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**Demand creation and competition effect of Export-platform
FDI on backward linkages – Evidence from panel data
analysis of Vietnamese supporting industries**

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Demand creation and competition effect of Export-platform FDI on backward linkages

Evidence from panel data analysis of Vietnamese supporting industries *

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Abstract

The paper deals with the impacts of Export-platform FDI on backward linkages. First, in a three-country model, these impacts can be explained through competition effect and demand creation one. Whenever the former is stronger than the latter, the investment has a negative impact on backward linkages and conversely. Otherwise, if foreign and domestic producers are heterogeneous, then there is an optimal threshold for input intensity of technology used by foreign producers allowing a highest level of backward linkages. Secondly, in the case of the Vietnamese supporting industries between 2000 and 2007, we observe that Export-platform FDI generates a 100% crowding-out effect. Moreover, the correlation between production of these industries and input intensity of technology used by foreign producers is positive. This indicates that the greater this intensity is, the bigger benefit these supporting industries could get from Export-platform FDI.

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1 Introduction

The second half of the twentieth century is known by a rapid growth of foreign direct investment (FDI) by multinational enterprises (MNEs). This investment brings an important source to finance the economic growth of the host country as well as new technologies to update local industries. Therefore, host countries seek not just more of such an investment, but also take advantage from its quality for a sustainable development. Perhaps, one of the main channels is through vertical linkages, or in the other words, backward linkages (UNCTAD, 2001). The latter exists whenever the located affiliates of MNEs acquire goods or services from domestic suppliers. We notice that contrary to the expectations of the host countries, the literature underlines some conditional, even opposite impacts.

There are two different ways to examine the impacts of FDI on backward linkages. While theoretical models are interested in the effects on the production of domestic suppliers, empirical studies highlight the effects on their productivity (called also vertical spillovers of FDI on the productivity of domestic suppliers).

Developing a two-country model, some authors such as Rodriguez-Clare (1996), Markusen and Venables (1999) and Lim and Saggi (2005, 2007) argue that the impacts of FDI on backward linkages could be examined through a competition effect and a demand for inputs effect. On the one way, the entry of MNEs in the host country lowers the degree of backward linkages by shrinking the output level of domestic producers that leads to a decline in demand for inputs (competition effect). On the other hand, such entry also sources the input locally and thereby creates an additional demand for inputs (demand effect). Therefore, the net impact of FDI on local input production is ambiguous (Lin and Saggi, 2005, 2007). For Rodriguez-Clare (1996), it will be positive upon the condition that MNEs are intensive in intermediate goods, that

communication costs between the headquarter and the production plant are high and that the home country and the host country are not too different in terms of the variety of intermediate goods produced. When these conditions are not fulfilled, the opposite happens: the entry of MNEs in the host country reduces the degree of backward linkages. In the same analyses line, Lin and Saggi (2005, 2007) suggest that the net effect of FDI on the level of backward linkages depends on the technological gap between MNEs and domestic producers. Whenever this gap reaches a critical threshold. In this case, MNEs improve the level of backward linkages because the demand effect is stronger than the competition effect. In the opposite case, if this condition is reversed, the entry of MNEs makes the local market more competitive whereas the demand effect is weak. Hence, the level of backward linkages falls.

As for the vertical spillovers of FDI, some authors outline the existence of a positive effect (Lim and Fong, 1982; Chung et al., 2003; Javorcik, 2004; Mucchielli and Jabbour, 2007 ...) whereas others highlight a negative vertical spillovers (Demijan et al., 2003; Rodriguez-Clare and Alfaro, 2004; Thangavelu and Pattnayak, 2006 ...). The sign and the power of these spillovers could be explained by different factors (Lim and Fong, 1982; Belderbos et al., 2001). In most case, the development level of the host country or the absorption capability of domestic suppliers play an important role (Blomstrom and Kokko, 1998; Gorg and Greenaway, 2004). Other factors are the policies of the host country (Faber, 2007; Jordaan, 2008), the origin of MNEs (Lim and Fong, 1982; Wei and Liu, 2006), the level of competition in the host country (Markusen and Venables, 1999; Kolasa, 2008), the nature of located subsidiaries (i.e. joint-ventures or greenfield) (Javorcik, 2004; Crespo and Fontoura, 2007) as well as the technology used by MNEs (Rodriguez-Clare, 1996; Markusen and Venables, 1999).

Over the two last decades, the number of bilateral trade agreements (BTA) is grown with an

particular rate¹. This rapid growth had then an influence on the investment behaviors of MNEs. A new kind of overseas investment, namely Export-platform FDI, appeared. This investment means a foreign production of final goods in a host country in order to export the output to third countries (Montout and Zitouna, 2005; Ekholm et al., 2007)². This investment is developed whenever the host and third countries are linked by a BTA and more particularly, when these countries create a free-trade area (Minda and Nguyen, 2012).

Indeed, the decrease of intra-regional custom tariffs, associated with the signature of a BTA or with the formation of a free-trade area, gives MNEs the choice between either tariff-jumping or Export-platform FDI (Neary, 2002; Montout and Zitouna, 2005). Tariff-jumping involves establishing an affiliate in all the countries receiving their exports in the past. Inversely, Export-platform FDI means producing in only one (or some) country (countries) in order to export the output to other members of this area. This strategy would be all the more preferable since there are many countries at different stages of development in the area. In this case, MNEs intend to invest in the country where the labor cost is lowest (Montout and Zitouna, 2005; Ekholm et al., 2007).

Since the existing literature on Export-platform FDI examines this investment as a new location strategy of MNEs against the development of BTA, the impacts of this investment on

¹Among the 210 notifications in force today, 85% of them were concluded during the 1990s and 2000s.

Source: WTO, Statistics Database (www.wto.org)

²From this definition, we notice that the similarity between Export-platform FDI and vertical FDI resides in the fact that the output of foreign production plants will be exported to third countries. However, whereas the output of the former is dedicated to serve final consumers, that of the other investment aims to assemble final goods.

On the other hand, Export-platform FDI is also similar to the horizontal one because they all intend to produce final goods in the host country. Nevertheless, their final destination is different. While the former serves third markets, the latter only serves the local one.

the host country are little studied. Otherwise, the theoretical models and empirical shown above rather concern the relationship between FDI and economy of the host country.

In order to better understand how Export-platform FDI affect the host country, the main purpose of this paper is to examine different impacts of Export-platform FDI on backward linkages. We develop first a three-country model in which a MNE (which headquarter is in the home country) competes with domestic firms (in the host country) in the production of a final good to serve a third country. We then apply the model in the case of the Vietnamese supporting industries between 2000 and 2007.

The rest of the paper is organized as follow. In the next section, we will outline the three-country model which allows us to examine different impacts of Export-platform FDI on backward linkages. In the following section, we will test the model in the case of the Vietnamese supporting industries. The final section concludes the main findings and provides some further lines of research.

2 The three-country model

The model is in line to that of Motta and Norman (1996), Montout and Zitouna (2005), Elkhom et al. (2007) and Minda and Nguyen (2012). However, while these authors consider Export-platform FDI as a strategic behavior of the MNEs, we are intersted in the impacts of this investment on backward linkages.

We consider a world involving three countries, a host country L , a home country M and a third country A . By assumption, the former is less developed than the other two countries. Otherwise, the host country and the third country may form a free-trade area or at least sign a BTA.

There is a final good which is only consumed in country A and could only be produced

in countries L and M by domestic firms (also called export firms and denoted by l whose the headquarter is in the host country) and by a MNE (also called foreign firm and denoted by m whose the headquarter is in the home country). These domestic firms and their foreign competitor choose their output level in a Cournot fashion. That means each firm determinates its output by taking as given the output level of its rivals.

Like Lin and Saggi (2005, 2007), we assume that the production of the final good requires input and labor. Nevertheless, compared to the home country M , input is more expensive and labor is cheaper in the host country L . We call c_m, c_l input cost and w_m, w_l labor cost respectively in M and L . Thus, $c_m < c_l$ and $w_m > w_l$.

