorable financial support, FDI is also considered to be the main channel for the transfer of technology, knowledge, skills, and managerial know-how (El-Wassal, 2012; Mohamed and Sidiropoulos, 2010). Therefore, many governments and policy makers around the world have been attempting to attract more foreign investment by offering costly programs, such as tax breaks, duty exemptions, and subsidized industrial infrastructures, to help domestic firms fully capture the potential benefits of FDI (Lauter and Moreaub, 2012; Cuong and Vinh, 2019). Researchers in the field of international business and economics have been paying more attention to the role of FDI on firms' productivity in recent years. It is a common belief that foreign firms operating in an

emerging market tend to outperform domestic companies due to their advanced technology and superior management capacity and practices. Therefore, if there is a gap in such valuable intangible assets between the recipient countries and multinational enterprises (MNEs), it is likely that some of those assets may transfer to the local firms via foreign-owned affiliates and subsidiaries, thereby improving the productivity of local firms (Bwalya, 2006; Marcin, 2008; Nguyen and Vo, 2017; Nguyen et al., 2018).

Responding to the globalization of markets and opportunities presented by technology advances, Vietnamese policy makers have been focusing on attracting FDI in recent years (Batten and Vo, 2015). Over the last 30 years, many regulations regarding attracting FDI have been introduced or modified to increase foreign capital inflow to the country. FDI has been considered as one of the major sources for enhancing the economic growth of Vietnam since the introduction of economic reform and renovation in 1986. During this period, the government offered many special incentives to foreign investors, including tax waivers and tariff reductions or exemptions, and in terms of giving them priority for attractive locations. Specifically, the investment law enacted from 1997 to 2000 promoted a better environment for foreign companies by giving tax breaks and simplified business registering procedures, and it enabled more foreign ownership of domestic firms (Anwar and Nguyen, 2011a; Schaumburg-Müller, 2003). The government's efforts in promoting the attractiveness of Vietnam as a place for potential investors has been shown to be a success, as evidenced by the fact that many remarkable achievements have been observed, which have significantly improved Vietnam's openness to the world. In other words, the Vietnamese government has been committed to ensuring a stable socio-political environment, protecting the legitimate rights and interests of foreign investors as its compliance with international trade agreements. Particularly, in 2007, by becoming an official member of the World Trade Organization, Vietnam got the opportunity to share its image with the international market. In addition, Vietnam was selected as the host for the Asia-Pacific Economic Cooperation (APEC) Forum in 2017, which attracted a tremendous amount of foreign capital inflow to the country. The role of foreign investors in Vietnam has been addressed in several studies (Vo, 2018a, 2018b, 2018c, 2019).

Regardless of the general belief that increasing the foreign presence in a domestic market is a beneficial strategy for the economic growth of the recipient countries, Rodrik (1999) claims that the positive influence of FDI spillovers is exaggerated, while actual evidence for the said effects is hardly found. Furthermore, the empirical results on whether FDI spillovers improve the productivity of domestic companies remain controversial. The pioneering research on this topic was conducted by Caves (1974), who found that there were positive spillovers from MNEs to Australian manufacturing companies. Aitken and Harrison (1999) state that local competitors tend to suffer in terms of losing market share since they are unable to compete with foreign brands. On the other hand, later studies found that competition from the presence of foreign companies benefited domestic firms. Specifically, to keep and retain their competitive position, local firms are pushed to invent more creative and efficient operating methods,

which results in better performance and productivity (Bwalya, 2006).

By employing a large amount of panel data from Vietnamese firms, we explore whether horizontal and vertical FDI spillovers have any influence on the productivity level and the rate of productivity growth of indigenous firms. To our knowledge, the very first research investigating FDI spillover in the Vietnamese market used firm-level panel data constructed from the 2000-2005 census and found positive evidence for backward technological spillovers in the manufacturing industry and horizontal spillovers in the service sector (Nguyen and Nguyen, 2008). After that, Anwar and Nguyen contributed to the existing literature on the impact of FDI on economic growth and trading positions in the Vietnamese market, as well as on the role of FDI in enhancing the productivity of domestic firms (Anwar and Nguyen, 2010a, 2010b, 2011b, 2011a, 2014). Although the advantages of FDI spillovers have been argued by many earlier studies (Aitken and Harrison, 1999; Aitken, Hanson and Harrison, 1997; Demena, 2015; Javorcik and Spatareanu, 2009; Perri and Peruffo, 2014; Zhang, 2014), they did not examine the spillover channels separately and only treated various spillover channels as “technological capabilities through internal effort” (Liao et al., 2012, p.545). Another reason for the different findings with regard to FDI spillovers is the time considered in each research study. FDI is shown to have a negative influence on domestic firms’ productivity in the short term (Aitken and Harrison, 1999; Liao et al., 2012). However, when considered in the long term, FDI spillovers are more likely to have a positive effect on domestic firms’ productivity growth rates as FDI spillovers help enhance future productivity capacity (firm-specific capital) by transferring essential technology know-how and managerial practices.

This paper contributes to the existing literature by focusing on examining the impact of a foreign presence on Vietnamese manufacturing firms’ productivity. In addition, we also test whether there are technology spillovers under the Vietnam context as despite the tremendous efforts of the Vietnamese government in attracting more foreign investment in recent years and its major influence on Vietnamese policy makers, it is a topic that receives little attention from researchers. Furthermore, the majority of research into the relationship between the productivity of the recipient countries and FDI spillovers is conducted in developed countries, such as China, Italy, the UK, and Canada, whereas the evidence for FDI spillovers is still limited in the case of Vietnam. We argue that as FDI is becoming more and more important to economic growth, it is necessary for local businesses, as well as policy makers, to have a better understanding of FDI spillover channels to develop suitable strategies for future growth accordingly.

We also look for evidence of horizontal and vertical spillovers from foreign firms in order to produce a comprehensive conclusion regarding their effects on domestic firms. Specifically, our model is composed of the following factors: human capital, the technology gap, and specific firms’ characteristics to test whether the spillover effect from these factors affects the recipient firms’ productivity. Thereby, we aim to find out whether the Vietnamese government’s policy of pursuing and competing for FDI is likely to bring positive benefits or harmful effects for domestic firms’ productivity.

Another contribution of this study is that we employ a recent, detailed, firm-level panel dataset collected by the General Statistic Organization (GSO) from 2010 to 2015. Therefore, the changes in plant behaviors and performance over time can be well captured and observed, thus minimizing errors concerning the causal relationship between FDI spillovers and firms' productivity.

The structure of this paper is as follows: Section 2 provides an overview of the literature. Section 3 describes the methodology and model used in this paper in more detail. Section 4 interprets the estimated results from the empirical test; further analysis and explanations are also included. Finally, Section 5 concludes and gives insights into the practical implications of the research.

## 2. LITERATURE REVIEW

### 2.1. Major Channels of FDI Productivity Spillovers

FDI spillovers, including knowledge and technology spillovers from FDI companies, have been a familiar and much-debated topic among researchers and policy makers. Productivity spillovers from FDI occur when the entry or presence of foreign firms leads to the enhancement of the productivity of domestic firms. According to previous studies, when MNEs expand their business to different markets outside their countries, they normally utilize their existing advanced technology and superior management practices in order to compete against local competitors and compensate for the lack of local market and customer demand knowledge (Aitken and Harrison, 1999; Blomström and Sjöholm, 1999). These intangible assets are expected to spill over to domestic firms via competition, imitation and demonstration, and labor turnover (Görg and Greenaway, 2004; Javorcik and Spatareanu, 2008). Theoretically, domestic firms can enjoy many benefits from this type of spillover, such as reductions in the costs of inventing new machinery technology and building and developing efficient business procedures and operations. However, according to El-Wassal (2012), productivity spillovers only occur when the recipient companies have the sufficient capability to apply and adopt the advanced knowledge and technology from the MNEs into their production process. In other words, the possibility of technology transfer largely depends on the domestic companies' ability to learn and catch up with such advanced knowledge, also known as "absorptive capacity" (Wang and Blomström, 1992).

