Chapter 7

Productivity Spillovers from Foreign Direct Investment: The Case of Vietnam

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There is a common consensus that the presence of foreign multinationals is often associated with advanced technologies or firm-specific features that can spill over to domestic firms. Particularly in the case of Vietnam, the importance of foreign direct investment (FDI) has been widely recognized to be substantial with many externalities that help to promote the development of the domestic sector.

Accordingly, with the use of a panel data set covering the period 2003 to 2007 constructed from Vietnam's "Enterprise Survey" at the firm level, this paper explores major channels of, and estimates factors affecting, the spillover effects of FDI on the productivity of Vietnam's domestic firms. Empirical results reveal the substantially positive effects of FDI, contributing to improving the productivity of Vietnam's domestic firms, emphasizing the importance of narrowing technology gaps and the need to upgrade the labor quality of domestic firms in order to be able to maximize benefits from FDI.

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1. Introduction

Theoretically, the presence of foreign multinationals is often associated with advanced technologies or firms-specific features that can spill over to domestic firms. In other words, FDI can benefit a country, by bringing important inputs such as capital, advanced technology and improved managerial skills. Although hot debate is still underway on whether these effects exist or not, for Vietnam at least the importance of FDI has been recognized as substantial with a wide spectrum of externalities affecting growth.

Supported by achievements in exports and investment, Vietnam has experienced tremendous economic growth. In the years 1998-2006, growth was robust and continuous with an average rate of over 7% annually. Vietnam's economy continued to grow rapidly after its accession to the WTO. In considering Vietnam's achievements, it is noted that the FDI sector has occupied a significant share of the Vietnamese economy, and that its role is becoming increasingly important over time. FDI, as a share of Vietnam's GDP, rose from 13.2% in 2000 to 15.9% in 2006 and to 21.2% in 2007 (CIEM, 2007 and CIEM, 2008).

Attracting FDI is and continues to be a vital component of the reform policy of Vietnam. Vietnam has become a leading recipient of FDI flows, in relation to the size of its economy. With the adoption of a series of measures to attract FDI, motivated by a belief that foreign presence is connected to advanced technology and stimulates an export-led orientation, together with more employment creation, the FDI inflow has rapidly increased over the period particularly in recent years. Starting from a small pledge of about 342 million USD in 1988, FDI rose to 21.348 billion USD in 2007 and 63 billion USD in 2008[2], turning Vietnam into one of the most attractive investment destinations in the world in general, and in the region in particular.

In East Asia in general and in ASEAN in particular, Vietnam is considered as a typical case in which to study the impacts of FDI on a host country. It can be seen that Vietnam's experience in attracting FDI, in association with its rapid economic growth

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[2] According to data provided by the General Statistical Office of Vietnam (GSO).

over time, has attracted increasing attention and a growing body of written research on FDI and its impacts on domestic sectors.

Overall, to the best of my knowledge, most current empirical studies on Vietnam's FDI agree that FDI spillovers from foreign firms to local firms in Vietnam are positive in various aspects. There are multiple channels through which local firms in Vietnam can benefit from the presence of foreign firms. Nevertheless, the magnitude of spillovers varies across regions, industries and firms; spillovers are even negative in some cases and aspects. The diversity in findings could be due to various causes, particularly with regard to methods of estimation and to data quality, triggering the need for more research work and comprehensive analysis in this area, as well as with regard to the aspect of the absorptive capacity of domestic firms, enabling them to gain benefits from FDI.

This study, based on empirical data at the firm level in Vietnam covering the period 2003-2007, aims to enrich the existing empirical research on the productivity impacts of FDI spillovers in the case of Vietnam. The paper will explore major channels and estimate factors affecting the spillover effects of FDI on productivity of domestic firms in Vietnam.

2.   Literature Review

With the use of micro-data, researchers have conducted a large number of empirical studies aiming to assess the impacts of the presence of MNCs on host countries during different periods of time. It is noted that the analytical frameworks of the majority of researchers are relatively similar. Spillover effects are analyzed through a measurement of the impacts of foreign presence on the output level or labor productivity of domestic enterprises. In this connection, in addition to factors that are assumed to have influence on the productivity of domestic firms or industries, including capital intensity, labor quality, production scales and the competitiveness of the market, a proxy for foreign presence is normally included as an independent variable in a linear or log-linear regression, where the labor productivity of the domestic sector is treated as a dependent

variable. Upon estimation, a positive spillover is inferred following the finding of a significant positive sign for the coefficient of the foreign presence, and vice versa. It is clearly proposed in theory that the presence of FDI may have positive productivity spillovers, resulting from the interaction process between foreign firms and domestic-owned firms. For example, domestic-owned firms can imitate the superior technology of foreign firms nearby (the technological imitation effect), or they can benefit from skilled labor turnover (the skill acquisition effect). Furthermore, competition and production linkages among firms are also important channels for such phenomena as technological diffusion (Görg and Greenaway, 2004).

