Foreign Presence and Export Response: Evidence from the Indonesian Manufacturing[‡]

Dionisius Narjoko[§]
Economic Research Institute for ASEAN and East Asia (ERIA), Indonesia

December 2009

Abstract: This paper examines the existence of spillovers associated with the presence of multinational enterprises (MNEs) on a firm's decision to export, and on export intensity. It utilizes data from Indonesian manufacturing for the census years 1996 and 2006. Channels through which MNEs can affect other firms' export behavior are considered and tested. The econometric analysis suggests the importance of technology and information channel. That is, the contribution of MNEs in improving technological and export-market knowledge raises the likelihood that domestic firms will enter the export market, and improves export performance. The analysis finds rather weak evidence to support the hypothesis that competition, created by the operation of MNEs, facilitates entry into export markets. Further analysis however shows large variation in the positive impact of foreign presence across more disaggregated sectors, which underlines the significance of the uniqueness of the industry. The overall analysis suggests that given the variation, policies to promote MNEs are still worth pursuing. The most obvious justification comes from the positive impact through the technology and information channel. Other than this, strengthening trade facilitation seems to be a positive proposition, given the finding that many of the new domestic exporters seem to have been constrained in increasing their exports.

Keywords: Indonesia, multinationals, export participation

JEL Classification: F23, L16, L60

[‡] The author thanks Fukunari Kimura and participants of the 2009 Comparative Analysis of Enterprise Data (CAED) Conference for useful comments and suggestions on the earlier draft of the study.
[§]Dionisius Narjoko. Email: dion.narjoko@eria.org
The author would like to submit this paper to the organizer of the **Fourth Empirical Investigations in Trade and Investment (EITI) Conference in 2010**, for a consideration of a presentation at the Conference.

1. Introduction

Proponents of globalization anticipate a positive impact from foreign direct investment (FDI) on development. An underlying argument justifying this is that the presence of FDI, through the operation of multinational enterprises (MNEs) in host countries, helps to improve the productivity of domestic firms.

There is now growing literature that formalizes and collects evidence of the positive externalities, often termed technology/productivity spillover. However, there is still conflicting evidence about the existence or positive impact of the spillover. On the one hand, Gorg and Greenaway (2004) for example reported negative productivity spillover occurring in several European countries, while on the other there exist studies which find evidence of a positive spillover effect for some Asian countries, such as Takii (2006) and Kohpaiboon (2006) for Indonesia and Thailand, respectively.

This study elaborates upon this subject, by examining the impact of the presence of MNEs on export performance of domestic firms. Specifically, it asks whether MNEs help domestic firms to participate and perform well in export markets. This study takes the reference of the Indonesian manufacturing sector as a case study, utilizing the rich plant-level census data of the sector for the years 1996 and 2006.

Indonesian manufacturing provides a good case study, considering the rapid FDI flow into the country since the early 1990s and even after the deep economic crisis of 1997/98. The rapid flow was often cited as an impact of the bold trade and investment liberalizations taken by the Indonesian government since the late 1980s. During the same period, the country also experienced rapid growth in its manufacturing exports. Given the domestic orientation of the trade and industrial policy before the liberalizations, it is only natural to argue that the Indonesian experience serves as a natural experiment for answering the research question.

The rest of this paper is organized as follows. Section 2 presents an analytical framework and identifies the testable hypotheses. Section 3 describes the methodology adopted by the study. Section 4 presents the empirical analysis. Section 5 summarizes and concludes the study.

2. Analytical Framework

Export spillover, broadly defined as the positive externalities arising from the presence of MNEs, is an implication of the theory that links productivity and exporting behavior or performance. According to this theory, the improvement in domestic firms' export performance is the consequence or result of export spillovers.

The accumulation of evidence from a wide availability of firm or plant level data indicates a substantial difference in the productivity of exporters and non-exporters. For developed countries, Bernard *et al*. (1995) and Bernard and Jensen (1999), for example, documented that exporters in US manufacturing are larger, more productive, more capital intensive, pay higher wages, and employ more skilled workers. A similar finding was reported by Aw and Hwang (1995) and Berry (1992) for developing countries. For Indonesian manufacturing, Sjoholm and Takii (2003) observed that exporting plants are larger and more productive. They found that labor productivity of these plants was about twice as high as non-exporting plants and this difference seems to have increased over time during the 1990s.

