Print ISSN: 2288-4637 / Online ISSN 2288-4645
doi:10.13106/jafeb.2021.vol8.no1.655

Spillover Effects of FDI on Technology Innovation of Vietnamese Enterprises

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Received: October 01, 2020 Revised: December 06, 2020 Accepted: December 14, 2020

Abstract

This paper aims to develop a conceptual framework for determinants of spillover effects of FDI on technology innovation of Vietnamese enterprises. The research proposes a logistic regression model for assessing how enterprises' ability to implement technological innovation is affected by the presence of FDI enterprises as well as other factors that show the change through the indirect influence of FDI such as the size of the enterprise, the type of enterprise, and the skill level of the labor force or its research and development activities. Five forms of technology innovation are considered: improving production process; product quality improvement; product expansion; expanding business activities into a new field of production; and changing business activities into a new field of production. General Statistics Office of Vietnam provided survey data to collect information from 3,166 enterprises in the manufacturing and processing industry in Hanoi, which were valid for analysis. The results show that all variables of enterprise type, size, R&D, and industry have a positive impact on the selection of one of the innovation forms. Several recommendations are further suggested to take advantage of the positive effects and minimizing the negative effects of FDI for technological innovation of Vietnamese enterprises.

Keywords: Spillover, FDI, Technology Innovation

JEL Classification Code: F14, O36, P11

1. Introduction

Vietnam has been quite successful in attracting FDI inflows since the inception of economic reform (known as "doi moi") in 1986 (Ta et al., 2020a). Up to now, Vietnam has attracted about 8,000 foreign direct investment (FDI) projects, the total registered investment capital is estimated at over USD145 billion and about 7,500 domestic investment projects, the total registered capital is estimated at nearly VND970 trillion (Do et al., 2020). The FDI sector has confirmed the major role it plays in the Vietnamese economy. Vietnam has become an attractive destination (Ta et al., 2020) and continues to attract record FDI.

The presence and development of FDI enterprises, besides directly affecting the growth of the whole economy, also affects domestic enterprises such as increasing competition pressure, forcing domestic enterprises to increase business efficiency, promoting technology dissemination and transfer, etc. These impacts are also known as spillover effects of FDI. The emergence of the spillover effects of FDI can be explained by the difference in development levels between foreign and domestic firms and therefore the advantage belongs to multinational companies–who have strengths in capital and technology. As a result, subsidiaries or joint ventures established by multinational companies often have competitive advantages over domestic firms, especially underdeveloped countries. The emergence of foreign firms firstly imbalances the market and forces domestic firms to adjust their behavior in order to maintain market share and profitability. Therefore, the spillover effect can be considered as the result of foreign firms' performance coinciding with the domestic firms' behavioral adjustment process, including the impact on technology innovation of businesses.

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This article has reviewed international trade and business theories and international investment theories, thereby clearly showing the relationship between foreign direct investment and business technology innovation activities of enterprises of the host country, build a model to evaluate the impact of FDI on technology innovation of enterprises in Vietnam to find out the relationship of FDI and technological innovation of enterprises, thereby proposing to take advantage of the positive effects and limit the negative effects of FDI on technology innovation of Vietnamese enterprises.

2. Literature Review

2.1. The Effect of FDI on Technology Innovation of Enterprises

Assessing the impact of FDI on the economic growth of a country in general or the spillover effects of FDI, in particular, has become the research topic of many scientists. However, the results draw mixed conclusions about the effects of FDI on economic growth as well as the spillover effects of FDI. The study of Alfaro's (2003) used regression method with panel data to investigate the relationship between FDI and labor productivity in different industries in 47 countries for the period 1981-1999. The study has concluded that FDI has a positive effect on the productivity of enterprises in the processing industry, but at the same time it has a negative impact on the growth of the agricultural and mining industries. Research by Kokko (1994) showed a positive correlation between FDI and economic growth in Mexico and research by Asongu and Odhiambo (2020) illustrated that FDI helps to boost the country's production capacity.

The positive effect of FDI is also examined in a study by Kurmar and Pradhan (2005) using panel data in 107 developing countries for the period 1980-1999. However, the study of Mencinger (2003) on the role of FDI in the growth of eight transition countries in Eastern Europe, during the period 1994-2001 found that FDI decreased their ability to keep pace with growth with the EU (Kayalvizhi et al., 2018; Sekuloska, 2015). The reason, due to the small size of these economies and FDI, is too focused on trade and finance that has reduced the spillover effect on productivity in the general economic sectors, Li et al., (2020). FDI also does not necessarily increase competition pressure because of the competitors of the receiving country are mostly new and small, therefore they are easily pushed out of the game.