According to the existing literature, FDI spillover is categorized into two types: horizontal and vertical. The first type of spillover occurs when domestic firms operating in the same sector as the MNEs experience productivity enhancement via competition, labor turnover, and imitation. On the other hand, the latter type of spillover can happen via the customer and supplier relationship between the local suppliers and foreign clients or vice versa. Specifically, in a backward relationship, local firms are required to upgrade their technology and enhance their management skills regarding their

intermediate products to meet the demanding standards of foreign buyers. Thus, technology spillover can occur when local suppliers receive assistance and technical support from the MNEs. In the forward process, local buyers can benefit from higher productivity thanks to the high-quality inputs from foreign suppliers. Positive vertical spillovers tend to receive more empirical support from recent research compared to intra-spillovers. Specifically, backward linkages between local companies and their foreign partners significantly enhance the efficiency of firms in different geographical contexts, such as in Lithuania from 1996 to 2000 (Javorcik, 2004), in China from 1995 to 1999 (Liu, 2008), and in Indonesia (Blalock and Gertler, 2008).

There are various studies about FDI spillovers and the channels via which domestic firms can receive and adopt such new knowledge and technology. In summary, Damijan et al. (2013) pointed out four main channels that generate spillovers, including (1) demonstration/imitation, (2) competition, (3) vertical/inter-industry linkage, and (4) labor turnover.

(1) The domestic firms may take advantage of demonstration and imitation effects to improve their institutional, managerial, and technological practices. Particularly, by observing and imitating the operating procedures of foreign enterprises, recipient firms will inherit several intangible assets, including advanced technologies, essential marketing skills, efficient inventory management, and quality control. Furthermore, knowledge transfer can also occur via connections and alliances with FDI corporations.

(2) The competition that FDI firms bring to the domestic market pushes domestic firms to update their skills and technologies and eventually leads to an improvement in productivity. However, Damijan et al. (2013) found the said competitiveness to be risky for the domestic firms as the level of their capacity to absorb new knowledge will determine whether they can benefit from the intense competition with foreign investors or suffer from market share loss. Similarly, a framework constructed by Wang and Blomström (1992), describing the correlation between the level of competition and spillover, showed that as competition becomes more intense, local firms will have to utilize their resources wisely or upgrade their technologies to keep their businesses alive in the market.

(3) Foreign linkage effects occur as a result of the strict quality of goods demanded for exporting to MNEs or the higher input imported from MNEs. Findlay (1978) states that the larger the technological gaps between foreign and domestic countries, the greater the chances for the recipient countries to absorb the advanced knowledge. The speed of technology transfer will be accelerated if the multinational affiliate is willing to establish upstream and downstream networks. Due to the demand for high quality input/output, the foreign companies are more likely to transfer some of their technology or knowledge to the local partners. This allows the recipient firms involved in supply and distribution chains to gain access to the advanced technology and, subsequently, leads to productivity improvement. Hamida (2013) also confirmed that being a part of the network through upstream and downstream activities enables the domestic suppliers and domestic customers to benefit from the technical and commercial know-how as well

as technology spillover, which leads to productivity improvement in the long run.

(4) The moving of employees from MNEs to domestic firms and complementary workers create a training effect of FDI spillovers. Another potential channel for technology spillovers from FDI to take place is through the acquisition of human capital. The availability of relatively skilled labor from abroad or employees trained under MNEs is considered as the key driver of FDI productivity spillovers (Goncalves, 1986). It has been argued that host countries are more likely to benefit from spillovers if they have a large supply of skilled labor (Keller, 1996). Additionally, the movement of labor from FDI firms to domestic firms can generate productivity improvements through either a direct spillover to complementary workers or via the knowledge carried by workers who move to another firm. Glass and Saggi (2002) argue that the knowledge that workers bring with them is the most essential channel for spillovers. Providing an overall review of FDI spillover, Wang et al. (2012) also find a significantly positive impact of FDI on domestic human capital and economic growth through building the capacity of local workers and encouraging innovations.

Although theoretical research into FDI spillover remains underdeveloped, empirical studies on the issue continue to increase. The framework of most studies is constructed using the main variable of labor productivity or total factor productivity and the presence of FDI, as well as other potential determinants to examine the effect of FDI on domestic firms' productivity. Even though numerous research studies have been conducted to investigate whether the invasion of MNEs can create productivity spillovers or not, the findings remain mixed. Some studies confirmed that the presence of FDI could cause harmful effects on domestic firms' performance (Haddad and Harrison, 1993; Aitken and Harrison, 1999; Djankov and Heokman, 2000; Jeon et al., 2013). Specifically, Aitken and Harrison (1999) discovered that the negative "market-stealing" effects from the competition by foreign brands outweigh the benefits of FDI spillovers. Consequently, the total productivity of domestic organizations is reduced with the existence of MNEs. On the contrary, other studies found that domestic firms enjoy positive spillovers that eventually enhance productivity (Haskel, Pereira and Slaughter, 2007; Javorcik, 2004; Liu X. et al., 2000; Liu X., Wang and Wei, 2001).

The explanation for such inconsistent findings is that some research did not take into account the difference between the short-term and long-term effects of FDI spillovers (Liu Z., 2008). The adoption of new technology is resource-consuming, and local firms might have to leverage their current resources and reduce some of them during the production. Therefore, productivity will suffer at the initial stage of the application, and as a result, negative correlations might be found. However, in the long run, when domestic firms have fully adapted and exploited the new technologies, they will gain efficiency and enjoy a higher rate of production growth. At this stage, higher efficiency will compensate for the initial loss in productivity (Darrat and Sarkar, 2009). Thus, we conclude that the results are heavily dependent on the length of time that each study attempted to cover.

## **2.2. The Technology Gap, Absorptive Capacity, and FDI Spillovers**

Perri and Peruffo (2014) organize the related theoretical and empirical studies by developing a framework to analyze the possibility of productivity spillovers. Three main attributes of spillover: magnitude, scope, and speed, are determined by firms' heterogeneity and the host business environment, such as learning efforts and resources, competitive and absorptive capacity, the technology gap, the financial market, the network, and regulations. In other words, the spillover effect varies between the micro (the MNC's subsidiaries, local firms) and the macro level (countries, economies, industries) and between the short term and the long term.

Studies on the technological gap emphasized the quality of technological transfer. Contrary to Findlay's findings, Glass and Saggi (1999) propose that the greater the knowledge gap between the host and home country, the lower the possibility of technological transfer due to insufficient human resources, infrastructure, and networks. They confirm that absorptive capacity and the technology gap are thus important determinants of technology spillovers. From a different perspective, Walz (1997) suggests that knowledge spillovers are the facilitator of innovative activities in backward companies. Iršová and Havránek (2013), Javorcik and Spatareanu (2008), and Kokko (1994) agree that the technology gap is an important determinant of FDI spillovers. However, it is worth mentioning that whether domestic firms can benefit from FDI spillovers heavily depends on how large the technology gap between the recipient companies and the MNEs is (Lemi, 2004). According to Dimelis (2005), the reason for this is due to the two streams of research on the catch-up and absorptive capacity hypotheses. The advocates for catch-up theory state that the larger the gap, the more likely FDI spillover can happen since there will be more knowledge and technology available for domestic firms to learn, and such intangible assets can be adopted by the domestic firms in the long run. Results from several studies confirm that the larger the gap, the more beneficial it is to local firms since a potential catch-up effect exists (Blalock and Gertler, 2009; Wang and Blomström, 1992).