Two theories were put forward to explain this phenomenon. The first, which is commonly referred to as the 'self-selection' hypothesis, argues that only the most productive firms are able to survive in the highly competitive export markets. This hypothesis is based on the presumption that there are additional costs involved in participating in export markets.

These costs, which usually involve high fixed costs, include transport costs and expenses related to establishing distributional channels, as well as production costs in adapting products for foreign tastes (Bernard and Jensen 1999). The alternative explanation argues that there is a learning effect from participating in exporting activities which will result in productivity improvement. One example is that exporters are often argued to be able to gain access to technical expertise, including product designs and methods, from their foreign buyers (Aw *et al*. 2000, p.67). This explanation is often termed the 'learning-by-exporting' hypothesis.

Each of these theories applies to different states of the exporting status of a firm. The self-selection hypothesis applies for a firm that is not yet exporting but is about to, and the learning-by-exporting hypothesis applies when a firm has become an exporter. Thus, the theories explain that productive firms self-select themselves to become exporters, and once there, these exporters learn and become even more productive than before they entered export markets.

In respect of the self-selection hypothesis, Bernard and Jensen (1999) found that exporters in US manufacturing are more efficient, larger and grow faster several years before they become exporters. Meanwhile, Hallward-Driemeier *et al*. (2002, p.25) observed a substantial productivity difference between domestic firms that were established as exporters and domestic firms that were not. This indicates that firms participating in export markets make a conscious decision to operate differently from ones that focus on the domestic market. Supporting this interpretation, they show that domestic exporters indeed bear a resemblance to foreign exporters. In particular, they are more capital intensive and use more equipment of recent vintage than domestic non-exporters.

It is worth noting here an implication of the presumed additional costs required for a firm to engage in exporting activities, which is persistency in export participation. Once a firm decides to service export markets in a period of time, it tends to stay as an exporter in the

next period. While there has not been much study of this topic, there is an indication that the extent of these costs is large and serves as an important source of exporting persistency. For example, Roberts and Tybout (1997) found that exporting experience in the previous year had a strong and positive effect in determining export participation in the current year for plants in Colombian manufacturing.[3]

2.1. Export Spillovers

Another implication of the sunk cost of exporting is that, if entering foreign markets is costly, there might be localized spillovers associated with exporting by one firm that reduces the cost of foreign market access for nearby firms. This is the idea of export spillovers. Two arguments support the idea (Aitken *et al*. 1997). First, geographic concentration of exporters may make it feasible to construct facilities that are able to support export activities, such as seaports, airports, and other logistics infrastructure. Thus, the source of export spillovers based on this argument is governmental or public initiatives. The other argument comes from the existence of MNEs. It is based on the presumption that activities or some particular characteristics of MNEs allow domestic firms to reduce their cost of exporting.

Export spillovers generated by MNEs are the focus of this study, and to facilitate the empirical analysis, it is important to explain the channels through which MNEs help domestic firms in improving their export performance.

As indicated by Aitken *et al*. (1997) and detailed by Greenaway *et al*. (2004), there are three ways or channels that facilitate export spillovers from MNEs. The first is information about foreign markets. Subsidiaries usually acquire detailed information about foreign markets, which mostly comes from their parent companies. This channel is important for both domestic firms in the preparation stage for exporting and those which have already

[3] Similar findings can also be observed in Campa (2004) and Bernard and Jensen (2004) for Spain and US manufacturing plants, respectively.

started selling in export markets. The information classified by this channel includes, for example, information about regulations in foreign markets, taste and preference of foreign consumers, the market competition situation in foreign markets, etc. This channel emphasizes the information that directly relates to markets abroad.