To establish a benchmark for our analysis, the model takes place in two moments. First, in an export regime (also called an export economy), there is not any trade agreement between the host and the third countries. Then, in an export-platform regime (also called an export-platform economy), a free-trade area or a BTA is created by the host country L and the third country A , followed by a lower intra-regional export cost between the two countries. In this situation, domestic firms continue to export whereas firm m develops an Export-platform FDI in the host country. The demand of final good in each regime is given by:

$$p_A^R = S_A^R - Q_A^R \tag{1}$$

where p_A^R, S_A^R, Q_A^R are the price, the third market size and the quantity of final good consumed in regime R (Export, Exp or Export-platform, Ep) respectively.

We distinguish also two cases, the case where domestic firms and MNE are all homogeneous and other when they become heterogeneous.

2.1 Homogeneous firms

In this case, both domestic firms and MNE have the same technology production. That means, for each unit of final good produced, one unit of input and one unit of labor are required.

2.1.1 Export economy

Under the export economy, there is not any trade agreement between the host country and the third country. Then all firms develop an export strategy, MNE exports from the home country and domestic firms export from the host country.

Let denote L^{Exp} be the number of domestic firms. Then the inverse demand function in the third market given in equation (1) can be explained as

$$p_A^{Exp} = S_A^{Exp} - \left(\sum_{l=1}^{L^{Exp}} q_l^{Exp} + q_m^{Exp} \right) \quad (2)$$

where q_m^{Exp} presents the output produced by the MNE and q_l^{Exp} represents the output produced by a firm l , $l = 1 \dots L^{Exp}$ and $(\sum_{l=1}^{L^{Exp}} q_l^{Exp} + q_m^{Exp})$ denotes the aggregate level of final good consumed in the third country.

Let denote τ_l and τ_m be the intra and the extra-regional transport cost, respectively. Therefore, the access costs to the third market of each firm will be:

- Firm m : $c_m + w_m + \tau_m$
- Firm l : $c_l + w_l + \tau_l$

Thus, we have the profit function of each firm:

$$\begin{aligned} \pi_m^{Exp} &= \left(S_A - \sum_{l=1}^{L^{Exp}} q_l^{Exp} - q_m^{Exp} \right) q_m^{Exp} - (c_m + w + \tau_m) q_m^{Exp} \\ \pi_l^{Exp} &= \left(S_A - \sum_{l=1}^{L^{Exp}} q_l^{Exp} - q_m^{Exp} \right) q_l^{Exp} - (c_l + w_l + \tau_l) q_l^{Exp} \end{aligned} \quad (3)$$

where π_l^{Exp} and π_m^{Exp} mean the profit of each firm l and that of firm m respectively.

Given the strategy of its rivals as well as its access costs to the third market, each firm maximizes its profit. Thereby, the "symmetric" Cournot-Nash equilibrium could be written:

$$\begin{aligned} q_m^{Exp} &= \frac{S_A - (L^{Exp} + 1)(c_m + w_m + \tau_m) + L^{Exp}(c_l + w_l + \tau_l)}{(L^{Exp} + 2)} \\ q_l^{Exp} &= \frac{S_A - 2(c_l + w_l + \tau_l) + (c_m + w_m + \tau_m)}{(L^{Exp} + 2)} \end{aligned} \quad (4)$$

We note that $\frac{\partial q_l^{Exp}}{\partial(c_l + w_l + \tau_l)} < 0$, $\frac{\partial q_l^{Exp}}{\partial(c_m + w_m + \tau_m)} > 0$ and $\frac{\partial q_m^{Exp}}{\partial(c_l + w_l + \tau_l)} > 0$, $\frac{\partial q_m^{Exp}}{\partial(c_m + w_m + \tau_m)} < 0$. The results seem to be similar to those of Lin and Saggi (2005, 2007) since the quantity of final good supplied by each domestic firm is a decrease function with its access costs to the third market and since it is an increase function with access costs to the third market of MNE and *vice versa*.

In this economy, the local input is only required by domestic firms. Hence, backward linkages are determined by

$$\begin{aligned} BK^{Exp} &= L^{Exp} q_l^{Exp} \\ &= L^{Exp} \frac{S_A - 2(c_l + w_l + \tau_l) + (c_m + w_m + \tau_m)}{(L^{Exp} + 2)} \end{aligned} \quad (5)$$

Remark 1 As $\frac{\partial BK^{Exp}}{\partial(c_l + w_l + \tau_l)} < 0$ and $\frac{\partial BK^{Exp}}{\partial(c_m + w_m + \tau_m)} > 0$, under the Export economy, the degree of backward linkages decreases in the access costs of domestic firms while it increases in those of their foreign competitor.

2.1.2 Export-platform economy

Under the Export-platform economy, the host country and the third country create a BTA, or more particularly form a free-trade area, following by a decrease in the intra-regional export cost. This cost becomes τ instead of τ_l , $\tau < \tau_l$.

Moreover, this creation has also an influence on the strategic behavior of MNE. She will locate a production plant in country L in order to export the final good to country A . The

aim of this location is to take advantage of the low labor cost in the host country as well as to benefit of a lower intra-regional export cost. This hypothesis is taken from different models of Export-platform FDI that have been developed in the literature (Montout and Zitouna, 2006; Ekholm and al., 2007; Minda and Nguyen, 2012).

While producing in the host country, we assume that firm m uses the local input. Otherwise, since the host country is less developed than the home country, she must transfer her technology to the plant production. Let denote g be the unit technological transfer cost. Hence, we notice that g can be represented as the technological gap between these two countries. The more g is high, the more this gap is important (Minda and Nguyen, 2012). Given the unit technological transfer cost, the access costs to the third market for MNE become $(c_m + g + w_l + \tau)$.

On the other hand, we suppose that the technology transfer from the MNE to the production plant generates technological spillovers (externalities) that could represent a benefit for the domestic firms. Those ones may be created by demonstration or by imitation (Blomstrom and Kokko, 1998; Gorg and Greenaway, 2004). The degree of these spillovers is noted θ for each unit of final good produced. Thereby, the unit access costs the to third market of each domestic firm will be $(c_l - \theta + w_l + \tau)$.

The location of the MNE in the host country also has an influence on the third market structure. Some domestic firms leave the market whereas some other ones enter. Let denote L^{Ep} be the final number of domestic firms under the Export-platform FDI. Therefore, if $L^{Ep} > L^{Exp}$, then the locataion of the MNE leads to a net entry of domestic firms whereas if $L^{Ep} < L^{Exp}$, then it leads to a net exit of these ones.

Given the number of domestic firms under the Export-platform economy, the demand func-

tion 1 could be rewritten as

$$p_A^{Ep} = S_A^{Ep} - \left(\sum_{l=1}^{L^{Ep}} q_l^{Ep} + q_m^{Ep} \right)$$

where q_l^{Exp} and q_m^{Exp} represent the quantity of final good produced by a typical firm l and by a firm m , respectively. Therefore, the profit function of each firm can be represented as

$$\begin{aligned} \pi_m^{Ep} &= \left(S_A - q_m^{Ep} - \sum_{l=1}^{L^{Ep}} q_l^{Ep} \right) q_m^{Ep} - (c_m + g + w_l + \tau) q_m^{Ep} \\ \pi_l^{Ep} &= \left(S_A - q_m^{Ep} - \sum_{l=1}^{L^{Ep}} q_l^{Ep} \right) q_l^{Ep} - (c_l - \theta + w_l + \tau) q_l^{Ep} \end{aligned} \quad (6)$$

where π_m^{Ep} is the profit of firm m and π_l^{Ep} is the profit of each firm l .