On the contrary, according to the absorptive capacity theory, if domestic firms possess an insufficient skilled workforce or physical capital, they are unable to learn or adapt to such advanced knowledge. Damijan et al. (2013) showed that only firms with high or medium absorptive capacity levels could experience significant and positive horizontal spillover. Similarly, Girma, Görg and Pisu (2008) confirmed that the chance for FDI spillovers to occur in domestic firms is less likely if the gap in the technology level between the recipient firms and the MNEs is too significant. Dimelis (2005), using a panel dataset from 2,589 manufacturing firms in Greece, also concluded that a smaller technology gap would be more beneficial to the domestic firms.

## **2.3. Firm Characteristics and FDI Spillovers**

Another stream of research focusing on the scope of FDI spillover employs

constructs such as domestic firm size, the ownership structure of FDI firms, the liberalization of trade, and geographic aspects. Under the presence of foreign entities, Aitken and Harrison (1999) suggest that small firms with low production scales are not able to facilitate technological development. On the other hand, large firms will capture the technology transfer benefits, given their potential capability.

According to previous studies, international trade can create FDI spillovers and improve productivity via the following ways. First, through international trade, the recipient countries can get access to better quality intermediate products via import activities. Second, open communication with foreign partners enables local firms to learn various knowledge and skills. Third, such trades may lead to technology leakage via imitation. Fourth, international trade encourages local firms to be innovative and enhance productivity using knowledge and technology learnt from other countries (Bernard and Jensen, 1999; Blalock and Gertler, 2004; Hejazi and Safarian, 1999; Monastiriotis and Jordaan, 2010).

Amiti and Javorcik (2008) and Girma et al. (2008) extend their investigation of vertical and horizontal spillovers to trade orientation in terms of exports, but their results are mixed and subject to important variables related to market structure. Although many studies have investigated the relationship between exports and technology spillovers through backward and forward linkages, few studies have examined the impact of imports on downstream and upstream spillovers. Blalock and Veloso (2007), using panel data from Indonesian manufacturers, show that downstream imports are associated with productivity achievements and consider imports as one of the key elements for promoting economic growth.

### 3. METHODOLOGY

#### 3.1. Data Description

In this study, we use the Vietnamese annual enterprise surveys conducted during the period 2007-2015 by the GSO. It is worth noting that the data collection for 2015 was completed at the end of 2016. The dataset includes the overall information, such as balance sheets, financial statements, and other figures that are relevant to our work. Recent studies in Vietnam also exploit this firm-level data from 2000 to 2005, which covers all industries, to analyze the spillover from FDI to Vietnam's domestic firms (Anwar and Nguyen, 2011b, 2014). The dataset covers the entire number of enterprises operating across all industries and throughout the country. All the general information about firms in the areas of labor, operation, and finance, such as business type; business assets; ownership ratio; annual revenue, profit, and loss; and labor force, was collected. With the suggestions of Rojec and Knell (2017), using a firm-level panel data analysis of FDI, spillovers could eliminate several failures to find the unambiguously positive effects in econometric work that have been mentioned by Görg and Greenaway (2004).



The author verified the creditable value and reliability of each observation to delete the observations that did not satisfy the minimum criteria, such as negative sales, negative output, negative input, negative capital stock, and missing information about the key variables.

### 3.2. The Model and Definition of the Variables

In this research, we follow the basic framework of Aitken and Harrison (1999) and develop the model further by taking into account other variables to capture the horizontal and vertical effects of various spillover channels on the productivity of Vietnamese companies in the manufacturing sector. However, instead of using the total output as a dependent variable like the original study, we use the total factor productivity (TFP) to investigate FDI presence effects on domestic firms' performance. Similar to Girma et al. (2008), Wei and Liu (2006), Xu and Sheng (2012), and other studies, we calculate (TFP) in two steps: The first step is the estimation involving several firms' inputs, such as labor, capital, and material. In the second step, the TFP is regressed on variables that capture the intra-spillover and vertical spillover effects and other firm-related variables, which will be further discussed in the following sections.

#### 3.2.1. Total Factor Productivity Estimation

To identify the impact of technology spillovers from FDI enterprises on indigenous ones, we assume the firm's production function is of the Cobb-Douglas type:

$$Y_{it} = A_{it}(f, a, m, g)L_{it}^{\beta_l}K_{it}^{\beta_k}, \quad (1)$$

where:  $i$  and  $t$  represent firm and time, respectively;  $Y_{ij}$  is the value-added output of firm  $i$  at time  $t$ , measured by the firm's profit;  $K_{it}$  and  $L_{it}$  are capital and labor inputs, respectively, measured by the firm's physical capital and the number of employees;  $f$  is the FDI presence;  $a$ : is the common technical factors;  $m$  is the stock of firm-specific capital, including human capital and managerial ability;  $g$  is the external sources of knowledge;  $A_{it}$  is the TFP in firm  $i$  at time  $t$ ;  $\beta_l$  and  $\beta_k$  are the elasticity of output with respect to labor and capital.

Taking the natural logs of Equation (1), which is denoted by small letters, we estimate the logarithm function of the production function:

$$y_{it} = \alpha + \beta_l l_{it} + \beta_k k_{it} + \omega_{it} + \varepsilon_{it}, \quad (2)$$

where  $y$ ,  $l$ , and  $k$  are the natural logarithms of output, labor, and capital inputs, respectively;  $\omega$  is the total factor productivity, which is known to the firm but not to the researcher;  $\varepsilon$  stands for random productivity shocks; and the subscripts  $i$  and  $t$  index the firm and time. It is important to note that the same inputs are used to

measure the TFP in the five economic regions as well as in the other provinces in Vietnam since there is no specific condition for any of these areas.  $\beta_l$  and  $\beta_k$  stand for the elasticity of labor and capital, respectively.

The concern about the estimated TFP resulting from Equation (2) is that it may be biased because the TFP can be influenced by the choice of factor input combinations in the same period. Therefore, there may be a correlation between the TFP and the contemporaneous covariates. In other words, since labor and other inputs are endogenously determined, the use of OLS from Equation (2) is susceptible to biasing the estimated coefficients (Liu, 2008). To overcome this simultaneous problem, Ilke (2010) reviewed several approaches to capture the TFP of firms while controlling the endogenous bias, which apply a fixed effect model, instrumental variables (IVs) and a generalized method of moments, and the semi-parametric estimations of Olley and Pakes (1992) and Petrin et al. (2004). Ilke (2010) also introduced methods applying non-parametric approaches, such as indexed number and data envelopment analysis (DEA). Under the unique characteristics of the GSO sample, we obtain consistent elasticity estimates for Equation (2) by employing the methodology of (Petrin et al., 2004), called the LP estimation method, which allows for firm-specific productivity difference, exhibiting idiosyncratic changes over time. According to Keller (2004), the LP estimation method leads to a substantially greater role of FDI spillovers, which comes to result in a better estimate of in-sample productivity growth.

### 3.2.2. Estimate of FDI Spillovers

In this research, we focus on examining both horizontal and vertical spillovers from FDI. In order to measure FDI spillovers, we construct and calculate related variables based on the existing literature (for example, see Aitken and Harrison, 1999; Javorcik, 2004; Liu, 2008; Grima et al., 2008). The degree of horizontal spillovers in industry  $j$  at time  $t$ ,  $H\_FDI_{jt}$ , is measured as follows:

$$H\_FDI_{jt} = \frac{\sum_{i \in j; i=FDI\ firms} TOTAL\ SALES_{ijt}}{\sum_{i \in j} TOTAL\ SALES_{ijt}}.$$

As mentioned in the Literature Review, the vertical spillover effect can be divided into two categories: vertical backward and vertical forward. The degree of backward spillovers in industry  $j$  at time  $t$  is computed as follows, where  $Y_{kj}$  is the output of industry  $k$  supplied to industry  $j$ .

$$BWD\_FDI_{jt} = \sum_{\forall k \neq j} \alpha_{kj} H\_FDI_{jt},$$

$$\alpha_{kj} = \frac{Y_{kj}}{Y_k}.$$

In other words, the greater the output proportion produced in an industry with a foreign presence and the greater the amount of intermediate inputs received by the foreign firms from industry  $k$ , the greater the value of the spillover effect (Girma et al., 2008). This measurement captures the extent of backward linkages between local firms in upstream sectors and foreign firms in downstream sectors.