2.2. The Spillover Effects of FDI on Technological Innovation of Enterprise

Research by Görg and Greenaway (2004) showed that FDI does have a spillover effect on technology. However, the occurrence of spillover effects depends on many objective and subjective factors, even depending on the estimation method. Research by Kokko (1994), Kokko and Blomström (1995) in a case of Mexico, and Moralles and Moreno (2020) in a case of Brazil, draw a very interesting conclusion that the spillover effect is unlikely to occur in protected industries. According to these authors, the technology absorption competency and technological gap between the home country and the host country are the two factors affecting the occurrence of spillover effects. There is study by Haddad and Harrison (1993) on the assessment of the spillover effects of FDI on firms in the Moroccan manufacturing industry by testing the variation in productivity gaps between firms in general and firms with the highest productivity in the same industry. The authors have demonstrated that the spillover effect occurs only when the productivity gap between domestic and FDI firms are not too large.

Sectors with a larger share of FDI are also industries with lower productivity disparities and domestic firms gradually narrowing the productivity gap, mainly due to competitive pressure generated by FDI instead of the spillover effects from technology transfer (Ha & Giroud, 2015). Also, based on the above methodology, Barrios and Strobl (2002) examined the spillover effects of FDI on firms in the same manufacturing industry in Spain. The author has expanded the testing model by including some dummy variables representing the specific characteristics of each industry and budget for research and development (R&D) activities of the business as a measure of technology ability of domestic enterprises. In a study by Li et al. (2001), Wang and Wu (2016) on China, the authors argue that the ownership form of domestic firms is also a determinant of the occurrence of spillover effects. According to the author, spillover effects through technology imitation and copying do not appear in state-owned enterprises, but in private enterprises.

In another study by Sjöholm (1999) looking at Indonesia did not find any difference in the magnitude of the spillover effect in ownership form of FDI enterprises. The research by Marin and Bell (2006) also classifies FDI into two lines as FDI with an incentive to fully exploit the assets of the host country and the flow of FDI to create completely new foreign branches. The authors considered that foreign branches of transnational companies are not merely receiving technology transfer from the parent company, but are also expected to develop more independently and be proactive in technology. Based on this theory, research by Marin and Sasidharan (2010) has shown that in the case of India, only FDI inflows with an incentive to create completely new foreign affiliates can create positive effect with host country. The absorption competency of domestic firms is also mentioned in many studies which explore the factors that create important spillover effects. The study by Girma and Wakelin (2002) in the case of Bulgarian, Romanian, Finnish and British domestic firms shows that only firms that invest heavily in R&D experience positive spillover effects.

Research by Girma and Wakelin (2002), Khachoo et al. (2018) has discovered the relationship between positive and significant spillover effects for firms with small technology gaps compared to foreign firms. This means that if domestic firms invest in R&D and technology development, they will receive the positive spillover effects more easily than companies with a large technology gap with foreign firms.

2.3. Determinants of the Spillover Effects of FDI on Technological Innovation of Enterprise

Innovation plays an very important role in improving the efficiency of production and business, sustainable development of enterprises and is an important premise for creating competitiveness (Duc, 2020; Zhang, 2017). According to Fu et al. (2011), in developed countries, the concept of innovation and technological capacity has long been the focus of attention, but in developing countries, this concept is still quite new and has not been thoroughly studied. To measure the capacity for innovation and development, governments and international organizations apply Science and Technology Indicators (STIs), such as the number of patents, the cost of R&D, and the number of scientists included in their assessment (European Commission 2009; OECD 2010; World Bank 2010). However, according to research by Freeman and Soete (2009), these indicators have significant limitations. This is mainly because STIs only focus on high-tech innovation issues based on research and technological advancement, while in developing countries where technology and technological innovation do not pay attention to these issues. Based on the Endogenous growth theory of Aghion and Howitt (1998), Grossman and Helpman (1991) and Romer (1990) have shown in detail the technological competency indicators and ability to upgrade at the enterprise level. Thus, these indicators will cover activities related to technology innovation in a broader range than Science and Technology Indicators (STIs) used in industrialized countries, technological competency indicators help to deeply understand and evaluate more fully about the innovation competency and technological competency of enterprises, especially those with little investment in R&D activity-based for innovation, and this is preferable for developing countries like Vietnam.