Each firm maximizes its profit while giving its access costs to the third market as well as the entry mode of its rival. So, we have the "symmetric" Cournot-Nash equilibrium in this market

$$\begin{aligned} q_m^{Ep} &= \frac{S_A - (L^{Ep} + 1)(c_m + g + w_l + \tau) + L^{Ep}(c_l - \theta + w_l + \tau)}{(L^{Ep} + 2)} \\ q_l^{Ep} &= \frac{S_A - 2(c_l - \theta + w_l + \tau) + (c_m + g + w_l + \tau)}{L^{Ep} + 2} \end{aligned} \quad (7)$$

Under the Export-platform economy, the local input is used both by domestic firms and the MNE. Therefore, the level of backward linkages under this economy is given by the following equation

$$\begin{aligned} BK^{Ep} &= L^{Ep} q_l^{Ep} + q_m^{Ep} \\ BK^{Ep} &= L^{Ep} \frac{S_A - 2(c_l - \theta + w_l + \tau) + (c_m + g + w_l + \tau)}{L^{Ep} + 2} \\ &\quad + \frac{S_A - (L^{Ep} + 1)(c_m + g + w_l + \tau) + L^{Ep}(c_l - \theta + w_l + \tau)}{(L^{Ep} + 2)} \end{aligned} \quad (8)$$

Remark 2 Since $\frac{\partial BK^{Ep}}{\partial (c_l - \theta + w_l + \tau)} < 0$ and $\frac{\partial BK^{Ep}}{\partial (c_m + g + w_l + \tau)} < 0$, under the Export-platform economy, the degree of backward linkages decreases in the access costs of MNE as well as in those of its domestic rivals.

In what follows, we next examine different impacts of Export-platform FDI on backward linkages.

2.1.3 Export-Platform FDI and backward linkages: ambiguous impacts

Let denote ΔBK be the backward linkages' evolution between the Export-platform economy and the Export economy. Hence, this variable can be representative of impacts of Export-platform FDI on backward linkages. Since $\Delta BK < 0$, the impacts are positive whereas whenever $\Delta BK > 0$, the impacts become negative. Given equations (5) and (8), we obtain then

$$\begin{aligned}\Delta BK &= BK^{Ep} - BK^{Exp} \\ &= \frac{2\beta - 1}{\beta} q_l^{Exp} + \Delta c + \Delta \tau - \Delta w - \Delta CT_l - \frac{\Delta CT_m - 2\Delta CT_l}{\beta(L^{Exp} + 2)}\end{aligned}\tag{9}$$

where

- $\beta = \frac{L^{Ep} + 2}{L^{Exp} + 2}$. Thus, this variable shows the impact of Export-platform FDI on the third market structure. Whenever $\beta > 1$, the Export-platform FDI has a positive impact on the third market structure or in other words, there is a net entry of domestic firms in this market. Inversely, if $\beta < 1$, then the impact appears to be negative. Thus, there is a net exit of domestic firms from the third market;

- $\Delta c = c_l - c_m$. Then, this variable can be considered as comparative advantage of the home country;

- $\Delta w = w_m - w_l$. So, it can be representative of comparative advantage of the host country;

$$- \Delta \tau = \tau_l - \tau_m;$$

- $\Delta CT_m = (g + w_l + \tau) - (w_m + \tau_m)$, the evolution of access costs to the third market for firm m between the two economies;

- $\Delta CT_l = (\tau - \theta) - \tau_l$, the evolution of access costs to the third market for firms l between the two economies.

Like other models in the literature (Rodriguez-Clare, 1996; Markusen and Venables, 1999; Lin and Saggi, 2005, 2007), we consider that the location of a MNE in the host country has two opposite impacts on the level of backward linkages, a competition effect and a demand creation effect. However, over the necessity of integrating a third country, our model completes the notion of competition effect and that of demand creation. Since in the model of Rodriguez-Clare or in that of Markusen and Venables (1999), the competition effect only leads to a net exit of domestic firms from the market, it involves both a net exit ($\beta < 1$) or a smaller output level of these firms ($q_l^{Ep} < q_l^{Exp}$). Otherwise, unlike the models of Lin and Saggi in which the demand creation is only generated by MNEs, we consider that it could come from both the production of MNEs (a direct demand creation) or an increase in demand for inputs of domestic firms (an indirect demand creation). This increase is, on the other hand, associated with a net entry of domestic firms ($\beta > 1$) or a higher output level of each of them ($q_l^{Ep} > q_l^{Exp}$).

The entry of firm m into the host country has no influence on the degree of backward linkages whenever $\Delta BK = 0$. This means that the following condition must be fulfilled

$$F(\Delta BK = 0) : \theta = \Delta\tau^* + \Delta c - \Delta w + \Delta\tau + 2q_l^{Exp} + \frac{2\Delta c - 2\Delta w + 2\Delta\tau - \Delta CT_m - (L^{Exp} - 2)q_l^{Exp}}{\beta(L^{Exp} + 2) - 2} \quad (10)$$

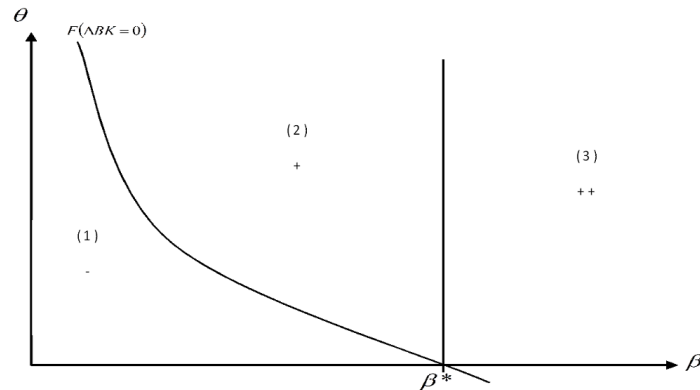
where $\Delta\tau^* = \tau_l - \tau$

Denoted $\beta^* = \frac{(L^{Exp} + 2)q_l^{Exp} + \Delta CT_m + 2\Delta\tau^*}{\Delta\tau^* + \Delta c - \Delta w + \Delta\tau + 2q_l^{Exp}}$, condition (10) can be represented in figure 1 below.

Given the present of competition effect and that of demand creation effect, different cases can be examined.

Case 1 *Export-platform FDI has no impact on backward linkages*

Figure 1: Impacts of Export-platform FDI on backward linkages



In this case, the competition effect is completely compensated by the demand creation effect (the curve $F(\Delta BK = 0)$). This is a so-called 100% crowding-out effect discussed by Markusen and Venables (1999). We are in the situation where the fall in demand for input associated with a lower production of domestic firms are fully offset by the increase in demand for input associated with the production of the MNE in the host country. Hence, the Export-platform FDI causes no impact on backward linkages.

Case 2 *If $\beta < \beta^*$, then Export-platform FDI has an ambiguous impact on backward linkages*

In area 1, the demand creation effect is weak whereas the competition effect is relatively strong. Consequently, the degree of backward linkages decrease under the Export-platform economy in comparison with the Export economy.

When $\beta < 1$, the entry of MNE into the host country leads to a net exit of domestic firms from the third market. The entry could also, in the worst case, conduct to a fewer output level of each domestic firms. This is the situation where the development level of the host country is relatively low. The direct demand created by the MNE is, on the other hand, low and cannot cancel out the losses associated with the competition effect. Consequently, backward linkages are strongly hurt. The result seems to be consistent with that of Rodriguez-Clare (1996) and

with that of Lin and Saggi (2007), so that MNEs could hurt the host country if the latter is relatively less developed than the home country.

On the other hand, if $\beta > 1$, then Export-platform FDI has a positive influence on the third market structure. Hence, there are more domestic firms under the Export-platform economy than under the Export one. Thus, the competition effect only leads to a decrease in the output level of each domestic firm. However, this decrease is relatively high and it may not be canceled out by the demand creation effect. By the way, the net impact of Export-platform FDI on backward linkages is negative.

In area 2, the demand creation becomes stronger than the competition effect. Therefore, the Export-platform FDI improves the level of backward linkages.