The vertical forward spillover effect in industry  $j$  at time  $t$  is calculated as follows:

$$FWD\_FDI_{jt} = \sum_{\forall h \neq j} \beta_{hj} H\_FDI_{jt},$$

$$\beta_{hj} = \frac{Y_{hj}}{Y_j}.$$

where  $\beta_{hj}$  represents the proportion of sector  $h$ 's output supplied to industry  $j$ .

This measurement can capture the extent of forward linkages between local firms in downstream sectors and foreign firms in upstream sectors. Some foreign firms in Vietnam use the output of domestic firms as input, and an increase in FDI leads to an increase in demand for inputs produced by domestic firms. The existing literature views this as a forward linkage between foreign and domestic firms.

The values of  $\alpha$  and  $\beta$  are obtained from the Input-Output Tables of Vietnam estimated by the General Statistic Office of Vietnam 2012. The dataset includes sectoral classification of firms at the two-digit level of the Vietnamese Standard Industrial Classification (VSIC).

### 3.2.3. Research Model

In the second step, the estimated TFP in Equation (2) is treated as a dependent variable, which is regressed on the FDI-related variables, such as horizontal and vertical FDI spillover, the technology gap, financial development, and other control variables. Because the dataset does not cover continuous information in foreign trading activities, we do not include foreign trading activities in this model. The study will investigate FDI spillovers by estimating the following equation:

$$\begin{aligned} TFP_{ijt} = & \beta_0 + \beta_1 H\_FDI_{jt} + \beta_2 FWD\_FDI_{jt} + \beta_3 BWD\_FDI_{jt} \\ & + \beta_4 HERF_{ijt} + \beta_5 HC_{ijt} + \beta_6 FINAN_{ijt} + \beta_7 TECH\_GAP_{jt} \\ & + \beta_8 LABOR\_SIZE_{ijt} + \mu_i + \varepsilon_{ijt}. \end{aligned} \quad (3)$$

where  $HERF_{ijt}$  is the Herfindahl index of firm  $i$  within industry  $j$  at time  $t$ ;  $HC_{ijt}$  is measured as the human capital level of firms by taking the ratio of the average labor wage of firm  $i$  to the average wage in the industry  $j$  at time  $t$ ;  $FINAN_{ijt}$  is financial development, measured as of firm  $i$  in industry  $j$  at time  $t$ , and it is measured by the current assets over the liability of the firm;  $TECH\_GAP_{jt}$  is the percentage difference between the average productivity of the foreign firm and that of domestic firms in the

same industry;  $LABOR\_SIZE_{ijt}$  is measured by the sales of firm  $i$  relative to the average firm sales in the same sector.

In this research, we aim to investigate one of the main channels via which FDI spillovers can occur, which is human capital. Jude (2016) found that the human capital level of the domestic firms can determine the absorptive capability, which, in turn, will lead to FDI productivity spillover. Specifically, local firms that possess a skillful and high-quality workforce tend to adopt new knowledge and technology transferred from a foreign presence. Since our dataset does not include a measurement for the skillfulness of employees, we adopted the method for this by following Jude (2016), in which human capital is calculated as the ratio of the firm's average wage to the industry's minimum wage. The interpretation for this is that the higher the salary of employees, the more skillful and valuable they are. Thus, with their equipped knowledge, said employees are able to learn advanced technology from abroad and help the local firms increase their productivity. Damijan et al. (2013) also confirm the positive relationship between human capital and firms' productivity.

According to previous studies, the technology gap can significantly determine the magnitude of FDI spillovers (Iršová and Havránek, 2013). Therefore, we take into account this factor to test whether Vietnamese companies can absorb technology transfer from foreign entities. As mentioned in the Literature Review, the empirical results about whether the technology gap accelerates or prevents the occurrence of FDI spillovers remains controversial. According to some studies, if the gap is too small, there is not much to learn from the MNEs. Specifically, findings by Sjöholm (1999) supported the opinion that a large technology gap enables spillovers as the MNEs have more knowledge to offer. Similarly, Blalock and Gertler (2009) found that Indonesian manufacturing firms with technology and knowledge that is compatible with that of the MNEs hardly benefit from spillovers. However, other studies show otherwise. Girma, Greenaway and Wakelin (2013) and Dimelis (2005) suggested that if the technology and knowledge being transferred to the recipient firms is too advanced and complicated, it is less likely that spillovers can exist as local firms may not be able to learn and apply such superior assets. Thus, we expect a negative correlation between the technology gap and Vietnamese firms' productivity.

We also take into account a firm's specific characteristics, such as size and time to control for changes over time. Additionally, the variable for financial development is included in our model to test its relationship with firms' total productivity. It is confirmed that a strong base of assets and experience are major competitive advantages for many businesses. In other words, the more assets firms own, the stronger their financial condition, which represents success and high productivity. According to Aitken and Harrison (1999), both small and large firms suffer from the market-stealing effects caused by the increase in FDI presence in the domestic market; firms with relative small assets, however, were found to suffer more severely from sale loss compared to large corporations. Therefore, we expect a positive relationship between firms' TFP and financial development. Similarly, we also predict that there is a positive

correlation between firms' average sales and productivity as sound financial health also leads to higher performance.

The data analysis will be conducted following these steps. First, we need to screen and filter to keep only the appropriate samples for analyzing the research models. Then, the key variables will be calculated in the research model following the estimations that were presented above. In order to analyze the research model, we will apply the econometric procedure developed by Hausman (1978) to test the correlation among the independent variables and to check whether the fixed effect model or the random effect model is the most suitable with the suggestions of Baum (2013), and Drukker (2003). In addition, to robustness check for the reliability of the methodology, we will apply the generalized method of moments (GMM). The program that will be used in the analysis is STATA 14.0.

## 4. DATA ANALYSIS

### 4.1. Empirical Results and Discussions

In this section, we report the results obtained after running an econometric test that measures the effect of intra-spillovers as well as that of vertical spillovers on Vietnamese firms' productivity in the manufacturing industry. Equation (3) is estimated to observe the relationship between domestic firms' TFP and FDI presence and other factors, such as the technology gap, financial development, human capital, and labor force size.

The next step in the analysis procedure is checking for co-linearity among the independent variables. Table 5 in the Appendix indicates relatively low correlations between the independent variables, which are almost all lower than 0.3 (Neter et al., 1990). This makes the coefficient estimations less biased and more reliable. Additionally, the variance inflation factor (VIF) is used to test whether co-linearity occurs in this research model. According to Table 1, the mean of the VIF is 1.34, and the highest VIF is 2.08 for the LABOR\_SIZE variable, which indicates that multicollinearity is not a problem for our model.

**Table 1.** VIF Scores

Variable	VIF	1/VIF
LABOR_SIZE	2.08	0.48130
HC	1.85	0.53934
H_FDI	1.39	0.72191
FWD	1.19	0.83932
BWD	1.07	0.93481
FN	1.07	0.93701
TECH_GAP	1.03	0.97416
HERF	1.01	0.98849
<i>Mean VIF</i>	1.34	

The model in this study is estimated by fixed effect regression based, following the result of the Hausman test (Hausman, 1978), which indicates that the fixed effect is more appropriate than the random effect in our dataset. It is important to note that the conduction of the Hausman test recommends the use of a fixed effect model for our large unbalanced 2007-2015 panel data. We also conduct a clustering firm option to reduce the heteroskedasticity and auto-correction bias in the model.