The emergence of FDI will generate spillover effects, including technological spillover effects. Therefore, to test the existence of these spillover effects, it is necessary to first consider the relationship between the level of foreign participation and the change and innovation in technology of domestic enterprises in the industry. Many different indicators can be used to estimate the level of foreign participation or the "position" of FDI, the criteria to measure position are often used as criteria for the number of employees in FDI enterprises in the industry or the revenue generated by the FDI enterprises in the industry, the proportion of FDI in the industry. Studies by Meyer (2003), Aitken and Harrison (1999) all use the share of workers employed in FDI firms relative to workers in that industry to measure the horizontal technological spillover effect. Barrios and Strobl (2002) examined the spillover effects of FDI on firms in manufacturing industry in Spain. The author has expanded the quantitative model and used the R&D activities variable as a measure of the technological competency of domestic enterprises. The study of Girma and Wakelin (2002) in the case of Bulgaria, Romania, Finland and the United Kingdom has shown that only firms that invest a lot in R&D have a positive spillover effect, including spillover effects on technology. The research of Blomström and Sjöholm (1999) and Barrios and Strobl (2002) tested the spillover effect of FDI on firms through productivity function. The authors used the skill level of the labor force variable as one of the variables to measure the effect of FDI on enterprises in general.

3. Methodology

3.1. Sources of Data

The enterprise survey samples used in the article are taken from General Statistic Office of Vietnam's survey data on technology use in production. The article has used data of enterprises in the manufacturing and processing industry in Hanoi over 10 years.

3.2. Proposed Model

This study analyzes the spillover effects of FDI on technological innovation of enterprise. The dependent variable is a dummy, thus it takes a value of 0 or 1 depending on whether the enterprise choose to use technology innovation. However, the independent variables are both continuous and discrete. The logistic regression (logit) model was adopted for this study. Logistic regression is a form of regression used to explain and predicts a categorical dependent variable. It works best when the dependent variable is a binary categorical variable (Gujarati, 2010). The main advantage of logistic regression is that it is not restricted by the normality assumption, which is a basic assumption in the ordinary least squares regression analysis (Rao and Maddala, 2009).

Yi is a binary variable where $Y_i = 1$ represents an enterprise that implements technology innovation, $Y_i = 0$ is not implemented. Then the logistic model shows how $P(Y_i=1) = p$ or $P(Y_i = 0) = 1-p$ depends on independent variables (see Equation 1).

$$p = P(Y_i = 1) = F(QM_{jit}, DN_{jit}, NG_{jt}, TD_{jit}, R\&D_{jit}) \quad (1)$$

Where researched variables is defined as:

The variable QM_{jit} is the size of enterprise i, industry j year t. Enterprise size is shown through the number of employees in the enterprise.

The variable TD_{jit} is the skill level of the labor force of enterprise i, industry j year t. The skill level of the labor force includes two dummy variables (TD1, TD2) to quantify this qualification factor in which TD1 = 1 if the answer is changed, increased; TD2 = 1 if the answer is change, decrease and when TD1 and TD2 are equal to 0, corresponding to the case of enterprise with no change in the skill level.

The variable DN_{jit} is the type of enterprise i, industry j year t. The type of enterprise includes two dummy variables (DN1; DN2) in which DN1 and DN2 are equal to 1 if they are state-owned and private-owned enterprises. When both of these dummies have a value 0, they correspond to FDI enterprises.

The variable NG_{jt} is a variable specific to the industry group. Industry group includes two dummy variables (NG1, NG2) used in the model, taking value of 1 if industry level is medium and high, when these two dummies have the value 0, then corresponding level the industry's technology is low.

The variable $R\&D_{jit}$ is the research and development activity of the enterprise i, industry j year t. Research and development activities of the enterprise is a binary variable that indicates whether the company has implemented R&D activities or not

From Equation, the research gives the econometric model as follows:

$$\text{Log}(p/(1-p)) = \beta_1 + \beta_2 QM_{jit} + \beta_3 DN_{jit} + \beta_4 NG_{jt} + \beta_5 TD_{jit} + \beta_6 R\&D^{jit} \quad (2)$$

The above model is the log odd form of the logistic model, which is actually a regression function with the dependent variable being the identifier variable. This model shows the relationship of each independent variable to the probability of occurring one of the values of the dependent variable.