Case 3 *Whenever $\beta > \beta_Z$, the Export-platform FDI absolutely generates a positive impact on backward linkages*

In this case, the entry of firm m into country L creates a very high demand for input. The level of backward linkages is thus improved whatever the power of competition effect (area 3).

When $\beta < 1$, there are less domestic firms under the Export-platform economy than under the Export one. Thus, the indirect demand creation would only come from a higher output level of each domestic firm.

Inversely, if $\beta > 1$, hence the location of firm m in the host country leads to a net entry of domestic firms into the third market. Therefore, the competition effect, if it exists, is only associated with a fall in production of each domestic firm.

Particularly, whenever $\beta > \beta_e$ where $\beta_e = \frac{2}{L^{Exp+2}} \frac{2\Delta\tau + \Delta CT_m + (L^{Exp+2})q_l^{Exp}}{2\Delta\tau + \Delta CT_m + 2q_l^{Exp}}$, the Export-platform FDI may act as a catalyst for the development of local industries. In fact, that is the case where under the Export economy, there is a little number of domestic firms in the third

market, due to high access costs (either high production costs or high export costs). Therefore, supporting industries cannot develop because the demand for input is low. However, under the Export-platform economy, these costs become lower, thanks to technological spillovers in downstream industries or to smaller export costs. Therefore, domestic firms could enter more easily into the third market. On the other hand, given the production of firm m in the host country and the massive enter of domestic firms into the third market, the demand for input is relatively high, that allows a considerable increase in level of backward linkages. The result appears to be similar to Markusen and Venables (1999) because we also find the catalyst role of MNE on the development process of the local industries.

2.1.4 Export-platform FDI and backward linkages: the power of structure variables

We observe that $\frac{\partial \Delta BK}{\partial \beta} = \frac{1}{\beta} q_l^{Ep} > 0$. Hence, the evolution of backward linkages' level between the Export-platform economy (ΔBK) and the Export economy is an increasing function in the evolution of the third market structure (β). The higher number of domestic firms under the Export-platform economy is, the greater level of backward linkages is in comparison with the Export economy.

Proposition 1 *Whenever $\Delta w = \Delta w^{BK}$, $\Delta BK = 0$, where*

$$\Delta w^{BK} = \frac{2\beta - 1}{\beta} q_l^{Exp} + \Delta c + \Delta \tau - \Delta CT_l - \frac{\Delta CT_m - 2\Delta CT_l}{\beta (L^{Exp} + 2)}$$

Hence, the Export-platform FDI does not have any influence on the level of backward linkages.

If $\Delta w < \Delta w^{BK}$, the impact becomes positive and vice versa.

The proposition argues that the Export-platform FDI improves the level of backward linkages under the Export-platform FDI if and only if the comparative advantage of the host country

(Δw) is low enough.

Otherwise, we notice that $\frac{\partial \Delta BK}{\partial \Delta w} < 0$. The result indicates that under the Export-platform economy, an improvement in Δw leads to a fall in ΔBK , that may damage the level of backward linkages. In fact, the more comparative advantage of the host country is high, the more MNE could benefit from by locating a plant production in this country. Therefore, the competition effect becomes stronger so that it cancel all gains linked with the demand creation effect. Consequently, the net impact of Export-platform FDI on backward linkages is unfavorable.

Proposition 2 *When $\Delta c = \Delta c^{BK}$, the Export-platform FDI has no impact on the level of backward linkages ($\Delta BK = 0$) where*

$$\Delta c^{BK} = -\frac{2\beta - 1}{\beta} q_l^{Exp} - \Delta\tau + \Delta w + \Delta CT_l + \frac{\Delta CT_m - 2\Delta CT_l}{\beta (L^{Exp} + 2)}$$

Below this threshold ($\Delta c < \Delta c^{BK}$), the impact is negative ($\Delta BK < 0$) while above it ($\Delta c > \Delta c^{BK}$), the impact becomes positive ($\Delta BK > 0$).

The proposition implies that the Export-platform FDI boosts the backward linkages on conditions that the comparative advantage of the home country is sufficiently high. Moreover, as $\frac{\partial \Delta BK}{\partial \Delta c} > 0$, the more this advantage is high, the more the level of backward linkages increases under the Export-platform economy.

Proposition 3 *If $g = g^{BK}$, $\Delta BK = 0$ where*

$$g^{BK} = (2\beta - 1) (L^{Exp} + 2) q_l^{Exp} + [\Delta c + \Delta\tau - \Delta CT_l] \beta (L^{Exp} + 2) + 2\Delta CT_l + \Delta w + \tau_m - \tau$$

while if $g < g^{BK}$, $\Delta BK > 0$ and whenever $g > g^{BK}$, $\Delta BK < 0$.

Hence, the Export-platform FDI will have a positive impact on the level of backward linkages ($\Delta BK > 0$) if the technological transfer cost does not reach a critical threshold ($g \leq g^{BK}$).

Above this threshold ($g > g^{BK}$), the impact becomes negative ($\Delta BK < 0$). Otherwise, since $\frac{\partial \Delta BK}{\partial g} < 0$, the weaker this cost is or in other words, the smaller technological gap between the host country and the home country is, the higher level of backward linkages under the Export-platform economy.

In this subsection, the model is based on the assumption according to which the MNE and the domestic firms are homogeneous (i.e. they have the same production technology). In the next subsection, we will focus on the case where the production technology of these firms becomes different.

2.2 Heterogeneous firms

In what follows, the MNE (firm m) and domestic firms (firms l) become heterogeneous. We consider that for each unit of the final good produced, the MNE requires λ units of input and μ units of labor ($\lambda, \mu > 0$) whereas domestic firms always require one unit of input and one unit of labor. The aim of this subsection is to outline impacts of input intensity of the MNE, measured by λ , on the level of backward linkages.

The profit function of each firm is given by

$$\begin{aligned}\pi_m^R &= (S_A - Q_A^R) q_m^R - CT_m^R q_m^R \\ \pi_l^R &= (S_A - Q_A^R) q_l^R - CT_l^R q_l^R\end{aligned}\tag{11}$$

where

- R represents the economy in which the MNE and domestic firms compete with each other ($R = Exp$, an Export economy or $R = Ep$, an Export-platform economy);

- q_l^R, q_m^R describe the output level of a typical domestic firms l ($l = 1, \dots, L^R$) and that of the single MNE under R respectively;

- Q_A^R indicates the total output level under R ;
- CT_l^R, CT_m^R represent the access costs to the third market of a typical domestic firm l ($l = 1, \dots, L^R$) and those of the single MNE under R respectively.

Applying the first-order conditions, the "symmetric" Cournot-Nash equilibrium will be determined.

Under the Export economy, the output level of the single MNE is defined by

$$q_m^{Exp} = \frac{S_A - (L^{Exp} + 1)(\lambda c_m + \mu w_m + \tau_m) + L^{Exp}(c_l + w_l + \tau_l)}{L^{Exp} + 2} \quad (12)$$

and that of a typical domestic firm l ($l = 1, \dots, L^{Exp}$)

$$q_l^{Exp} = \frac{S_A - 2(c_l + w_l + \tau_l) + (\lambda c_m + \mu w_m + \tau_m)}{L^{Exp} + 2} \quad (13)$$

As for the Export-platform economy, the output level of the single MNE is determined by

$$q_m^{Ep} = \frac{S_A - (L^{Ep} + 1)(\lambda c_m + g + \mu w_l + \tau) + L^{Ep}(c_l - \theta + w_l + \tau)}{(L^{Ep} + 2)} \quad (14)$$

and that of a typical domestic firm l ($l = 1, \dots, L^{Ep}$)

$$q_l^{Ep} = \frac{S_A - 2(c_l - \theta + w_l + \tau) + (\lambda c_m + g + \mu w_l + \tau)}{L^{Ep} + 2} \quad (15)$$

Remark 3 Since $\frac{\partial q_l^{Exp}}{\partial \lambda} > 0$ and $\frac{\partial q_l^{Ep}}{\partial \lambda} > 0$, the output level of a typical domestic firm l under each economy ($R = Exp$ or $R = Ep$) increase in the input intensity of the MNE (λ).