**Table 2.** The Effect of FDI Spillover on Domestic Firms' TFP

	FEM LN_TFP1p2	REM LN_TFP1p2	Xtabond2 LN_TFP1p2
L.LN_TFP1p2	-0.003 (0.011)	0.589*** (0.005)	0.397*** (0.014)
H_FDI	-0.512*** (0.057)	-0.820*** (0.029)	-1.726*** (0.223)
FWD	-0.036*** (0.006)	-0.029*** (0.004)	-0.231*** (0.027)
BWD	-0.001 (0.001)	-0.009*** (0.002)	0.322*** (0.053)
HERF	1.131*** (0.317)	1.431*** (0.227)	1.224 (0.746)
HC	-0.288*** (0.006)	-0.215*** (0.003)	-0.163*** (0.010)
FN	0.131*** (0.033)	0.156*** (0.026)	0.116*** (0.016)
TECH_GAP	0.031 (0.026)	-0.321*** (0.016)	-0.711*** (0.056)
LABOR_SIZE	0.132*** (0.010)	0.288*** (0.004)	0.399*** (0.013)
_cons	3.072*** (0.055)	0.551*** (0.029)	1.092*** (0.072)
N	124,614	124,614	124,614
No. firms	84,325	84,325	84,325
R <sup>2</sup>	0.106		

Notes: The dependent variable is the natural log of the TFP. Standard errors in parentheses\* p < .10, \*\* p < .05, \*\*\* p < 0.01.

Based on the result of the fixed effect model, as shown in Table 2, horizontal spillovers negatively correlated to firm productivity. This can be explained by the intense competition from abroad, which reduces the domestic firms' position in the market and means that they are unable to compete with such strong competitors who

possess superior knowledge and technology. Although there are many contrasting findings (Aitken and Harrison, 2013; Girma, 2005; Girma and Wakelin, 2007; Keller and Yeaple, 2009; Kosová, 2010), this result has been supported by several previous studies (Gorodnichenko et al., 2014; Hamida, 2013; Javorcik and Spatareanu, 2008; Jeon et al., 2013; Le and Pomfret, 2011; Merlevede et al., 2014; Zanello et al., 2016). Merlevede et al. (2014) investigated a Romanian subset from the Amadeus database for a period of 10 years, from 1996 to 2005, and found that foreign entry initially impacts negatively on the productivity of domestic firms but is followed by a positive effect that could cover the initial disruptive stage. However, this scenario does not seem to be the situation in the Vietnamese market since our results indicate that domestic firms suffer heavily from the market-stealing effect. In general, the fierce competitiveness brought by foreign entry worsens the performance of local firms in Vietnam.

The coefficient of forward spillovers from FDI to local productivity is significantly negative ( $\beta = -0.036$ ;  $p\text{-value} < 0.01$ ). This means that Vietnamese buyers are unable to benefit from FDI spillovers from foreign firms as there is a low possibility that foreign suppliers are willing to transfer their technology to domestic firms via this interaction. Our finding is inconsistent with the findings of the insignificant result of forward linkage FDI spillovers (Anwar and Nguyen, 2010a, 2011b) from studies conducted in a similar market but over a different period. This difference may come from the gradual improvement of intra-spillovers in many internal and external determinants in terms of a better quality of infrastructure, higher exposure to advanced technology, and the acquisition of human capital and labor (Halpern and Muraközy, 2007; Iršová and Havránek, 2013).

From the result, we can see that market power, proxied as the Herfindahl index, and financial development play an important role in determining firms' productivity ( $\beta_{HERF} = 1.131$  and  $\beta_{FN} = 0.131$ ; both  $p\text{-values} > 0.01$ ). Human capital has been proven to negatively relate to the TFP of firms, with a coefficient of  $-0.288$  at the 0.01 level of significance.

### 4.3. Robustness Check

The dynamic panel data (DPD) approach has been developed to fix the obstacle of the fixed effect model in the context of the dataset that contains a relatively small number of observed periods compared to the number of individual units (small  $T$  and large  $N$ ; Holtz-Eakin et al., 1988). The issue is that the mean of the lagged dependent variable  $y_{t-1}$  contains a zero value on observations in the time  $t$  period because the mean error is subtracted from containing a contemporaneous value of error at time  $t$ . Consequently, the bias in the calculating of the coefficients of the lagged dependent variable  $y$  becomes considerable for the reason that it is not mitigated when the number of observations increases (Baum, 2013). It is worth noting that this bias is not caused by an autocorrelation error so, the lagged dependent variable cannot be independent of the composite error process. The DPD approach has improved the

limitation of the IVs approach, which does not exploit all the information available in the sample. With the GMM introduced by Arellano and Bond (1991); Arellano and Bover (1995); Blundell and Bond (2000); Blundell, Bond, and Windmeijer (2001); and Bond (2002), the DPD model can be estimated more efficiently.

We use the syntax `xtabond2` to robust the effects of FDI spillovers on domestic productivity (Stata, 2015). The results of the robustness check are almost consistent with the fixed effect model. The negative impacts of FDI presence and FDI vertical linkages on firm productivity were confirmed. However, the backward linkage spillover appeared to be positively significant in domestic productivity, which is supported by previous findings (Girma, 2005; Girma and Wakelin, 2007; Javorcik, 2004; Kosova, 2010; Le and Pomfret, 2011; Sourafel et al., 2013). The result could indicate that FDI enhances productivity when the intermediate inputs supplied by domestic firms are able to meet the strict standards of foreign partners. In other words, the local firms are able to learn new technology from foreign entities. Another difference in the result of the GMM compared to the fixed effect model (FEM) is the significantly negative effect of the technology gap on domestic productivity. It shows that in the industries where foreign firms have a higher technological level, domestic productivity is lower.

#### 4.4. Interaction Effects

In this research, we use the GMM approach to analyze the interaction effects of human capital, financial development, and the technology gap in the relationship between FDI spillovers and firm productivity. As mentioned above, the fixed effect model has several limits in analyzing DPD. Thus, we consider the GMM to be the most appropriate approach for analyzing “small T and large N” samples like the GSO dataset. In addition, the dependent variable of this research is a dynamic variable that depends on its past realizations, and independent variables that are correlated with past realizations of the error are not strictly exogenous.

When taking into account the interaction of human capital, the relations of horizontal and vertical spillovers do not change but do strengthen the negative impact of FDI forward spillovers ( $\beta_{F_{HC}} = -0.095$ , p-value < 0.01). Financial development impacts inversely on the positive relationship of FDI backward spillovers ( $\beta_{B_{FN}} = -0.570$ , p-value < 0.01) and lessens the negative impact of horizontal spillovers ( $\beta_{H_{FN}} = 0.874$ , p-value < 0.05). The technology gap also strengthens the negative impacts of FDI horizontal and forward spillovers. The coefficient for this variable is significantly negative, meaning that the higher the gap, the lower the productivity spillover that firms can enjoy. The result is also consistent with previous studies by Girma and Wakelin (2007), which concluded that if the gap is too large, the recipient firms may be unable to absorb the advanced technology from foreign firms.

Similarly, according to Dimelis (2005), the chance of spillover can be higher if the domestic firms already have the relative knowledge and technology that is not so outdated compared to the foreign investors. In the case of Vietnam, it is proven that the



lower the technology gap, the higher the chance for the local firms to catch up and learn from foreign companies.