Literature review shows that empirical results of explaining possible channels of FDI spillovers are mixed (Blomstrom and Kokko, 1998; Meyer and Sinani, 2001; Lipsey, 2002; Crespo and Fontoura, 2007). Some studies (e.g. Globerman, 1979; Blomstrom and Persson, 1983; Kolasa, 2007) reveal positive spillovers, while some others indicate negative or negligible effects. It is noted that almost in the recent two decades, empirical papers have focused on explaining these mixed results. Accordingly, an important concluding remark is that the existence, pace and magnitude of productivity spillovers are subjected to the nature and extent of each channel of technological transmission, the nature of both foreign and domestic firms and the condition of host countries.

For instance, the imitation effect is not simply a duplication of technology but subjects on the sophistication of the technology imitated (Blomstrom and Kokko, 1998). Furthermore, the optimal decision choice made by multinational corporation should be to minimize the probability of their technology being imitated (Ethier, 1986). Skill acquisition is limited as foreign firms tend to pay higher wages than domestic firms (Haddad and Harrison, 1993; Lipsey and Sjoholm, 2001). The presence of a positive effect through vertical linkages seems to be obvious, but it depends on the intensity of the input-output linkages. If the buyer's power is significant, the gain from productivity growth in the upstream sectors will be largely appropriated by the downstream sector (Driffield and Love, 2002; Graham *et al*., 1999). Current literature also focus on the absorptive capability of domestic firms (Kinoshita, 2001; Girma, 2005), the productivity gap (Kokko, 1994), the heterogeneous nature of the ownership of both foreign and

domestic firms (Sjöholm, 1999) and the negative market stealing effect (Aitken and Harrison, 1999).

In addition to the aforementioned factors, an arguable reason explaining the mixed results is the bias of estimation in data sources and estimation methods. Hale and Long (2007) suggested three sources of bias for productivity spillover studies, including the aggregation bias (for studies that use aggregated data instead of firm level data), the endogeneity bias (caused by the endogeneity of the FDI variable), and selection bias (caused by using only a sub-sample of domestic-owned firms where there might be non-random sample selection). They concluded that cross-section data and aggregated data potentially produce biased result (upward or downward) unless researchers have appropriate solutions. A meta-analysis study by Görg and Strobl (2000) also suggested the same conclusion. They emphasized that by using cross-section or sectoral data, researchers have been faced with an endogeneity problem that may cause biased estimation.

Among multiple empirical studies, Chen and Demurger (2002) analyses the link between FDI and manufacturing productivity growth in China with the use of industry-level data from 1988-1994. He estimates total factor productivity (TFP) growth by manufacturing sector and relates the estimates to FDI inflows. Empirical results indicate significant differences in TFP growth between FDI-dominated manufacturing sectors and sectors dominated by domestic investment, confirming the prevailing findings on the positive impacts of FDI on economic growth. However, such clear-cut judgment cannot be made for the intermediate and equipment sectors.

Among some studies analyzing both the effects of trade openness and FDI liberalization, Bessonova *et al.* (2003) examines the effects of the liberalization of imports and FDI on Russian firms using firm-level data from 1995-2001. The paper shows that more liberalized trade and increased foreign presence provide positive impacts on domestic firms, reflected in the improvement of the TFP of domestic firms. Several other FDI-related papers using micro-data, such as Caves (1974), Globerman (1979), Blomstrom (1986), Blomstrom and Wolff (1989), Aitken and Harrison (1999), Haskel *et al.* (2004), Kee (2005), and Keller and Yeaple (2008) also confirm the predominant positive impacts of FDI and trade openness.