4. Data Analysis

The study used the General Statistics Office of Vietnam's survey data to collect information from 3,166 enterprises in the manufacturing and processing industry in Hanoi. Results of technology innovation selected by enterprises are shown in Table 1 as follows:

According to Table 1, the form most chosen by enterprises is the second form "Product quality improvement", up to 2,442 enterprises (accounting for 71.1%), follow by technological innovation form. While enterprises that chose the form "Expanding business activities into a new field of production - new business" accounted for only 7.2%, equivalent to 231 enterprises. The results showed that many enterprises chose to use many forms of technological innovation at the same time. Table 2 shows the number of enterprises are applying a corresponding number of forms in technology innovation. Thus, almost all businesses use at least one form of technology related to innovation.

The variable coefficients, standard errors, probability values and some diagnostic statistics are shown in Tables 3 to 7 as follows:

Based on the tests of the significance of the variables (the Prob. column in the estimation models), out of the five models, only in Model 1 (see Table 13) the variable QM has p value < 0.05 representing the enterprise model has an innovation impact, which means that only when the enterprise chooses the first form then the size of the enterprise plays a role in determining the ability to innovate technology or products.

Table 1: Types of technology innovation selected by enterprises

Type of Innovation	Number of Enterprises	%
Process improvement	2,054	64.9
Product quality improvement	2,442	77.1
Product expansion	1,583	50.0
Expanding business activities into a new field of production - new business	617	19.5
Changing business activities into a new field of production - other business fields	231	7.2

Table 2: Proportion of enterprises choosing innovation types

Number of Form	Number of Enterprises	%
0	18	0.6
1	980	31.0
2	971	30.7
3	875	27.6
4	230	7.3
5	92	2.9
Total	3,166	100.0

Table 3: Model 1: Improving production process

Dependent Variable: Y1				
Method: ML - Binary Logit (Quadratic hill climbing)				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.572980	0.152482	3.757696	0.0002
QM	0.000855	0.000239	3.581562	0.0003
DN1	-0.457232	0.458007	-0.998308	0.3181
DN2	-0.329655	0.125781	-2.620860	0.0088
NG1	-0.008314	0.087782	-0.094709	0.9245
NG2	0.060401	0.096697	0.624648	0.5322
TD1	0.235645	0.132509	1.778331	0.0753
TD2	0.347932	0.105176	3.308096	0.0009
R&D	0.558755	0.124217	4.498206	0.0000
LR statistic	81.73635			
Prob(LR statistic)	0.000000			

Table 4: Model 2: Improving product quality

Dependent Variable: Y2				
Method: ML - Binary Logit (Quadratic hill climbing)				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	0.851238	0.160775	5.294607	0.0000
QM	0.000210	0.000194	1.082047	0.2792
DN1	-0.565536	0.442228	-1.278833	0.2010
DN2	0.070242	0.131727	0.533237	0.5939
NG1	0.097684	0.100399	0.972956	0.3306
NG2	0.045829	0.108458	0.422552	0.6726
TD1	0.277533	0.154088	1.801129	0.0717
TD2	0.367002	0.123014	2.983423	0.0029
R&D	0.425691	0.143015	2.976550	0.0029
LR statistic	54.15813			
Prob(LR statistic)	0.000000			

Table 5: Model 3: Expand many types of products

Dependent Variable: Y3				
Method: ML - Binary Logit (Quadratic hill climbing)				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	-0.168621	0.136692	-1.233583	0.0000
QM	0.000114	0.000140	0.812665	0.2792
DN1	-0.598691	0.438381	-1.365687	0.2010
DN2	-0.052553	0.110442	-0.475842	0.5939
NG1	-0.006840	0.084024	-0.081403	0.3306
NG2	-0.177747	0.091403	-1.944648	0.6726
TD1	0.183268	0.122699	1.493639	0.0717
TD2	0.308565	0.096960	3.182399	0.0029
R&D	0.544008	0.109612	4.963047	0.0029
LR statistic	48.85993			
Prob(LR statistic)	0.000001			