**Table 3.** Interaction of Human Capital, the Financial Base, and the Technology Gap

	GMM Models			FEMs		
	LN_TFPlp2	LN_TFPlp2	LN_TFPlp2	LN_TFPlp2	LN_TFPlp2	LN_TFPlp2
L.LN_TFPlp2	0.385*** (0.014)	0.398*** (0.014)	0.413*** (0.015)	-0.003 (0.011)	-0.002 (0.011)	-0.003 (0.011)
H_FDI	-1.507*** (0.334)	-2.446*** (0.272)	-1.413*** (0.376)	-0.437*** (0.058)	-0.403*** (0.061)	-0.555*** (0.063)
FWD	-0.365*** (0.061)	-0.138*** (0.035)	0.277*** (0.047)	-0.044*** (0.006)	-0.036*** (0.007)	-0.030*** (0.008)
BWD	0.247*** (0.078)	0.420*** (0.049)	-0.302*** (0.048)	-0.001 (0.001)	0.003* (0.001)	-0.002 (0.002)
HERF	1.342* (0.803)	2.234** (0.975)	1.805* (1.039)	1.205*** (0.327)	1.132*** (0.314)	1.114*** (0.316)
HC	-0.129*** (0.018)	-0.162*** (0.011)	-0.175*** (0.013)	-0.291*** (0.007)	-0.290*** (0.006)	-0.288*** (0.006)
FN	0.122*** (0.018)	0.321*** (0.025)	0.076*** (0.019)	0.131*** (0.034)	0.181*** (0.020)	0.131*** (0.033)
TECH_GAP	-0.693*** (0.068)	-0.737*** (0.058)	-0.722*** (0.085)	0.030 (0.026)	0.042* (0.023)	0.027 (0.027)
LABOR_SIZE	0.418*** (0.019)	0.397*** (0.013)	0.434*** (0.014)	0.131*** (0.010)	0.133*** (0.010)	0.132*** (0.010)
H_HC	-0.085 (0.186)			0.078** (0.031)		
B_HC	-0.017 (0.057)			0.002* (0.001)		
F_HC	-0.095*** (0.035)			-0.011*** (0.003)		
H_FN		0.874** (0.416)			-0.534*** (0.124)	
B_FN		-0.570*** (0.060)			-0.010** (0.004)	
F_FN		-0.001 (0.058)			0.008 (0.011)	
H_TG			-1.715** (0.780)			0.140 (0.148)
B_TG			1.777*** (0.150)			0.009 (0.016)
F_TG			-1.405*** (0.141)			-0.021 (0.026)
cons	1.108*** (0.084)	1.058*** (0.075)	0.912*** (0.080)	3.073*** (0.055)	3.046*** (0.053)	3.072*** (0.055)
N	124614	124614	124614	124614	124614	124614
R <sup>2</sup>				0.107	0.108	0.106

However, the results show that local firms still gain more from FDI backward spillovers even with a large technology gap. This implies that local firms in Vietnam indeed receive technology and superior support from foreign buyers. The results also confirmed the significant interaction of human capital, financial development, and the technology gap on firm productivity in FDI spillovers.

## 5. CONCLUSION AND POLICY IMPLICATIONS

Since the attraction of FDI plays a major role in the growth of Vietnam, we believe studies on such topics have important implications for policy makers in designing better strategies to attract even more investment from abroad. Using unbalanced plant-level panel data from 87,195 Vietnamese firms from 2010-2015, this paper tries to answer the question of whether local firms in Vietnam benefit from an FDI presence in the same industry, region, and both. In order to avoid biased results that arise from variation between industries and regions, the fixed effect method is applied in the regression process.

The relationship between FDI and firm productivity still causes concern for many researchers. While this topic has provided rich insight into the impacts of FDI spillovers, limited empirical research has investigated the case of Vietnam. In this study, we examine the effects of FDI spillovers on the productivity of domestic firms. Employing the GMM approach to investigate enterprises operating in Vietnam during the period from 2007 to 2015, we illustrated how the spillovers from FDI occur for the domestic firms. Overall, as shown in our results, horizontal and forward linkage spillovers impact negatively on the productivity of domestic firms, while backward spillovers have a positive effect on local productivity. The human capital, financial development, and technology gap are confirmed as vital conditions for technology spillovers. This study provides an innuendo of technology/knowledge spillovers from FDI firms to domestic firms.

As a developing country that is still in the initial stage of attracting foreign investment, Vietnamese enterprises need more time to learn from the more experienced foreign firms and develop their own creative and unique business operations in order to compete against MNEs. The results suggest that in order to capture the benefits of FDI spillover, the first step is to increase the ability of the local workforce and create more training programs and opportunities for the local labor to reduce the technology gap. According to the result, the presence of foreign entities is proven to negatively affect domestic firms' productivity, which outweighs the positive effects of technology spillovers. Therefore, more support from the Vietnamese government is required, such as further investment in the education system as well as the expansion of R&D and infrastructure to increase the absorptive capacity of local firms.

## APPENDIX

**Table 1A.** Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
LN_TFP1p2	537,772	3.497358	1.639061	-8.65752	12.15582
H_FDI	537,772	0.053338	0.128176	0	1
FWD	537,772	0.249302	0.624221	0	9.475119
BWD	537,772	0.345254	1.534984	0	156.1357
HERF	537,772	0.000649	0.016515	1.50E-19	1
HC	537,772	-0.84138	1.483453	-10.3208	7.275376
FN	537,772	0.351565	0.380684	-45.8874	5.744615
TECH_GAP	537,772	0.329518	0.289112	-12.0571	2.979438
LABOR_SIZE	537,772	2.689906	1.390139	0.693147	11.46307

**Table 2A.** Correlation Table

	LN_TFP1p2	H_FDI	FWD	BWD	HERF	HC	FN	TECH_GAP
LN_TFP1p2	1							
H_FDI	0.0299*	1						
FWD	0.0214*	0.3947*	1					
BWD	-0.0127*	0.2563*	0.2012*	1				
HERF	0.0440*	0.0233*	0.0149*	0.0096*	1			
HC	0.1927*	-0.1372*	-0.0727*	-0.0554*	0.0544*	1		
FN	-0.0437*	-0.0903*	-0.0449*	-0.0339*	-0.0098*	-0.1824*	1	
TECH_GAP	-0.2681*	0.0109*	0.0194*	0.0467*	-0.0072*	-0.0202*	-0.0614*	1

## REFERENCES

- Aitken, B., G. Hanson and A. Harrison (1997), "Spillovers, Foreign Investment, and Export Behavior", *Journal of International Economics*, 43, 103-132.
- Aitken, B.J. and A.E. Harrison (2013), "Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela", *American Economic Review*, 89(3), 605-618.
- Amiti, M. and B.S. Javorcik (2008), "Trade Costs and Location of Foreign Firms in China", *Journal of Development Economics*, 85(1-2), 129-149.

- Anwar, S. and L.P. Nguyen (2010a), "Absorptive Capacity, Foreign Direct Investment-Linked Spillovers and Economic Growth in Vietnam", *Asian Business & Management*, Springer, 9(4), 553-570.
- \_\_\_\_\_ (2010b), "Foreign Direct Investment and Economic Growth in Vietnam", *Asia Pacific Business Review*, 16(1-2), 183-202.
- \_\_\_\_\_ (2011a), "Foreign Direct Investment and Trade: The Case of Vietnam", *Research in International Business and Finance*, 25(1), 39-52.
- \_\_\_\_\_ (2011b), "Foreign Direct Investment and Export Spillovers: Evidence from Vietnam", *International Business Review*, 20(2), 177-193.
- \_\_\_\_\_ (2014), "Is Foreign Direct Investment Productive? A Case Study of The Regions of Vietnam", *Journal of Business Research*, Elsevier Inc., 67(7), 1376-1387.
- Arellano, M. and S. Bond (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", *The Review of Economic Studies*, Wiley-Blackwell, 58(2), 277-297.
- Arellano, M. and O. Bover (1995), "Another Look at the Instrumental Variable Estimation of Error-Components Models", *Journal of Econometrics*, Elsevier, 68 (1), 29-51.
- Batten, J.A. and X.V. Vo (2009), "An Analysis of the Relationship Between Foreign Direct Investment and Economic Growth", *Applied Economics*, 41(13), 1621-1641.
- \_\_\_\_\_ (2015), "Foreign Ownership in Emerging Stock Markets", *Journal of Multinational Financial Management*, 32, 15-24.
- Baum, C.F. (2013), "Dynamic Panel Data Estimators", *Applied Econometrics*, EC823, 88.
- Bernard, A.B. and J. Bradford Jensen (1999), "Exceptional Exporter Performance: Cause, Effect or Both?", *Journal of International Economics*, 47(1), 1-25.
- Blalock, G. and P.J. Gertler (2004), "Learning from Exporting Revisited in a Less Developed Setting", *Journal of Development Economics*, 75(2), 397-416.
- \_\_\_\_\_ (2009), "How Firm Capabilities Affect Who Benefits from Foreign Technology", *Journal of Development Economics*, 90(2), 192-199.
- Blalock, G. and F.M. Veloso (2007), "Imports, Productivity Growth and Supply Chain Learning", *World Development*, 35(7), 1134-1151.
- Blomström, M. and F. Sjöholm (1999), "Technology Transfer and Spillovers: Does Local Participation with Multinationals Matter?", *European Economic Review*, 43(4-6), 915-923.
- Blundell, R. and S. Bond (2000), "GMM Estimation with Persistent Panel Data: An Application to Production Functions", *Econometric Reviews*, Taylor & Francis, 19(3), 321-340.
- Blundell, R., S. Bond and F. Windmeijer, (2001), "Estimation in Dynamic Panel Data Models: Improving on the Performance of The Standard GMM Estimator", *Nonstationary Panels, Panel Cointegration and Dynamic Panels*, Emerald Group Publishing Limited, 53-91.
- Bond, S.R. (2002), "Dynamic Panel Data Models: A Guide to Micro Data Methods and