In the case of Vietnam, quantitative studies on the impacts of FDI have grown over time, particularly in recent years. Among typical FDI-related studies in Vietnam, with the use of panel data at firm level for Vietnamese industries from 2000 to 2004, Le Quoc Hoi (2007) examined wage spillovers from foreign firms to local enterprises both horizontally (intra-industry) and vertically (inter-industry). Empirical results strongly support the presence of wage spillovers from foreign firms to domestic firms in Vietnam. In another research project, with the same data set at firm level from 2000 to 2004, Le Quoc Hoi (2008) uses an estimation model derived from the Cobb-Douglass production function to explore technology spillover effects through horizontal and backward linkages and at the same time to analyze the impact of the characteristics of industries and the foreign and domestic firms on the occurrence and scope of such spillovers. His research shows that while backward linkages produce positive effects on domestic firms, horizontal impacts are negative. At the same time, while domestic-oriented foreign firms produce negative impacts on the productivity of domestic firms, export-oriented foreign firms do not generate significant impacts.

The impacts of FDI on the technical efficiency of local firms are analyzed by Nguyen Dinh Chuc *et al.* (2008), where horizontal spillovers are evaluated through imitation, competition and labor mobility, and horizontal spillovers are evaluated through backward and forward linkages on technical efficiency. The paper concludes that FDI presence measured in terms of output helped to improve production efficiency of domestic manufacturing firms. In this connection, the paper shows that the production efficiency of domestic firms is improved through their increased access to new, improved or less costly intermediate inputs supplied by foreign invested firms. The paper also indicates an upward trend in the production efficiency of local manufacturing firms over time.

Nguyen Phi Lan (2008) conducted a study of FDI technology spillover effects on domestic manufacturing firms' productivity, through both horizontal and vertical linkages, at the same time examining the degree of variance of FDI across regions of Vietnam. The paper uses data from the annual enterprise survey conducted by the Vietnamese Government Statistics Office (GSO) from 2000 to 2005, focusing on manufacturing firms. The most noticeable finding of the paper is that the whole period 2000-2005 witnessed positive impacts from horizontal and backward linkages of FDI on

the productivity of the Vietnamese manufacturing firms, while negative impacts were only seen with regard to the forward linkage effects on domestic productivity.

Pham Xuan Kien (2008) uses the data of the Enterprise Survey 2005 by the GSO to test the possible impacts of FDI on labor productivity in Vietnam as a whole. The paper focuses on data at the firm level in four sub-industries: food processing, textiles, garments and footwear, electronics and mechanics, with a total of 441 enterprises including domestic and FDI firms located around the country. The paper finds that the spillovers of FDI to overall labor productivity in Vietnam are unambiguous and strongly positive. This, once again, stresses the crucial role of foreign capital in the economic development of developing economies like Vietnam. Through FDI, the host countries obtain not only the necessary capital, but also obtain modern technology, management skills, and marketing skills. The author agrees with the view that the presence of FDI firms facilitates competition between enterprises in the host country, which induces them to use resources more efficiently, to improve technology as well as management, and in consequence to improve labor productivity as a whole. The negative impacts of skill gaps on overall labor productivity suggest that Vietnam may stimulate FDI firms that tend to apply labor-intensive technologies to employ the labor force, which is abundant and relatively cheap in the short run. However, in the long run, it should focus on narrowing the technology gap between domestic and foreign firms.

Furthermore, the author recognizes that improving the skills of local workers is crucial because it seems that relatively cheap labor will no longer be a competitive factor attracting FDI in the near future. Thus the Vietnamese government should pay attention to improving labor skills through vocational colleges and training programs. The government should also help develop domestic enterprises, particularly small and medium enterprises by providing them with more training in new technologies. The government should help these firms to renew their technologies, machines and so on, so as to catch up and compete with FDI firms in the domestic market as well as to compete with foreign firms in international markets.

A critical review of literature on FDI spillovers in the case of Vietnam thus shows that foreign presence is positive to Vietnam's economic development in various aspects, ranging from the promotion of the transfer of technology and managerial skills from foreign firms to local ones, particularly with regard to those which act as suppliers to

foreign partners, to the strengthening of total factor productivity. The presence of foreign firms clearly stimulates the demand for not only efficiency improvement but also for imitation and adaptation of new and advanced technology and knowledge.

3. Research Question

This paper aims to answer the two following research questions:

a. Are there productivity spillovers from FDI to domestic enterprises?

b. Through what major channels does FDI impact on the productivity of domestic firms?