Table 6: Model 4: Expand its operations into a new production - business field

Dependent Variable: Y4				
Method: ML - Binary Logit (Quadratic hill climbing)				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	-1.831644	0.181131	-10.11229	0.0000
QM	0.000170	0.000155	1.097384	0.2725
DN1	0.360626	0.525228	0.686609	0.4923
DN2	0.287552	0.148958	1.930418	0.0536
NG1	0.108350	0.102747	1.054533	0.2916
NG2	-0.289542	0.120784	-2.397188	0.0165
TD1	0.414015	0.143778	2.879534	0.0040
TD2	0.372766	0.114886	3.244667	0.0012
R&D	0.188795	0.129513	1.457726	0.1449
LR statistic	37.68506			
Prob(LR statistic)	0.000088			

Table 7: Model 5: Change the operation of the enterprise to another production - business field

Dependent Variable: Y5				
Method: ML - Binary Logit (Quadratic hill climbing)				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	-3.018084	0.308761	-9.774824	0.0000
QM	0.000148	0.000260	0.570001	0.5687
DN1	0.679537	0.599516	1.133476	0.2570
DN2	0.033545	0.233381	0.143736	0.8857
NG1	-0.319270	0.154520	-2.066202	0.0388
NG2	-0.959523	0.209039	-4.590156	0.0000
TD1	-0.006617	0.249039	-0.026572	0.9788
TD2	0.406059	0.169796	2.391455	0.0168
R&D	-0.503932	0.250911	-2.008406	0.0446
LR statistic	64.09612			
Prob(LR statistic)	0.000000			

Regarding the hypothesis of the relationship between FDI and technology innovation activities of Vietnamese enterprises, we will compare the ability of enterprises with different types may have various abilities to innovate technology and products. Enterprise type variable (DN2) will be checked to confirm the above hypothesis. If this variable is significant (with an alpha level of 5%), then there is a difference in the ability to innovate technology and products between FDI and non-FDI firms. Among the five models, only in Model 1 (see Table 3) and Model 4 (see Table 6), the variable DN2 is statistically significant, meaning that the participation of FDI enterprises has an impact on innovation when the enterprise select model of innovation according to Model 1 and Model 4.

For industry factors (NG1, NG2), these variables are not significant in Model 1 (Table 3) and Model 2 (see Table 4). This shows that, when enterprises choose breakthrough and innovative forms of innovation, the processing and manufacturing industry with a high technology, medium or low technology level will get effected in the choice of technology innovation.

In terms of labor qualifications (TD1, TD2), we see that all five Models show the qualification variable that affects the technology innovation of enterprises. This proves that technological innovation is really affected by the labor skills of enterprises. This can be understood in the sense that businesses want to innovate, the level of labor must be renewed.

To examine the significance of the R&D variable in the models allows us to evaluate the hypothesis that the R&D capacity of Vietnamese enterprises has a positive spillover effect on technology from the FDI sector. We see only in Model 4 (see Table 6), the variable R&D has no meaning.

In Model 5 (see Table 7) there are differences between years when enterprise choose to "Changing the operation of the enterprise to another production - business field". With this difference, we have to separate the data for each year to estimate the corresponding model. There are differences over the years of enterprise when it chooses to switch to production and business process, showing that the business has a direction and changes more drastically when the effects of the economic crisis and competitive pressure in later years has had a critical impact on the operation of the business.

Estimation results from Model 1: If the enterprise chooses the improving production process (see Table 3), then the relationship between the independent variables and the dependent variable is expressed in the following function:

$$Y1 = 0.572980 + 0.000855*QM - 0.457232*DN1 - 0.329655*DN2 - 0.008314*NG1 + 0.060401*NG2 + 0.235645*TD1 + 0.347932*TD2 + 0.558755*R\&D$$

In Model 1, there are factors include size, participation of FDI enterprises, labor qualification of enterprises and R&D that affect the technology innovation of firms. The R&D factor has the strongest impact ($\beta_{R\&D} = 0.558755$), The size of the firm has a smaller impact ($\beta_{QM} = 0.000855$).

Estimated results from Model 2: If the enterprise chooses to improve product quality (see Table 4), then the relationship between the independent variables and the dependent variable is expressed in the following function:

$$Y2 = 0.851238 + 0.000210*QM - 0.565536*DN1 + 0.070242*DN2 - 0.097684*NG1 + 0.045829*NG2 + 0.277533*TD1 + 0.367002*TD2 + 0.425691*R\&D$$

In Model 2, there are factors include labor qualification and R&D that affect firm technology innovation. The R&D factor has the strongest impact ($\beta_{R\&D} = 0.425691$), the labor qualification factor of the business has the smallest impact ($\beta_{TD2} = 0.367002$).