Under the Export economy, the local input is only required by domestic firms. Given equation 13, the degree of backward linkages can be represented by

$$\begin{aligned} BK^{Exp} &= L^{Exp} q_l^{Exp} \\ &= L^{Exp} \frac{S_A - 2(c_l + w_l + \tau + \tau_l) + (\lambda c_m + \mu w_m + \tau + \tau_m)}{L^{Exp} + 2} \end{aligned} \quad (16)$$

On the other hand, under the Export-platform economy, the local input is needed by both domestic firms and the MNE. Given equations 14 and 15, the degree of backward linkages can be rewritten as

$$\begin{aligned}
BK^{Ep} &= L^{Ep} q_l^{Ep} + \lambda q_m^{Ep} \\
&= L^{Ep} \frac{S_A - 2(c_l - \theta + w_l + \tau_l) + (\lambda c_m + g + \mu w_l + \tau_l)}{L^{Ep} + 2} \\
&\quad + \lambda \frac{S_A - (L^{Ep} + 1)(\lambda c_m + g + \mu w_l + \tau_l) + L^{Ep}(c_l - \theta + w_l + \tau_l)}{(L^{Ep} + 2)}
\end{aligned} \tag{17}$$

Remark 4 In equation (17), the second term of the right side indicates the direct demand creation effect (λq_m^{Ep}). Since $\frac{\partial \lambda q_m^{Ep}}{\partial \lambda} > 0$ when $\lambda < \lambda^*$ and $\frac{\partial \lambda q_m^{Ep}}{\partial \lambda} < 0$ when $\lambda > \lambda^*$ where

$$\lambda^* = \frac{S_A - (L^{Ep} + 1)(g + \mu w_l + \tau_l) + L^{Ep}(c_l - \theta + w_l + \tau_l)}{2(L^{Ep} + 1)c_m}$$

an increase in λ has hence an ambiguous impact on the direct demand creation effect.

Let denote $\Delta Z = BK^{Ep} - BK^{Exp}$, the evolution in the degree of backward linkages between the two economies. Given equations (16) and (17), the evolution can be rewritten in the following equation

$$\Delta Z = a\lambda^2 + b\lambda + c \tag{18}$$

where

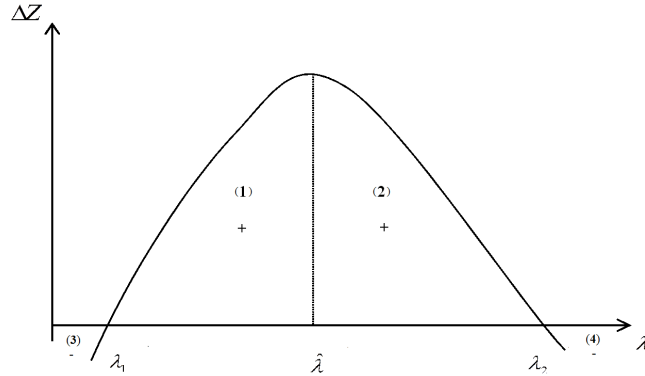
$$\begin{aligned}
b &= \frac{2(\beta - 1)}{\beta(L^{Exp} + 2)}c_m \\
&\quad + \frac{S_A - [\beta(L^{Exp} + 2) - 1]\varphi + [\beta(L^{Exp} + 2) - 2]CT_l^{Ep}}{\beta(L^{Exp} + 2)} \\
a &= -\frac{\beta(L^{Exp} + 2) - 1}{\beta(L^{Exp} + 2)}c_m < 0 \\
c &= 2\frac{\beta - 1}{\beta(L^{Exp} + 2)}[S_A - 2(c_l + w_l + \tau)] \\
&\quad + \frac{\beta(L^{Exp} + 2) - 2}{\beta(L^{Exp} + 2)}(\theta + \varphi) \\
&\quad + \frac{\beta L^{Exp}}{\beta(L^{Exp} + 2)}(\mu w_m + \tau_m) \\
\varphi &= g + \mu w_l + \tau \\
CT_l^{Ep} &= c_l - \theta + w_l + \tau
\end{aligned}$$

Since $\lambda > 0$, we focus on the most common case where the equation $\Delta Z = 0$ has two solutions

$$\begin{aligned}
\lambda_1 &= \frac{-b - \sqrt{b^2 - 4ac}}{2a} > 0 \\
\lambda_2 &= \frac{-b + \sqrt{b^2 - 4ac}}{2a} > 0
\end{aligned}$$

Therefore, equation (18) can be graphically represented in figure 2 below.

Figure 2: Export-platform FDI, input intensity of MNE and backward linkages



As we mentioned above, an increase in λ has an ambiguous impact on the direct demand

creation effect. On the other hand, this increase also leads to a higher output level of a typical domestic firm l . Thereby, the net impact of this increase on the degree of backward linkages is ambiguous.

Case 4 *If $\lambda < \hat{\lambda}$ where $\hat{\lambda} = -\frac{b}{2a}$ then $\frac{\partial \Delta Z}{\partial \lambda} > 0$. Hence, the evolution in the level of backward linkages (ΔBK) increases in the input intensity of the single MNE (λ).*

If the input intensity of firm m does not achieve a minimal threshold ($\lambda < \lambda_1$), the demand creation effect is relatively low whereas the competition effect is strong and carries out the positive effect. Thus, Export-platform FDI hurts backward linkages (Area 3).

Conversely, whenever the condition is reversed ($\lambda > \lambda_1$), the demand creation effect becomes stronger than the competition effect. Therefore, the entry of MNE into the host country boosts the level of backward linkages (area 1).

Case 5 *When λ reaches an critical threshold ($\lambda = \hat{\lambda}$), the degree of backward linkages achieves its optimal level.*

Case 6 *Whenever $\lambda > \hat{\lambda}$ then $\frac{\partial \Delta Z}{\partial \lambda} < 0$. Hence, the evolution in the degree of backward linkages decreases in the input intensity of the single MNE*

Whenever the input intensity of the MNE does not exceed a maximal threshold ($\lambda < \lambda_2$), the demand creation remains higher than the competition effect. Thereby, the net impact of Export-platform FDI on backward linkages is positive (Area 2).

On the opposite way, if the condition is not fulfilled ($\lambda > \lambda_2$) then the competition effect becomes stronger than the demand creation. Therefore, the location of MNE in the host country damages the degree of backward linkages (Area 4).

3 Evidence from supporting industries in Vietnam during the period 2000-2007

Building on the framework above, we develop an empirical study in the case of Vietnam to search for any backward linkages created by Export-platform FDI.

The country is chosen because it is a member of the AFTA (Asean free-trade area). By investing in Vietnam, foreign firms could easily access to other markets of this area such as Singapore, Thailand or Indonesia, etc. These firms could also export their output to the U.S. market since the latter and Vietnam signed a BTA in 2001. Moreover, while locating in Vietnam, foreign firms may take advantage of the low-cost labor (UNCTAD, 2008, 2009). Therefore, this country fulfills all conditions underlined in the three-country model above. In addition, Vietnam is one of the ten most attractive countries for FDI worldwide (UNCTAD, 2007, 2008, 2009). Lastly, to this day, there are few studies examining impacts of Export-platform FDI on development economies.

As Nguyen et al. (2010) and Minda and Nguyen (2012), in this study, foreign investments in export-oriented industries are used as a proxy for these investments. According to the foreign investment law (the decree No. 24 of July 31, 2000), an industry is said export-oriented whenever most of its production (more than 50%) is reserved to export³.

The data set is collected from the Vietnamese enterprises' surveys over a eight-year period, from 2000 to 2007. The survey is conducted annually by the General Statistics Office (GSO) and its branch offices (Provincial Statistic Offices), with a technical assistance from the World Bank. It covers all business entities existing at the end of the year in question. The first motivation of the survey is to collect the enterprises' productive factors (labor, capital and other assets)

³See Appendix A for the list of export-oriented industries.

in different industries and economic sectors. The survey also collects necessary information for aggregate indicators such as the number of enterprises, the number of employees, the production value, etc. It is used as well to build an enterprise database.