4. Data and Methodology

4.1. Data

The paper uses a panel data set covering the period 2003 to 2007, constructed from the Vietnam Enterprise Survey at firm level. The enterprise data are collected by the GSO for all sectors and industries, as at March 1st annually. The general objectives of the survey are: (i) to collect the business information needed to compile national accounts; (ii) to gather up-to-date information for the business register and sample frames for other business sample surveys; and (iii) to update the statistical database of enterprises. An important strength of the survey lies in its coverage, which includes almost all enterprises in 29 sectors and industries, in three industrial groups (4 sectors in mining and quarrying, 23 in manufacturing, and 2 in electricity, gas and water supply), providing a wide range of information on the property structure of enterprises, output, capital stock, investment, employment, location, wages, sales, etc. However, the survey is still limited in some aspects, such as a lack of some financial information and missing data.

In our panel data constructed from the Vietnam Enterprise Survey over the five year period (2003-3007), domestic-owned firms constitute about 95% of the total number of

firms (85% are domestic privately owned firms and 10% are state owned firms (SOEs) and the remaining 5% are foreign firms (including joint-ventures and wholly foreign-owned firms).

By the GSO's definition, foreign firms are enterprises with capital invested by foreigners, irrespective of their percent of capital share. In the data, foreign firms comprise the three following: (i) firms with 100% foreign capital; (ii) joint ventures between the state and foreign investors; and (iii) joint ventures between others and foreign investors. To estimate the production function, among other things, two inputs are considered; these are labor and capital. Capital is calculated as fixed asset value (book value) at the end of the year of survey. It then is adjusted by the GSO's producer price index (PPI) at the 3-digit level together with relevant financial variables. Similarly, labor input is calculated as the average value of total employment of the firm at the beginning and the end of each year.

4.2. Methodology

The model employed in the paper is derived from the Cobb-Douglas production function of the domestic sector in industry *i* with the form as follow:

$$\ln Y_{it} = \beta_0 + \beta_k \ln K_{it} + \beta_l \ln L_{it} + \ln HEFjt + \beta_f FOR + \gamma FOR * FAC_{it} + \varepsilon_{it} \quad (1)$$

Where β_0 constant, *t* is time, ε is the error term accounting for all other factors influencing productivity, and measurement error. *Y* denotes the value added of the domestic sector. *K*, *L* denotes capital, labor inputs of domestic firms in industry *i*. *FOR* indicates the degree of foreign presence in each industry measured by the share of employment of the foreign sector, following the argument of Caves (1974) that this proxy was better than the share of output of the foreign sector.

The characteristics of an industrial sector are also expected to determine the productivity change of a firm in that sector. To take into account the level of concentration in industry *j* we use the Herfindahl index to show the extent of market control of firms in the industry. A higher value of the Herfindahl index implies a high level of industry concentration, thus less competition. The Herfindahl index is

constructed as the sum of the squares of output share in the industry and presented as the following:

$$HEF = \sum_i \left(\frac{x_{ijt}}{X_{jt}} \right)^2$$

in which x_{ijt} is the output of firm i in sector j at time t. X_{jt} is the total output of sector j.

The existing body of literature on FDI research reveals that foreign investors may be attracted to industries with higher productivity, thus the actual relationship between foreign presence and the productivity of domestic firms may overestimate the positive impact of the foreign sector. So, it is possible that ordinary least squares (OLS) estimation may potentially cause an upward bias. With the assumption that the unobserved characteristics of industries are time-invariant, we can estimate the equation (1) with the fixed effect method to account for the bias. However, it may be possible that unobserved features do not affect the productivity of domestic firms, so we will also estimate equation (1) with the random effect method and use the Hausman test to decide which method is better.

In equation (1), the group of factors (FAC) that affects the magnitude of FDI spillover on the productivity of domestic firms (FAC) includes the technology gap between foreign firms and domestic enterprises (PR), capital intensity (CI) and skill intensity (SI).

To examine the effect of the technology gap on technology spillovers, we define the technology gap for each domestic firm as the percentage difference between its labor productivity and that of the average foreign firm in the same industry. A negative value for domestic firm i indicate that firm i is more productive than the average foreign firm in the same industry and a positive value indicates that firm i is less productive than the average foreign firm in the same industry. A positive value shows that a technology gap exists between the domestic firm and the average foreign firm in the same industry.

CI is defined as the percentage difference of the capital-labor ratio between a domestic firm and that of an average foreign firm in each three-digit sector. In this

connection, it is noted that foreign firms may be more capital-intensive and larger than domestic firms, and these characteristics may account for some of the productivity differentials between foreign firms and domestic firms. Therefore, the use of this variable can help to control for the impact of capital intensity on productivity.