- Practice”, *Portuguese Economic Journal*, 1(2), 141-162.
- Bwalya, S.M. (2006), “Foreign Direct Investment and Technology Spillovers: Evidence from Panel Data Analysis of Manufacturing Firms in Zambia”, *Journal of Development Economics*, 81(2), 514-526.
- Bui, T.M.H., X.V. Vo and D.T. Bui (2018), “Gender Inequality and FDI: Empirical Evidence from Developing Asia-Pacific Countries”, *Eurasian Economic Review*, 8(3), 393-416.
- Cuong, L.K. and X.V. Vo (2019), “Interbank Financing and Business Cycle in Europe”, *Journal of Economic Studies*, 46(6), 1280-1291.
- Damijan, J.P. et al. (2013), “Impact of Firm Heterogeneity on Direct and Spillover Effects of FDI: Micro-Evidence from Ten Transition Countries”, *Journal of Comparative Economics*, 41(3), 895-922.
- Darrat, A. and J. Sarkar, (2009), “Growth Consequences of Foreign Direct Investment: Some Results for Turkey”, *Journal of Economic Development*, 34(2), 85-96.
- Demena, B.A. (2015), “Publication Bias in FDI Spillovers in Developing Countries: A Meta-Regression Analysis”, *Applied Economics Letters*, 22(14), 1170-1174.
- Dimelis, S.P. (2005), “Spillovers from Foreign Direct Investment and Firm Growth: Technological, Financial and Market Structure Effects”, *International Journal of the Economics of Business*, 12(1), 85-104.
- Drukker, D.M. (2003), “Testing for Serial Correlation in Linear Panel-Data Models”, *Stata Journal*, 3(2), 168-177.
- El-Wassal, K.A. (2012), “Foreign Direct Investment and Economic Growth in Arab Countries (1970-2008): An Inquiry into Determinants of Growth Benefits”, *Journal of Economic Development*, 37(4), 79-101.
- Findlay, R. (1978), “Relative Backwardness, Direct Foreign Investment and the Transfer of Technology: A Simple Dynamic Model”, *The Quarterly Journal of Economics*, JSTOR, 92(1), 1-16.
- Girma, S. (2005), “Technology Transfer from Acquisition FDI and the Absorptive Capacity of Domestic Firms: An Empirical Investigation”, *Open Economies Review*, 16(2), 175-187.
- Girma, S. and K. Wakelin (2007), “Local Productivity Spillovers from Foreign Direct Investment in The UK Electronics Industry”, *Regional Science and Urban Economics*, 37(3), 399-412.
- Girma, S., H. Görg and M. Pisu, (2008), “Exporting, Linkages and Productivity Spillovers from Foreign Direct Investment”, *Canadian Journal of Economics*, 41(1), 320-340.
- Girma, S., D. Greenaway and K. Wakelin (2013), “Who Benefits from Foreign Direct Investment in the UK?”, *Scottish Journal of Political Economy*, 60(5), 560-574.
- Glass, A.J. and K. Saggi (1999), “FDI Policies Under Shared Factor Markets”, *Journal of International Economics*, 49(2), 309-332.
- \_\_\_\_\_ (2002), “Multinational Firms and Technology Transfer”, *The Scandinavian Journal of Economics*, 104(4), 495-513.

- Goncalves, R. (1986), "Technological Spill-overs and Manpower Training", *Journal of Economic Development*, 1, 119-132.
- Görg, H. and D. Greenaway (2004), "Much Ado about Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment?", *World Bank Research Observer*, 19(2), 171-197.
- Gorodnichenko, Y., J. Svejnar and K. Terrell (2014), "When Does FDI Have Positive Spillovers? Evidence from 17 Transition Market Economies", *Journal of Comparative Economics, Association for Comparative Economic Studies*, 42(4), 954-969.
- Halpern, L. and B. Muraközy (2007), "Does Distance Matter in Spillover?", *Economics of Transition*, 15(4), 781-805.
- Hamida, L.B. (2013), "Are There Regional Spillovers from FDI in the Swiss Manufacturing Industry?", *International Business Review*, 22(4), 754-769.
- Hausman, J.A. (1978), "Specification Tests in Econometrics", *Econometrica: Journal of the Econometric Society*, JSTOR, 1251-1271.
- Hejazi, W. and A.E. Safarian (1999), "Trade, Foreign Direct Investment, and R&D Spillovers", *Journal of International Business Studies*, 30(3), 491-511.
- Holtz-Eakin, D., W. Newey and H.S. Rosen (1988), "Estimating Vector Autoregressions with Panel Data", *Econometrica: Journal of the Econometric Society*, JSTOR, 1371-1395.
- Ilke, V.B. (2010), "Total Factor Productivity Estimation: A Practical Review", *Journal of Economic Surveys*, 26(1), 98-128.
- Iršová, Z. and T. Havránek (2013), "Determinants of Horizontal Spillovers from FDI: Evidence from a Large Meta-Analysis", *World Development*, 42(1), 1-15.
- Javorcik, B.S. (2004), "Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages", *The American Economic Review*, 94(3), 605-627.
- Javorcik, B.S. and M. Spatareanu, (2008), "To Share or not to Share: Does Local Participation Matter for Spillovers from Foreign Direct Investment?", *Journal of Development Economics*, 85(1-2), 194-217.
- \_\_\_\_\_ (2009), "Liquidity Constraints and Firms' Linkages with Multinationals", *World Bank Economic Review*, 23(2), 323-346.
- Jeon, Y., B.I. Park and P.N. Ghauri (2013), "Foreign Direct Investment Spillover Effects in China: Are They Different across Industries with Different Technological Levels?", *China Economic Review*, 26, 105-117.
- Jude, C. (2016), "Technology Spillovers from FDI. Evidence on the Intensity of Different Spillover Channels", *World Economy*, 39(12), 1947-1973.
- Keller, W. (1996), "Absorptive Capacity: On the Creation and Acquisition of Technology in Development", *Journal of Development Economics*, 49(1), 199-227.
- Keller, W. and S. Yeaple (2009), "Multinational Enterprises, International Trade and Productivity Growth: Firm Level Evidence from the United States", *Review of Economics and Statistics*, 91(4), 821-831.