After examining the raw data and deleting firms with missing key information and firms located in other industries, we have a database including 264 year-supporting industries⁴. The database covers different variables such as the degree of domestic backward linkages and that of foreign backward linkages, the number of firms, the labor force, the capital stock, the investment level, etc.

In what follows, we first present a brief discussion about the variables used in the empirical study, followed by the econometric specifications. The section concludes with the interpretation of estimate results.

3.1 Data description and variables explanation

The dependent variable is the output level of a typical supporting industry i . Let denote $Y_{i,t}$, the output level of a typical industry i during year t ($Y_{i,t} = \sum y_{ik,t}$ where $y_{ik,t}$ represents the output level of a typical firm k located in industry i during year t). The independent variables could be identified in two groups, the backward linkages' variables and the sectorial variables.

3.1.1 Backward linkages' variables

The backward linkages' variables indicate the direct and indirect demand creation effect generated by Export-platform FDI. These variables are calculated as

$$DBL_{i,t} = \sum a_{ij} DP_{j,t}$$

$$FBL_{i,t} = \sum a_{ij} FP_{j,t}$$

⁴See appendix B for the list of supporting industries.

where - $DBL_{i,t}$ indicates the total level of backward linkages of an input i created by domestic firms in downstream industries throughout year t ;

- $FBL_{i,t}$ represents the total level of backward linkages of an input i created by foreign firms in downstream industries throughout year t ;

- a_{ij} indicates the proportion of output level of a typical supporting industry i 's that will supplies an export-oriented industry j . The proportion is taken from the 2005 input - output matrix at the four - digit level⁵. It is calculated by excluding all export-oriented industries which supply themselves or the other ones;

- $DP_{j,t}$ denotes the total output level of domestic firms located in a typical export-oriented industry j throughout year t ;

- $FP_{j,t}$ indicates the total output level of foreign firms located in a typical export-oriented industry j during year t .

3.1.2 Sectorial variables

Sectorial variables of a given industry are those that may have an influence on its production. In the study, the database allows us to examine the power of the foreign capital share, that of the industry size and that of investment level on the production of an industry.

First, the level of foreign capital share means the foreign capital share in the capital stock of a given industry. It is calculated as

$$fcap_share_{i,t} = \frac{\sum K_{if,t}}{\sum K_{ik,t}}$$

where - $fcap_share_{i,t}$ indicates the level of foreign capital share in the capital stock of a typical supporting industry i at the end of year t ;

⁵Owing to the absence of data, we have only the input-output matrix (in 2005) over the period studied.

- $K_{if,t}$ means the capital stock of a typical foreign firm f located in industry i at the end of year t ;

- $K_{ik,t}$ denotes the capital stock of a typical firm k located in industry i at the end of year t .

Second, the industry size is measured by

$$indus_size_{i,t} = \frac{\sum_{k=1} L_{ik,t}}{\sum_{i=1} \sum_{k=1} L_{ik,t}}$$

where - $indus_size_{i,t}$ presents the size of industry i at the end of year t ;

- $L_{ik,t}$ is the labor force of a typical firm k located in a given industry i at the end of year t .

Third, the investment level ($indus_invest$) of a typical industry i means the total investment realized in the industry in question throughout a given year.

3.2 Econometric specifications

In order to examine the impacts of Export-platform FDI on backward linkages over the period 2000-2007, we use the fixed effects (FE) model and the random effects (RE) one. The empirical study is in the line of the econometric analysis of panel data which is largely developed on the topic of the impacts of MNE on the host country (e.g. Kejzar, 2006; Biterza, 2008). However, it differs from other studies by focusing on the production level instead of the productivity. Indeed, the main reason is that an improvement in productivity could not be associated with a greater production level. That is the case where the presence of MNEs in host-country incites domestic firms to become more efficient while their output level declines because some parts of their market shares are involved by these multinationals (Aitken and Harrison, 1999).

In the study, impacts of Export-platform FDI are examined through those of backward link-

ages' variables on the output level of a given supporting industry. The following two equations are proposed

$$\begin{aligned} \ln Y_{i,t} = & \alpha + \beta_1 \ln DBL_{i,t} + \beta_2 \ln FBL_{i,t} \\ & + \beta_3 \text{indus_size}_{i,t} + \beta_4 \text{fcap_share}_{i,t} + \beta_5 \text{indus_Invest}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (19)$$

$$\begin{aligned} \ln Y_{i,t} = & \alpha + \beta'_1 \ln DBL_{i,t} \\ & + \beta_3 \text{indus_size}_{i,t} + \beta_4 \text{fcap_share}_{i,t} + \beta_5 \text{indus_Invest}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (20)$$

In equation (19), β_2 means the power of the direct demand creation effect. Therefore, the parameter is estimated to be positive ($\beta_2 > 0$). Otherwise, parameters β_1 and β'_1 represent the extent of backward linkages created by domestic firms in downstream industries. By comparing β_1 and β'_1 , we could determine the net impact of Export-platform FDI on backward linkages. Three cases could be involved

- When $\beta_1 > \beta'_1$, the indirect demand creation is also generated. The degree of backward linkages are greatly improved by Export-platform FDI from where we are in area 3 of figure 1 above.

- If $\beta_1 < \beta'_1$ then some domestic productions in downstream industries are replaced by foreign ones, leading to a decline in domestic demand in input. This fall can be high enough go that $\beta_1 + \beta_2 < \beta'_1$. In this case, the competition effect of Export-platform FDI carries out its demand creation effect. Hence, the investment hurts the level of backward linkages and we are in area 1 of figure 1 above.

- In the opposite case, whenever $\beta_1 + \beta_2 > \beta'_1$, the demand creation effect becomes stronger than the competition effect. Therefore, the degree of backward linkages is boosted under the Export-platform FDI and we are located in area 2 of figure 1 above.

Otherwise, to examine impacts of the input intensity of MNE on the level of backward linkages, we base on the following equation

$$\begin{aligned} \ln Y_{i,t} = & \alpha + \beta_1 \ln DBL_{i,t} + \beta_2 \ln FBL_{i,t} + \beta_3 FBL_{i,t}^2 \\ & + \beta_4 \text{indus_size}_{i,t} + \beta_5 \text{fcap_share}_{i,t} + \beta_6 \text{indus_Invest}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (21)$$

where $FBL_{i,t}^2 = \ln FBL_{i,t} * \ln FBL_{i,t}$

In equation (21), $FBL_{i,t}^2$ is used to investigate the role of this intensity. Whenever $\beta_3 > 0$, the degree of backward linkages increases in the input intensity of MNE. Thus, we position in area 1 of figure 2 mentioned above. Conversely, when $\beta_3 < 0$, we are in area 2 of the figure where the level of backward linkages decreases in the input intensity of MNE.

3.3 Estimate results

This paragraph is intended to interpret impacts of Export-platform FDI on backward linkages in the case of Vietnam. The estimates are based on sample from 34 supporting industries which supply 24 export-oriented industries for the period 2000-2007.