The second channel focuses on technology, or information about the technology, brought by MNEs. Information classified by this channel is not directly related to information about foreign markets. As explained by Greenaway *et al*. (2004), domestic firms can benefit by using or adopting the more advanced technology used by MNEs, which is usually brought about by the demonstration effect and/or imitation. In practice, this channel usually works via – but not limited to – outsourcing practices and activities (e.g. the allocation of engineers from MNEs to domestic firms to supervise the production of the outsourced products, etc.). Supporting this, Machikita *et al*. (2009) found that in many Southeast Asian countries, upstream-downstream transactions and personal communication are important factors that moderate the technology transfer from MNEs to domestic firms.

Finally, the last channel comes through the competition effect. Entry of MNEs leads to increased competition initially, but after that, it creates pressure for domestic firms to become more productive. Given that higher productivity is needed to survive in export markets, the competition effect from MNEs thus encourages domestic firms to join and perform well in export markets.

Using plant-level data of Mexican manufacturing for the period 1986-1990, Aitken *et al*. (1997) found a robust result supporting the existence of export spillover coming from MNEs on the export performance of domestic plants in the sector. However, this finding is not robust to changes in sample size. Their results suggest the lack of robustness is related to large differences in specific industry characteristics.

The positive export spillovers effect from MNEs was confirmed by Kokko *et al*. (2001) and Greenaway *et al*. (2004). Using the case study of manufacturing firms in Uruguay in

1988, Kokko *et al*. (2001) found that foreign ownership at sectoral level increases the likelihood of exporting. They, however, only found a positive impact for multinationals that were established after 1973, which was a more outward oriented period for the Uruguayan economy. There was no evidence of export spillover from the group of multinationals established before 1973, when the policy was more inward oriented. Greenaway *et al*. (2004), meanwhile, found that multinationals not only increase the desire of domestic firms to export, but also export intensity. They used a panel of firms in the UK in finding this. Unlike other previous studies, they showed evidence of the positive impact that runs through the three channels identified above.

2.2. Hypotheses

Drawing from the discussion above, the following section presents the testable hypotheses that relate the channels of export spillover resulting from the presence of MNEs with the export response of domestic plants.

2.2.1. Technology Channel

The larger the technology intensity of MNEs' operations, the higher the chances of successful imitation by domestic firms. Thus, technological capability brought by MNEs (*FTECH*) is hypothesized to increase the export participation and performance of domestic plants.

Unlike the more traditional approach which underlines the link extent of ownership share with degree of control, this study defines MNEs as plants that have any positive share of

foreign ownership. This consideration is based on previous empirical studies which suggest the share of foreign ownership does not necessarily reflect the extent of control.[4]

2.2.2. Competition Channel

This study defines the importance of MNEs in an industrial sector to reflect the extent of competitive pressure created by MNEs (*FEMPSH*). The hypothesis concerning *FEMPSH* however is ambiguous. On the one hand, a positive relationship is expected, stemming from the improved productivity of domestic firms as a result of competitive pressure from MNEs. On the other, however, a negative relationship could also occur, for the reason that the operation of MNEs may crowd out the operation of the domestic plants. This is likely to occur if the motivation for investing abroad by the MNEs is expanding markets (i.e., the market-seeking hypothesis). The model built by Markusen and Venables (1999), where MNEs compete with domestic firms in industries producing final goods, predicts that the increase in output due to the operation of MNEs decreases market price and leads to the exit of some domestic firms.

2.2.3. Information Channel

Following Greenaway *et al*. (2004), this study defines the relative importance of foreign plants' export activities in an industry, or (*FEXPSH*), to represent the extent of information about foreign markets embedded in the operation of MNEs. Thus, the notion of 'export activities' is proxied by the extent of exported sales. Higher *FEXPSH* allows domestic plants to learn about export markets more easily, which in turn increase their likelihood of

[4] Aswicahyono and Hill (1995) for example reported that many Indonesian case studies have demonstrated that local partners often play relatively minor roles, even when they hold the majority of equity.

participating in the markets. Thus, a positive relationship between *FEXPSH* and the domestic plants' export performance is expected.