Furthermore, skill intensity (SI) is taken into account as a factor affecting FDI spillovers, considering that skill intensity is important in helping domestic firms to maximize benefits from FDI spillovers, as shown in Girma and Wakelin (2001). SI is defined as the difference between the wage of a worker in a domestic firm and the average wage payment of a worker in a foreign firm in each industry, given the assumption that payment is closely related to labor quality and may be taken as a measure of skill intensity. With the inclusion of interaction terms between FAC (PR, CI and SI) and foreign presence (FOR), we aim to measure whether these factors affect FDI spillovers from foreign firms to local firms in Vietnam.

5.   Empirical Result

Empirical results from foreign presence, and interaction terms between foreign presence and factors affecting the degree of FDI spillovers are presented in Tables 1, 2, 3 and 4. Results are reported with the consistent and efficient estimators between fixed effects and random effects, with the check for validity by, the Hausman test, which indicates that the fixed effect estimation method is better.

Table 1. Productivity Impacts with Foreign Presence

	Fixed	Random
Dependent Variable: Productivity of Domestic Firm		
No. of observations	28096	28096
R2	0.84	0.85
Hausman	Prob>chi2 = 0.0000	
_cons	5.957237***	6.399468**
	(0.0660175)	(0.0502461)
log_K	.3502589***	.2792507***
	(0.0050161)	(0.0031955)
log_L	.2938032***	.4169616***
	(0.0120342)	(0.0058458)
Log_HEF	.2068741***	.2166288***
	(0.0018917)	(0.001519)
FOR	.503312***	.442301****
	(0.107223)	(0.0677724)

Note: Figures in parentheses are standard errors.
      *** Significant at 1%.
      ** Significant at 5%.

The positively significant coefficient of FOR in Table 1 shows that foreign presence produced very substantial spillover effects on the domestic sector of Vietnam during the 2003-2007 period.   At the same time, it is noted that the impacts of industry concentration, proxied by the Herfindahl index, are considerable with regard to the output growth of domestic firms.

Table 2. Spillovers with Technology Gap in Productivity

	Fixed	Random
Dependent Variable: Productivity of Domestic Sector		
No. of observations	27878	27878
R2	0.94	0.85
Hausman	Prob>chi2 = 0.0000	
_cons	5.873633***	6.298005***
	(0.0666459)	(0.0507486)
log_K	.3504812***	.2790592***
	(0.0050213)	(0.0031796)
log_L	.2991367***	.4221275***
	(0.0120523)	(0.0058466)
Log_HEF	.2039082***	.2121936***
	(0.0019291)	(0.0015492)
FOR	.664433***	.506865***
	(0.1086116)	(0.0687719)
FORPR	-.0205722***	-.028842***
	(0.0020395)	(0.0018426)

Note: Figures in parentheses are standard errors.
      *** Significant at 1%.
      ** Significant at 5%.

Looking at Table 2, we can see regression results with interaction terms of foreign presence and technology gap (FORPR). The interaction terms of FOR and technology gap (PR) are negatively significant. This implies that the technology gap remains a constraint to FDI spillovers despite the recent signals that domestic firms have increasingly become accustomed to higher technologies, and that FDI spillovers in recent times seem to be in favor of capital intensive industries compared to labor intensive ones.

Table 3. Spillovers with Capital Intensity

Dependent Variable: Productivity of Domestic Sector		
	Fixed	*Random*
No. of observations	27878	27878
R2	0.84	0.85
Hausman	Prob>chi2 = 0.0000	
_cons	5.880813***	6.298005***
	(0.0665887)	(0.0507486)
log_K	.3632036***	.2790592***
	(0.0051561)	(0.0031796)
log_L	.2851694***	.4221275***
	(0.0120508)	(0.0058466)
Log_HEF	.2073361***	.2121936***
	(0.001895)	(0.0015492)
FOR	.5096791***	.5068652***
	(0.1077299)	(0.0687719)
FORCI	.0090833***	-.028842***
	(0.0009216)	(0.0018426)

Note: Figures in parentheses are standard errors.
    *** Significant at 1%.
    ** Significant at 5%.