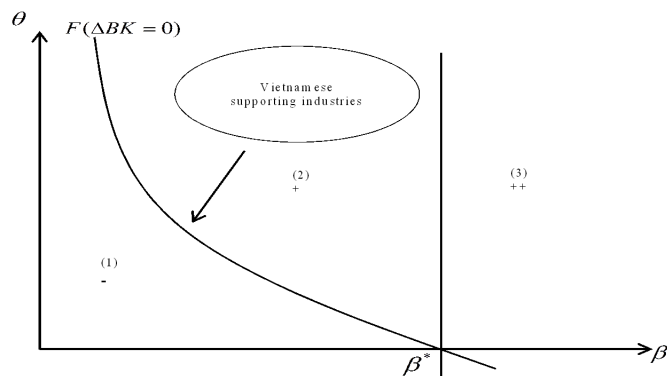
At first, table 1 represents estimates of equations (19) and (20). Column 1, 2 show those of equation (19) using the RE and FE statistical models, respectively. Furthermore, those of equation (20) are presented in column 3 and 4, using the RE and FE models, respectively. The estimation give ratios F statistically significant to the threshold of 0.1%. It means that individual effects are justified and the FE model is then more efficient than the grouped regression one. As the Lagrange multipliers (LM) are largely higher than the chi-square of 3.84 ($\chi^2(1) = 3.84$), the RE model is more effective than the classic regression model. We also observe that the Hausman ratios are significant at the level of 0.1%. Hence, the FE model is more appropriate for our sample.

We observe that all sector variables are significant and have a positive influence of production of upstream industries. On the one hand, if the size of a given industry increases by 10%, its production will grow by 1.4%. On the other hand, the same increase in investment level of the industry in question is accompanied by an increase of 2.3% in its own production. Furthermore, we observe a remarkable role of foreign suppliers' presence in this production, because a 1% increase in the foreign share in capital stock of an industry leads to a 1.2% growth in industrial production.

Table 1 shows as well that variable FBL (presented in columns 3 and 4), which is known as a direct demand creation, has the expected positive sign and is statistically significant in both two modules ($\beta_2 > 0$). The results confirm our prediction in the three-country model, that Export-platform FDI could create a direct demand in input. Using the FE method, we note that if foreign producers in export-oriented industries increase their demand in a given input by 10%, production in related upstream industry will go up to 3.7%. Otherwise, in the absence of foreign producers (column 2), a 1% increase in domestic producers' demand leads to a rise of 0.7% in production of the upstream industry in question. However, taking into account this presence, this production amounted to 0.34% (column 4). Since $0.34 < 0.7$ (i.e: $\beta_1 < \beta'_1$), some domestic productions in downstream industries are substituted by foreign ones, leading to a decline in domestic demand in input. In addition, given that $0.34 + 0.37 \simeq 0.7$ (i.e: $\beta_1 + \beta_2 \simeq \beta'_1$), Export-platform FDI does not have any influence on production in upstream industries. Hence, following our discussion in the previous subsection, we conclude that over the period studied, Vietnamese supporting industries are located in the curve $F(\Delta BK = 0)$ of figure 1 (cf. figure 3 below).

Thus, this is the case called 100% crowding-out that on the one hand, MNEs gain some market shares from domestic producers. On the other hand, the decline in local demand for input

Figure 3: Impacts of Export-platform FDI on Vietnamese supporting industries



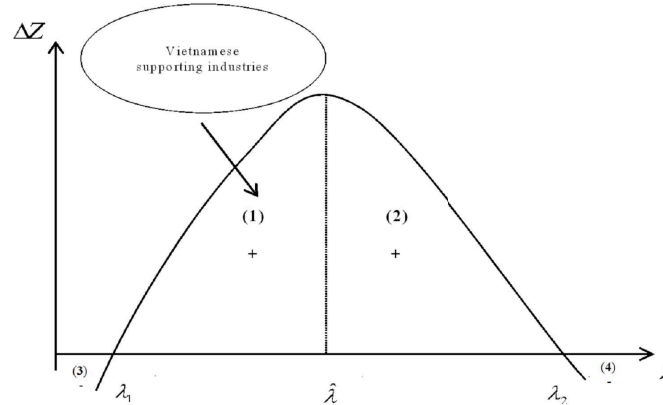
related to this market conquest is fully offset by the increase in demand for input associated with the production of these foreign firms in the host country. Consequently, Export-platform FDI has no impact on backward linkages. Hence, our result seems to be similar to that of Markusen and Venables (1999), since these authors also observed the crowding-out effect of FDI on local industries.

In a second time, we examine how input intensity of the technology used by foreign producers affects backward linkages. The regressor estimates, using the FE and RE statistical models, are based on equation (21) and shown in column 1 and 2 respectively of table 2 below.

The table gives statistically significant values of LM , F et W ratios at the threshold of 0.1%. That means the FE model is the most relevant for the regression (21). Hence, we note that $FBK2$ (which describes the input intensity of technology used by MNEs) is statistically significant at the level of 10% and has a positive sign. Therefore, the more technology of MNEs is intensive in input, the greater backward linkages are. Following our discussion in the econometric specifications' subsection, during the period studied, Vietnamese supporting industries are located at the area 1 of figure 2 where $\lambda < \hat{\lambda}$ (cf. figure 4 below).

Thus, in order to improve backward linkages, the government can implement some policies

Figure 4: Production technology of MNE and Vietnamese supporting industries



encouraging MNEs to use more local inputs. First, these ones may be due to an increase in local content requirement in production process of MNEs. This suggestion seems to be closer to that of Beldebois et al. (2001), since these authors also confirm a positive effect of this increase on the productivity of local suppliers. Second, incentive policies which improve local inputs quality (investment subsidies, increased spending on R & D) are welcome since on the one hand, these policies could make domestic inputs more competitive deal with imported ones. On the other hand, according to surveys conducted by UNCTAD on the determinant factors of FDI location (UNCTAD, 2008, 2009), a very low proportion of FDI flows in Vietnam is attracted by the quality of intermediate goods (just for about 4% of foreign investors which are satisfied with this criterion). Finally, Vietnamese government could as well make a higher duty on imported inputs or increase its subsidy for the purchase of domestic inputs which could allow to a greater purchase quantity of these ones.

4 Conclusion

The purpose of this paper is to highlight impacts of Export-platform FDI on backward linkages, a topic which is, in the best of my knowledge, not much examined in the literature. This investment means a foreign production in the host country while the output is exported to third

markets.

At the first time, we developed a three-country model in which impacts of Export-platform FDI could be explained by competition effect and demand creation one. Competition effect, resulting from competition between foreign and domestic producers in downstream industries, could lead to a lower production of domestic producers or to a net exit of them from the third market. Therefore, competition effect hurts backward linkages. On the other hand, demand creation implies a direct and indirect input demand created by the location of MNEs on the host country. Direct demand creation is caused by the production of MNE whereas indirect demand creation is generated whenever more domestic firms are in the third market or whenever each of them has a greater production. When competition effect is stronger than demand creation one, Export-platform FDI has a negative impact on backward linkages. Conversely, if the former is weaker than the other, this investment improves backward linkages.

Furthermore, if MNE and domestic firms are heterogeneous (they do not have the same production technology), then impacts of Export-platform FDI on backward linkages also depend upon input intensity of the technology used by MNE. Whenever this intensity does not reach a smallest or exceed a highest level, impacts appear to be negative. Inversely, between these two thresholds, this investment improves backward linkages in the host country. In addition, the model showed that there is an optimal intensity of MNE production' technology which maximizes backward linkages. Below this threshold, the more technology of MNE is intensive in input, the greater benefits obtained from this investment are. Conversely, above this threshold, the higher this intensity is, the less the host country could benefit from Export-platform FDI.

The model is in the basic game-theory models analyzing impacts of FDI on backward linkages (Rodriguez-Clare, 1996; Markusen and Venables, 1999; Lin and Saggi, 2005, 2007). However, it differs from others for three reasons. First, the model proposes a typology about competition

effect and input demand creation effect. The former could lead to a net exit of domestic producers in the market as well as to a lower production of each of them. As for input demand creation one, it could be directly generated by production of foreign producers in host country. One may also be indirectly engendered by greater total production of domestic ones. Second, the model underlines impacts of input intensity of foreign producers' technology on backward linkages. Lastly, the model deals with a three-country model, instead of a two-country model, since the latter is not taking into account the economic integrations phenomenon.

In a second time, the three-country model is tested in the case of the Vietnamese supporting industries between 2000 and 2007, using the RE and FE statistic models. Unlike other empirical studies focusing on productivity, we dealt with production in upstream industries, because in agreement with Aitken and Harrison (1999), an improvement in productivity does not necessarily lead to an increase in production.