3. Methodology

3.1. Statistical Framework

Considering the analytical framework discussed in the previous section, empirical models to gauge the impact of the presence of MNEs on domestic firms' export performance are estimated. This study applies the model to the rich Indonesian large and medium plant manufacturing data for the census years 1996 and 2006. The models utilize the panel-data feature of the data, although they use only two data series. All of these decisions are explained below whenever they are relevant.

This study adopts the general approach of model specification from the literature on firm's export supply response. In particular, two dependent variables are considered to represent the response: (1) export participation, and (2) export intensity. The adoption of this approach is motivated by empirical literature on the subject, where export supply response is often examined by evaluating the change in some measures of export performance between two points of time. Calculating these measures is straightforward at the aggregate level, but not at the firm level. This is because aggregate change in export is a result from two different, but related, firm behaviors. First, existing exporters can increase or decrease their exported output. They may increase by redirecting output to foreign markets or by expanding exports. Included in this mechanism are firms that switch from exporting to non-exporting. The second behavior is where non-exporters that have been domestically oriented switch to participate in foreign markets. The second mechanism can also be achieved by new firms entering the industry.

The empirical models are given as the following:

$$EP_{i,j,t} = \alpha_0 + \alpha_1 EP_{i,j,t-1} + \alpha_2 EP_{i,j,t-2} + \alpha_3 ' X_{i,j,t} + \alpha_4 ' Y_{j,t} + \alpha_5 ' Z_{j,t} + \varepsilon_{i,j,t} \quad (3.1)$$

$$EXP_{i,j,t} = \beta_0 + \beta_1 ' X_{i,j,t} + \beta_2 ' Y_{j,t} + \beta_3 ' Z_{j,t} + \mu_{i,j,t} \quad (3.2)$$

where (3.1) and (3.2) are export participation and export intensity equation, respectively. i represent plant i, j represent industry j, defined at four-digit ISIC level, and t represents time (i.e. t=1996, 2006). $EP_{i,j,t}$ is a binary variable which takes the value of 1 if the plant was exporting in time t. EXP_{it} is a plant's export intensity and is defined as the ratio of exports to total output. Industry and regional dummies are included in both equations, to control for differences across industries and region, respectively. $EP_{i,j,t-1}$ and $EP_{i,j,t-2}$ are defined as exporting history variables. Their inclusion in the export participation equation is motivated by the persistency in exporting behavior. As explained, there are additional and large costs that a firm needs to pay if it intends to enter foreign markets (i.e. Roberts and Tybout 1997; Campa 2004).

Equations (3.1) and (3.2) are estimated using the domestic plants only. This is natural given that this study examines the impact on domestic firms.

The estimations are made only for the data of 1996 and 2006. This is because, key information needed to construct a variable that is commonly used to proxy the pool of technology and knowledge, namely the expenditure for research and development (R&D) activities, licenses and royalties, and training, is only the data of these years.

This study pooled the data for the estimations. A year time-dummy variable is included to control for different business environments affecting the data in the two census years, particularly related to the situations before and after the 1997/98 economic crisis.

Having argued for the use of only the census years' data, it is unavoidable however that the estimation has to draw information on the domestic plants' exporting status from the previous two years. Thus, for the estimation of the sample of 1996, for example, the plants' exporting status in 1994 and 1995 are used into the sample. As explained, this creates a reduction in the number of observations. However, as also explained, it is still worth going in this direction, given that the key information to reflect the technological capability of MNEs is not available in the non-census year data.

$X_{i,j,t}$ and $Y_{j,t}$ are sets of explanatory variables capturing the plant i and industry j characteristics at time t, respectively. $Y_{j,t}$ is designed to include variables that determine the entry of MNEs into a country. As noted in Greenaway *et al*. (2004), failure to address these determinants likely results in biased estimates because of possible endogeneity between the exporting decision and performance of domestic firms, and the factors of MNEs presence.

Meanwhile, $Z_{j,t}$ is set of variables representing the channels of export spillover from MNEs. This is to proxy the channels of the spillovers as discussed in the previous section.