- Kokko, A. (1994), "Technology, Markets, Characteristics and Spillovers", *Journal of Development Economics*, 43, 279-293.
- Kosová, R. (2010), "Do Foreign Firms Crowd out Domestic Firms? Evidence from the Czech Republic", *The Review of Economics and Statistics*, 92(4), 861-881.
- Lauter, M. and F. Moreaub (2012), "Domestic Investment and FDI in Developing Countries: The Missing Link", *Journal of Economic Development*, 37(3), 1-23.
- Le, H.Q. and R. Pomfret (2011), "Technology Spillovers from Foreign Direct Investment in Vietnam: Horizontal or Vertical Spillovers?", *Journal of the Asia Pacific Economy*, 16(2), 183-201.
- Lemi, A. (2004), "Foreign Direct Investment, Host Country Productivity and Export: The Case of U.S. and Japanese Multinational Affiliates", *Journal of Economic Development*, 29(1), 163-187.
- Liao, H., X. Liu and C. Wang (2012), "Knowledge Spillovers, Absorptive Capacity and Total Factor Productivity in China's Manufacturing Firms", *International Review of Applied Economics*, 26(4), 533-547.
- Marcin, K. (2008), "How Does FDI Inflow Affect Productivity of Domestic Firms? The Role of Horizontal and Vertical Spillovers, Absorptive Capacity and Competition", *Journal of International Trade and Economic Development*, 17(1), 155-173.
- Merlevede, B., K. Schoors and M. Spatareanu (2014), "FDI Spillovers and Time Since Foreign Entry", *World Development*, 56, 108-126.
- Mohamed, S. and M. Sidiropoulos (2010), "Another Look at The Determinants of Foreign Direct Investment in MENA Countries: An Empirical Investigation", *Journal of Economic Development*, 35(20), 75-95.
- Monastiriotis, V. and J.A. Jordaan (2010), "Does FDI Promote Regional Development? Evidence from Local and Regional Productivity Spillovers in Greece", *Eastern Journal of European Studies*, 1(2), 139-164.
- Neter, J., W. Wasserman and M.H. Kutner (1990), *Applied Statistical Models*, Richard D. Irwin, Inc., Burr Ridge, IL.
- Nguyen, A.N. et al. (2008), "Foreign Direct Investment in Vietnam: Is There Any Evidence of Technological Spillover Effects", Working Papers 18, Development and Policies Research Center (DEPOCEN), Vietnam.
- Nguyen, D.P. and X.V. Vo (2017), "Determinants of Bilateral Trade: Evidence from ASEAN+ 3", *Asian Pacific Economic Literature*, 31 (2), 115-122.
- Nguyen, D.P. et al. (2018), "Government Cost and Firm Value: Evidence from Vietnam", *Research in International Business and Finance*, 46, 55-64.
- Olley, G.S. and A. Pakes (1992), "The Dynamics of Productivity in the Telecommunications Equipment Industry", NBER Working Paper No. 3977.
- Perri, A. and E. Peruffo (2014), "Knowledge Spillovers from FDI: A Critical Review from the International Business Perspective", *International Journal of Management Reviews*, 18(1), 3-27.
- Petrin, A., B. Poi and J. Levinsohn (2004), "Production Function Estimation in Stata Using Inputs to Control for Unobservables", *Stata Journal*, 4(2), 113-123.

- Rojec, M. and M. Knell (2017), "Why is There a Lack of Evidence on Knowledge Spillovers from Foreign Direct Investment?", *Journal of Economic Surveys*, 32(3), 579-612.
- Schaumburg-Müller, H. (2003), "Rise and Fall of Foreign Direct Investment in Vietnam and Its Impact on Local Manufacturing Upgrading", *European Journal of Development Research*, 15(2), 44-66.
- Sjöholm, F. (1999), "Technology Gap, Competition and Spillovers from Direct Foreign Investment: Evidence from Establishment Data", *Journal of Development Studies*, 36(1), 53-73.
- Sourafel, G., G. David and W. Katharine (2013), "Who Benefits from Foreign Direct Investment in the UK?", *Scottish Journal of Political Economy*, 60(5), 560-574.
- Stata, A. (2015), *Stata Base Reference Manual Release 14*, Citeseer.
- Vo, X.V. (2010), "Net Private Capital Flows and Economic Growth: The Case of Emerging Asian Economies", *Applied Economics*, 42(24), 3135-3146.
- \_\_\_\_ (2015a), "Foreign Ownership and Dividend Policy: The Case of Vietnam", *International Journal of Banking, Accounting and Finance*, 6(2), 73-86.
- \_\_\_\_ (2015b), "Foreign Ownership and Stock Return Volatility: Evidence from Vietnam", *Journal of Multinational Financial Management*, 30, 101-109.
- \_\_\_\_ (2016a), "Does Institutional Ownership Increase Stock Return Volatility? Evidence from Vietnam", *International Review of Financial Analysis*, 45, 54-61.
- \_\_\_\_ (2016b), "Finance in Vietnam: An Overview", *Afro-Asian Journal of Finance and Accounting*, 6(3), 202-209.
- \_\_\_\_ (2016c), "Foreign Investors and Corporate Risk-taking Behavior in an Emerging Market", *Finance Research Letters*, 18, 273-277.
- \_\_\_\_ (2016d), "Foreign Ownership and Stock Market Liquidity-Evidence from Vietnam", *Afro-Asian Journal of Finance and Accounting*, 6(1), 1-11.
- \_\_\_\_ (2017a), "Determinants of Capital Structure in Emerging Markets: Evidence from Vietnam", *Research in International Business and Finance*, 40, 105-113.
- \_\_\_\_ (2017b), "Do Foreign Investors Improve Stock Price Informativeness in Emerging Equity Markets? Evidence from Vietnam", *Research in International Business and Finance*, 42, 986-991.
- \_\_\_\_ (2017c), "How Does the Stock Market Value Bank Diversification? Evidence from Vietnam", *Finance Research Letters*, 22, 101-104.
- \_\_\_\_ (2018a), "Determinants of Capital Flows to Emerging Economies: Evidence from Vietnam", *Finance Research Letters*, 27, 23-27.
- \_\_\_\_ (2018b), "Foreign Investors and Stock Price Crash Risk: Evidence from Vietnam", *International Review of Finance*, 21 December.
- \_\_\_\_ (2018c), "Foreign Ownership and Corporate Cash Holdings in Emerging Markets", *International Review of Finance*, 18(2), 297-303.
- \_\_\_\_ (2019), "Do Foreign Investors Promote Stock Price Efficiency in Emerging Markets?", *International Review of Finance*, 19(1), 223-235.
- Walz, U. (1997), "Innovation, Foreign Direct Investment and Growth", *Economica*,



- 64(253), 63-79.
- Wang, C. et al. (2012), “Reconceptualizing the Spillover Effects of Foreign Direct Investment: A Process-Dependent Approach”, *International Business Review*, 21(3), 452-464.
- Wang, J.Y. and M. Blomström (1992), “Foreign Investment and Technology Transfer: A Simple Model”, *European Economic Review*, 36(1), 137-155.
- Wei, Y. and X. Liu (2006), “Productivity Spillovers from R&D, Exports and FDI in China’s Manufacturing Sector”, *Journal of International Business Studies*, 37(4), 544-557.
- Xu, X. and Y. Sheng (2012), “Are FDI Spillovers Regional? Firm-level Evidence from China”, *Journal of Asian Economics*, 23(3), 244-258.
- Zanello, G. et al. (2016), “The Creation and Diffusion of Innovation in Developing Countries: a Systematic Literature Review”, *Journal of Economic Surveys*, 30(5), 884-912.
- Zhang, Y.A.N.A. (2014), “FDI Spillovers Over Time in an Emerging Market: The Roles of Entry Tenure and Barriers to Imitation”, *Academy of Management Journal*, 57(3), 698-722.

*Mailing Address: Quarter 6, Linh Trung Ward, Thu Duc District, Ho Chi Minh City, 700000, Vietnam, Email: nvphuong@hcmiu.edu.vn.*

*Received February 4, 2020, Accepted February 11, 2020.*