Table 3 presents results of the regression with interaction terms between foreign presence and capital intensity (FORCI). Results show a significantly positive sign for the interaction terms FORCI (FOR*CI) during the period 2003-2007. This indicates that differences in capital intensity between foreign companies and local ones had an important implication for the productivity of the latter, implying that the domestic sector may have benefited from FDI spillovers, given the current level of the gap in capital intensity. The positive coefficient of capital intensity also implies that FDI spillover is beneficial for local firms in favor of labor-intensive activities.

Table 4. Spillovers with Skill Intensity

Dependent Variable: Productivity of Domestic Sector		
	Fixed	*Random*
No. of observations	27878	27878
R2	0.84	0.85
Hausman	Prob>chi2 = 0.0000	
_cons	5.960373***	6.413001***
	(0.0663805)	(0.0504503)
log_K	.3516103***	.2799967***
	(0.0050337)	(0.0032036)
log_L	.2911778***	.4110119***
	(0.012138)	(0.0059096)
Log_HEF	.2075826***	.2168819***
	(0.0018998)	(0.0015258)
FOR	.549132***	.401426***
	(0.1209336)	(0.0758376)
FORSI	-.0021147**	-.0026878**
	(0.0044711)	(0.0025378)

Note: Figures in parentheses are standard errors.
      *** Significant at 1%.
      ** Significant at 5%.

Lastly, the FDI spillovers in connection with skill intensity are shown in Table 4. FOR remains positively significant but FORSI is negatively significant. This stresses the importance of improving labor quality so as to assist the domestic sector to maximize benefits from FDI spillovers. Overall, empirical analysis indicates evidence of substantial FDI spillovers in Vietnam.

6.   Concluding Remarks

This empirical paper has focused on examining the productivity spillover effect of FDI inflow in Vietnam during the period from 2003-2007. It has contributed to the exploration of major channels for spillover, and estimated the level of the spillover effects affecting the productivity of domestic firms in Vietnam. Empirical results show that there is a strong connection between the spillovers of FDI and the differences in technology, capital intensity and skill intensity between FDI and domestic firms. Overall, the presence of foreign multinationals is substantially positive for the domestic sector, contributing to improved productivity of local firms. Advantages in the capital

intensity of foreign firms compared to the local ones have contributed to improving the productivity of the latter. It is noted that, however, technology gaps remain obstacles to FDI spillovers, restricting local firms from improving their productivity. Furthermore, the gap in skill intensity between foreign companies and domestic ones, with the resultant outcome of a negative influence on the output of domestic firms, may signify the need to pay more attention to the quality of the labor force so as to help the domestic sector to maintain and improve its competitiveness.

In this paper, fixed effect estimation has been used to help to control for the possibility that unobserved time-invariant factors in industries may affect FDI operation, thus lessening the possibility of biased estimation. Nevertheless, the existence of mixed effects of FDI in the current literature may arise from the nature of spillover takers or spillover givers, and the conditions required for the spillover process to occur. At the same time, there is a possibility that the omission of linkages between domestic companies and possible contributions of these factors to productivity spillovers as done in our paper as well as in a large number of FDI-related empirical studies might not be the best alternative. These aspects are left for further research.

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Appendix 1. Industrial Sectors

C	Mining and Quarrying
C10	Mining of coal and lignite; extraction of peat
C11	Extraction of crude petroleum and natural gas
C12	Mining of metal ores
C13	Other mining and quarrying
D	**Manufacturing**
D15	Food and beverage
D16	Cigarettes and tobacco
D17	Textile Products
D18	Wearing Apparel, dressing and Dying of Fur
D19	Leather Tanning and Dressing
D20	Wood and Wood Products
D21	Paper and Paper Products
D22	Printing, Publishing and Reproduction of Recorded Media
D23	Coke and Refined petroleum products and Nuclear fuel
D24	Chemicals and Chemical products
D25	Rubber and Plastic products
D26	Other Nonmetallic Mineral products
D27	Basic Metals
D28	Fabricated metal products
D29	Machinery and Equipment N.e.c
D30	Office, accounting and computing machinery
D31	Electrical machinery and apparatus N.e.c
D32	Radio, TV, communication equipment
D33	Medical and precision and optical instruments
D34	Motor vehicles trailers and semi-trailers
D35	Other transport equipment
D36	Furniture, N.e.c
D37	Recycling
E	**Electricity, gas and water supply**
E40	Electricity, gas steam and hot water supply
E41	Collection, purification and distribution of Water

Source: Le Thanh Thuy (2005).