Equation (3.1) was estimated within the framework of a binary choice model (i.e. probit or logit), instead of a linear probability model (LPM). This is because the predicted probability derived from LPM may lie outside the 0-1 region, which is clearly not reasonable in practice.[5]

An important statistical issue regarding the estimation is sample censoring. That is, the dependent variable of equation (3.2), or $EXP_{i,j,t}$, can only be calculated for the plants that

[5] Despite this, a binary response model also has a number of shortcomings. An important one is that the potential for bias arising from neglected heterogeneity (i.e. omitted variables) is larger in a binary choice model than in a linear model. Nevertheless, Wooldridge (2002) points out that estimating a binary response model by a binary choice model still gives reliable estimates, particularly if the estimation's purpose is to obtain the direction of the effect of explanatory variables.

switch to become exporters. Given that the process that determines a firm's export participation is a non-random process, estimating equation (3.2) without taking into account the truncated sample suffers from the omitted-variable problem, and this would produce biased estimates. In the theoretical econometric literature, the omitted variable is often called the inverse Mills ratio.

To solve this problem, the Heckman (1976) two-step estimation approach was employed.[6] The approach that Heckman proposed is to include the inverse Mills ratio as another explanatory variable in equation (3.2). This is done in two steps. In the first, a probit model to estimate equation (3.1) is regressed and the inverse Mills ratio is estimated. In the second step, equation (3.2) is regressed with the estimated inverse Mills ratio as an additional regressor. A test for a selectivity problem can be done by evaluating the statistical significance of the estimated coefficient of the inverse Mills ratio.

3.2. Data

The data for the empirical analysis in this study are drawn from the census of medium- and large-scale manufacturing establishments (*Statistik Industri*, or SI) for the years 1996 and 2006. The establishments are defined as those with 20 or more employees. The surveys were undertaken by the Indonesian Central Board of Statistics (*Badan Pusat Statistik*, or BPS).[7]

As noted in many studies, SI data are considered to be among the best, by the standards of developing countries. The data cover a wide range of information on the establishments, including some basic information (ISIC classification, year of starting production, location), ownership (share of foreign, domestic and government), production (gross output, stocks, capacity utilization, share of output exported), material costs and various types of expenses,

[6] See Johnston and Dinardo (1997) for more detailed exposition about the Heckman two-step approach.

[7] BPS provided the authors with the raw data of these surveys in electronic form.

labor (head-count and salary and wages), capital stock and investment, and sources of investment funds.

The data, however, have several limitations. Among others, they do not include information which can identify whether an establishment is a single-unit or is part of a multi-plant firm. As a result, establishments owned by an enterprise cannot be linked up, and hence the number of enterprises is over counted: some plants may have been counted as firms whereas in practice they are not.

3.3. Measurement of Variables

This subsection lists and details how this study measures the variables used in the estimation.

3.3.1. Export Spillover Variables

Three export spillover variables are included, each of which represents the channel of the spillovers, these are foreign technological capability ($FTECH_j$), foreign employment share ($FEMPSH_j$), and foreign exporting activities ($REXPSH_j$). All these are defined at industry level, i.e., at four-digit ISIC level, to capture together the concentration effect of MNEs presence.

As commonly adopted in the literature, $FTECH_j$ is proxied by technology-related expenditure of foreign plants as a percentage of sales. The technology-related expenditure includes the expenditure for R&D, training activities, and license fees.[8] For industry j, the formula is

[8] The inclusion of license fees is, to a large extent motivated by the general understanding that the major mode of technological transfer occurring in Indonesia has been through technical licensing agreements (Thee 2006).

$$FTECH_j = \frac{\sum_f (\text{R\&D cost + training cost + license and royalties fees})_f}{\sum_i (\text{output})_f}$$

where *f* and *i* denote foreign plant *f* and general plant *i*, respectively.