The estimates suggest that Export-platform FDI generates a 100% crowding-out effect. That means while making an Export-platform FDI in Vietnam, MNEs gain some market shares of domestic firms, following by a lower demand in local input. However, the production of MNEs in the country also increases demand in local input. Whenever negative influences is fully offset by positive ones, Export-platform FDI does not have any impact on backward linkages. In addition, we observed a positive correlation between production in upstream industries (i.e supporting industries) and input intensity of technology used by foreign producers in downstream industries (i.e export-oriented industries). In other words, the more this technology is intensive in input, the greater potential benefits that Vietnamese suppliers could obtain from Export-platform FDI.

While this paper has just outlined some possibilities generated by the interaction between competition effect and demand creation one or by the input intensity of technology used by

MNE, it leaves open many discussions for further research. The entry of MNE and that of domestic firms in the model were considered as exogenous. What would happen whenever these entries become endogenous? In this case, the entry of domestic firms and that of MNEs are interdependent. Therefore, according to Markusen and Venables (1999), Export-platform FDI could act as a catalyst leading to the development of local industry. That is the case where domestic firms could be strong enough to reduce the position of the MNE in the industry in question. Otherwise, we have worked entirely in a partial equilibrium framework. Developing the three-country model in a general equilibrium would include in the picture a factor market competition and could thus integrate the impacts of Export-platform FDI on a real wage and on a real interest rate.

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Appendix

A List of Vietnamese export-oriented industries

1500 - Food products and beverages

- 1511 - Animal food manufacturing
- 1512 - Seafood product preparation and packaging
- 1514 - Grain and oilseed milling
- 1520 - Dairy product manufacturing
- 1532 - Bakeries and Tortilla manufacturing
- 1542 - Sugar and Confectionery product manufacturing

1700 - Textile products manufacturing

- 1711 - Fiber, yarn and thread mills
- 1712 - Textile ennoblement
- 1721 - Textile and Fabric
- 1722 - Carpet and Rug mills
- 1723 - Net and String products
- 1729 - Other textiles products
- 1730 - Knitting products

1800 - Clothing manufacturing

- 1810 - Garment products manufacturing

1900 - Leather, leather products and shoes

- 1920 - Shoes manufacturing

2500 - Plastics and Rubber products manufacturing

- 2520 - Plastics products manufacturing

2690 - Non-metallic mineral products

- 2691 - Pottery, Ceramics and Plumbing fixture manufacturing

2692 - Clay building material and Refractory manufacturing

2693 - Brick and construction products

3000 - Computer and Peripheral equipments manufacturing

3100 - Electrical equipments manufacturing

3130 - Electrical cables manufacturing

3200 - Radio, television and communication equipments manufacturing

3210 - Electronic components

3220, 3230 - Communication equipments

B List of supporting industries

1500 - Food products and beverages

1533 - Prepared feeds for farm animals

1549 - Other Foods manufacturing

1910 - Leather and related products

1911 - Tanning and dressing of leather, dressing and dyeing of fur

1912 - Luggage, handbags and like, saddler and harness

2000 - Wood and wood products and cork (except furniture) manufacturing, Articles of straw and plaiting materials

2010 - Sawmilling and planing of wood, excluding impregnation

2100 - Paper products manufacturing

2101 - Pulp, paper and paperboard manufacturing

2102 - Corrugated paper and paperboard, containers of paper and paperboard manufacturing

2109 - Other articles of paper and paperboard

2400 - Chemical Industries

2411 - Other organic basic chemicals manufacturing

2413 - Plastics, synthetic rubber in primary forms manufacturing

2422 - Paints, varnishes and similar coatings, printing ink and mastics manufacturing

2429 - Other chemical products

2430 - Man-made fibers manufacturing

2500 - Plastic and rubber products manufacturing

2511 - Rubber tires and tubes, retreading and rebuilding of rubber tires manufacturing

2519 - Other rubber products manufacturing

2690 - Non-metallic mineral products

2694 - Cement, lime and plaster manufacturing

2695 - Other articles of concrete, cement and plaster manufacturing

2696 - Cutting, shaping and finishing of stone

2699 - Other non-metallic mineral products

2700 - Basic metals manufacturing

2720 - Precious and light metals production

2732 - Casting of light metals

2900 - Machinery and equipment manufacturing

2911 - Engines and turbines (except aircraft), vehicle and cycle engine manufacturing

2912 - Fluid power equipment, other pumps and compressors manufacturing

2913 - Bearings, gears, gearing and driving elements manufacturing

2914 - Ovens, furnaces and furnace burners manufacturing

2915 - Packing, packaging and weighing equipments manufacturing

2919 - Other general purpose machinery manufacturing

3100 - Electrical equipments manufacturing

3120 - Electricity distribution and control apparatus manufacturing

3140 - Batteries and accumulators manufacturing

3150 - Electric lighting equipments manufacturing

3190 - Other Electrical equipments manufacturing

3500 - Other transport equipments manufacturing

3591 - Motorcycles manufacturing

3700 - Collection, treatment and recovery

3710 - Collection, treatment and recovery of metallic waste

3710 - Collection, treatment and recovery of non-metallic waste

Table 1: Export-platform FDI and backward linkages

Variable	Label	(1) RE	(2) FE	(3) RE	(4) FE
		Coefficient	Coefficient	Coefficient	Coefficient
		Std. Err.	Std. Err.	Std. Err.	Std. Err.
Local producers' demand	DBK	0.14**	0.70***	0.01 ^{ns}	0.34***
		0.05	0.07	0.09	0.09
Foreign producers' demand	FBK			0.15*	0.37***
				0.07	0.07
Foreign capital share	fcap_share	1.19*	1.22***	1.16***	1.24***
		0.25	0.24	0.24	0.24
Industry size	indus_size	0.12***	0.14***	0.13***	0.13***
		0.03	0.03	0.03	0.03
Industry investments	indus_inves	0.47***	0.26***	0.45***	0.23***
		0.05	0.04	0.05	0.04
Constant		5.93***	1.47 ⁺	5.91***	1.81***
		0.70	0.76	0.71	0.69
Observations	N	264		264	
Number of groupes	n	34		34	
R ^{2a}		0.8308	0.6806	0.796	0.716
Breusch et Pagan' test	LM	51.86***		53.06***	
Ficher' test	F	79.85***		86.86***	
Hausman' test	W	135.61***		526.69***	

Significant levels : * : p<0.05 ** : p< 0.01 *** : p<0.001 ^{ns} : not significant ⁺ : p< 0.1

Standard errors are robust, allowing to avoid the heteroskedasticity problem

^a: R² within for fixed effects model and R² between for random effects model

Table 2: MNEs' technology and backward linkages

Variable	Label	(1) RE	(2) FE
		Coefficient	Coefficient
		Std. Err.	Std. Err.
Local producers' demand	DBK	-0.04 ^{ns}	0.31***
		0.09	0.09
Foreign producers' demand	FBK	-0.29 ^{ns}	0.01 ^{ns}
		0.07	0.07
Intensity in input	FBL2	0.02***	0.02 ⁺
		0.009	0.009
Foreign capital share	fcap_share	1.13*	1.25***
		0.25	0.24
Industry size	indus_size	0.13***	0.14***
		0.03	0.03
Industry investments	indus_inves	0.44***	0.22***
		0.05	0.04
Constant		8.83***	4.11**
		0.70	1.43
Observations	N		264
Number of groupes	n		34
R ^{2a}		0.787	0.6806
Breusch et Pagan' test	LM	55.76***	
Ficher' test	F		77.14***
Hausman' test	W	235.82***	

Significant levels : * : p<0.05 ** : p< 0.01 *** : p<0.001

^{ns} : not significant ⁺ : p< 0.1

Standard errors are robust, allowing to avoid the heteroskadaticity problem

^a: R² within for fixed effects model and R² between for random effects model