Estimated results from Model 3: If the enterprise chooses to expand many types of products (see Table 5), then the relationship between the independent variables and the dependent variable is expressed in the following function:

$$Y3 = -0.168621 + 0.000114*QM - 0.598691*DN1 - 0.052553*DN2 - 0.006840*NG1 - 0.177747*NG2 + 0.183268*TD1 + 0.308565*TD2 + 0.544008*R\&D$$

In Model 3, there are factors include labor qualification and R&D that affect the firm's technological innovation. The R&D factor has the strongest impact ($\beta_{R\&D} = 0.544008$), The labor qualification factor of the firm has a smaller impact ($\beta_{TD2} = 0.308565$).

Estimated results of Model 4: If the firm chooses to change its operations to a new field of production - business (see Table 6), then the relationship between the independent variables and the dependent variable is expressed in the following function:

$$Y4 = -1.831644 + 0.000170*QM + 0.360626*DN1 + 0.287552*DN2 + 0.108350*NG1 - 0.289542*NG2 + 0.414015*TD1 + 0.372766*TD2 + 0.188795*R\&D$$

In Model 4, there are factors for the participation of FDI firms, industries, and firm's labor qualification to their technological innovation. The labor qualification factor of enterprises has the strongest impact ($\beta_{TD2} = 0.372766$), the participation factor of FDI enterprises has a smaller impact ($\beta_{DN2} = 0.287552$).

Estimated result from Model 5: If the firm chooses to change its operations to another production – business field (see Table 7), then the relationship between the independent variables and the dependent variable is expressed in the following function:

$$Y5 = -3.018084 + 0.000148*QM + 0.679537*DN1 + 0.033545*DN2 - 0.319270*NG1 - 0.959523*NG2 - 0.006617*TD1 + 0.406059*TD2 - 0.503932*R\&D$$

In Model 5, there are industry factors, firm's labor qualification, and R&D that influence firm technology innovation. The labor qualification factor of the firm has the strongest impact ($\beta_{TD2} = 0.406059$), the R&D factor has a smaller impact ($\beta_{R\&D} = -0.503932$).

Thus, from the results received by the estimation models, we realize that enterprises can choose different forms to innovate processes or products. Choosing which form will determine which factors will affect the ability to innovate. The model results show that all variables of enterprise type, size, R&D, industry have a positive impact on the selection of one of the innovation forms.

5. Conclusions and Policy Recommendations

On the basis of the impact channels of FDI related to technology innovation of Vietnamese enterprises, the article proposes views on taking advantage of the positive effects and minimizing the negative effects of FDI for technological innovation of Vietnamese enterprises. The breakthrough views are: some large-scale FDI enterprises have transferred modern technology in Vietnam; the quality of technology according to FDI into Vietnam has been improved; through FDI into hi-tech zones, technology transfer centers have been formed with spillover effects.

However, FDI into Vietnam still has limited effects on technological innovation of Vietnamese enterprises such as: FDI has not really become the main source of technology for Vietnamese enterprises; many old and outdated technologies are also transferred through FDI into Vietnam; FDI has not really created a strong incentive to change technology for domestic enterprises; linkages and cooperation to form technology relations between FDI and domestic enterprises are weak; FDI with the formation of a contingent of highly qualified specialists and workers have not met expectations; FDI has not contributed much to the development of the science and technology market in Vietnam. On that basis, the article proposes solutions focusing on two groups of solutions:

Group of solutions to promote the positive effects of FDI on technology innovation of Vietnamese enterprises in which breakthrough solutions are: (i) To encourage investment in source technologies and modern technologies from foreign countries into Vietnam; (ii) Policy to attract FDI to hi-tech zones; (iii) Solutions to develop Vietnam's science and technology market.

Group of solutions to limit the negative effects of FDI on technology innovation of Vietnamese enterprises in which the breakthrough solutions are: (i) Solutions to restrict the transfer and sale of old and outdated technology from abroad; (ii) Solutions to develop technology-based links between FDI and domestic firms; (iii) Enhancing technology absorption capacity of Vietnamese enterprises.

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