FEMPSH is proxied by the share of foreign plants' employment in an industry. Thus, for industry *j*,

$$FEMPSH_j = \frac{\sum_f (\text{employee})_f}{\sum_i (\text{employee})_i}$$

Foreign plants' export activities, or *FEXPSH*, is proxied by the plants' export share. Thus, for industry *j*, the formula to compute it is the following,

$$FEXPSH_j = \frac{\sum_f (\text{exports})_f}{\sum_i (\text{exports})_i}$$

3.3.2. Plant Level Variables (Control Variables)

Size ($SIZE_i$) is proxied by number of employees. The other common alternatives, such as output or profits, are not used as they tend to be more sensitive to changes in the business cycle.

This study employs real value-added per labor as a proxy for labor productivity (LP_i).[9] Wholesale price indices at the three-digit ISIC level are used to compute the real value added.

Government ownership (GOV_i) is proxied by the share of central and regional government in a plant's capital structure.

[9] Value-added is chosen to proxy output, instead of gross output, because it avoids the double-counting problem and is less sensitive to substitution between intermediate and labor inputs.

Import dependence ($IMDEP_i$) is proxied by the intensity of imported input in total input. For plant *i*, it is defined as

$$IMDEP_i = \frac{(value\ of\ \ imported\ \ input)_i}{(value\ of\ \ imported\ \ +\ \ domestic\ input)_i}$$

This study employs interest coverage ratio to construct variable financial leverage (LEV). For plant *i*, it is defined as

$$LEV_i = \frac{1}{(\text{Interest Coverage})_i} \text{ , where}$$

$$(\text{Interest coverage ratio})_i = \frac{(\text{EBIT})_i}{(\text{interest payments})_i}$$

and $EBIT_i$ is equal to sales (or earnings) before deduction of interest payments and income taxes. Interest coverage ratio measures the number of times a firm's earnings exceed debt payments. In other words, it indicates how well a firm's earnings can cover interest payments. In general, a low interest coverage ratio implies that a firm is highly leveraged (i.e. higher LEV_i) and has low capability to take on additional debt (i.e. more financially constrained).

3.3.3. Industry Level Variables (Control Variables)

This study includes a set of industry-level variables that account for some determinants of MNEs' operations in their host country (i.e., the matrix $Y_{j,t}$). The following lists and details these variables which are also defined at the four-digit ISIC level.

Minimum efficient scale, or *MES* , is included to account for the size of an industry. It is defined as the average plant size accounting for 50 percent of industry output (Caves *et al*. 1975). Plant size is measured by total number of workers.

MNEs usually possess brand names, and therefore, they usually invest in industries with high levels of advertising activities. Advertising intensity (*PD*) is included to capture the extent of differentiated product. For industry *j*, it is

$$PD_j = \frac{(\text{advertising expenditure})_j}{(\text{output})_j}$$

The other variables aim at capturing the importance of competition in an industry. Inclusion of these variables is motivated by the proposition that MNEs may be interested in entering industries with either less competitive activity or with high import protection. This is particularly true for the market-seeking MNEs. Two variables are included to proxy the extent of competition, namely the Herfindahl Index (*HHI*) and the nominal tariff (*TARIFF*). The latter is included to capture the extent of import protection which is likely to affect domestic competition.

For industry *j*, the formula for *HHI* is

$$HHI_j = \sum_i \left(\frac{VA_i}{\sum VA_i} \right)^2$$

where VA_i is the value added of plant i in industry j.

As for *TARIFF*, this study uses the nominal tariff data at the three-digit ISIC level, drawn from the WTO database through the service of the WITS database.

3.3.4. Other Control Variables

In addition to the control variables above, the estimations include dummy variables for provinces, to control for regional differences in plant operations in Indonesia. A year dummy variable for 2006 is included to control for differences across time. As noted, this variable should capture the different business environment for the periods before and after the crisis. Finally, industry dummy variables are also included to capture other cross-industry differences which are not captured by the other variables.

4. Empirical Analysis

4.1. The export participation of domestic plants: a descriptive analysis

Before presenting and discussing the econometric results, it is useful to describe the general picture of the entry of domestic plants into export markets and how a concentration of MNEs may affect the decision of the domestic plants to export. To do so, we define the export entry rate, in terms of number of plants ($ENX1_{j,t}$) and value added ($ENX2_{j,t}$) as the following:

$$ENX1_{j,t} = \frac{ENXP_{j,t}}{TXP_{j,t-1}} \text{ and } ENX2_{j,t} = \frac{ENXVA_{j,t}}{TXVA_{j,t-1}}$$

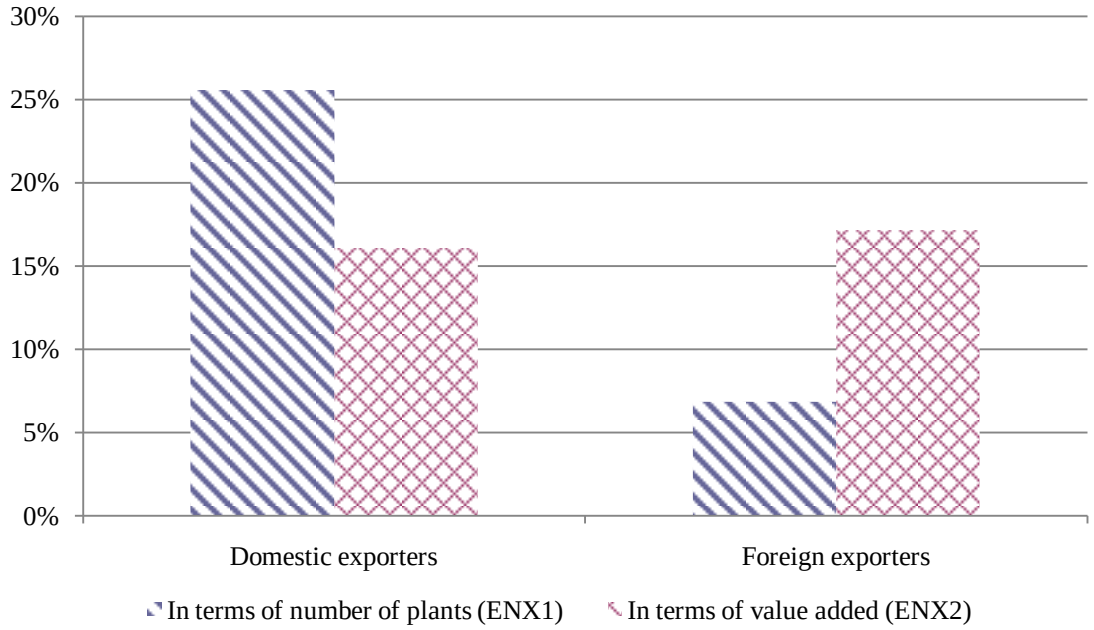
where: $ENXP_{j,t}$ = Total number of plants in industry j that become exporters in time t

$TXP_{j,t-1}$ = Total number of exporting plants in industry j at time $t-1$

$ENXVA_{j,t}$ = Exported value added of plants that become exporters in industry j at time t

$TXVA_{j,t-1}$ = Exported value added of all exporting plants in industry j at time $t-1$

Figure 4.1. Exporting Entry Rates of Domestic and Foreign Plants in Indonesian Manufacturing, Average 1996 and 2006.



Source: *Statistik Industri (SI),* 1996 and 2006.

Figure 4.1 presents the average 1996 and 2006 exporting entry rates for the group of foreign and domestic plants in Indonesian manufacturing. In terms of number of plants, the figure reveals that entry into exporting is substantially higher for the group of domestic plants. The rate is about 25 percent, in contrast with the rate for the group of foreign plants, which is about 7 percent. This is a favorable observation from the policy perspective, because it indicates that domestic plants were actively seeking to sell into export markets. Meanwhile, in terms of value added, entry into exporting is about the same between the two groups, which is measured at about 16 percent.

However, looking at the figure more carefully, there is indeed an issue regarding the favorable performance. Comparing the two entry rates across the domestic and foreign plants groups, it appears that many of the new domestic exporters are 'small', in terms of their exported output. This is in contrast to the picture of the new foreign exporters, which seem to be much 'larger' in terms of their exported output. The comparison suggests that a new

foreign exporter exports twice as much as a new domestic exporter. Obviously there could be many reasons to explain this, but it seems that many new domestic exporters are more constrained than their foreign counterparts.

The picture at a more disaggregated level is similar. This shown in Table 4.1, which presents the entry rates for all sectors defined at the two-digit ISIC level. The most important difference is that now $ENX2_{j,t}$ of the group of foreign plants is much lower for some industries. This is evident for the following industries: wood products (ISIC 33), non-metallic mineral products (ISIC 36), and machinery and transport equipment (ISIC 38). Thus, domestic plants in these industries, on average, actually export more than their foreign counterparts when they decide to participate in international markets.

Table 4.1. Exporting Entry Rates of Domestic and Foreign Plants in Indonesian Manufacturing by Major Industry Groups, Average 1996 and 2006.

a) In terms of number of plants (*ENX1*)

ISIC / Industry	Domestic Exporters	Foreign Exporters
31 Food and beverage	53.6%	9.1%
32 Textile and garments	38.5%	9.0%
33 Wood products	25.2%	1.7%
34 Paper products	50.2%	22.0%
35 Chemical, rubber and plastics	34.5%	16.3%
36 Non-metallic mineral products	39.4%	16.4%
38 Machinery and transport equipment	33.0%	30.7%
39 Other manufacturing	21.7%	11.6%

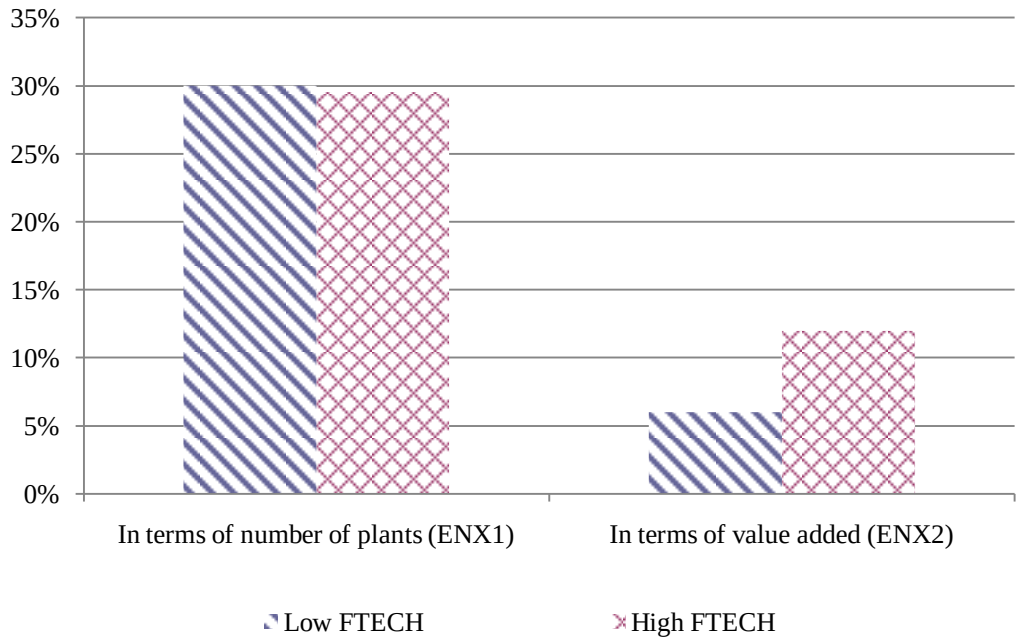
b) In terms of value added (*ENX2*)

ISIC / Industry	Domestic Exporters	Foreign Exporters
31 Food and beverage	21.3%	40.0%
32 Textile and garments	15.2%	16.6%
33 Wood products	10.8%	2.8%
34 Paper products	8.3%	89.1%
35 Chemical, rubber and plastics	14.9%	18.5%
36 Non-metallic mineral products	75.9%	0.4%
38 Machinery and transport equipment	62.8%	6.2%
39 Other manufacturing	35.6%	16.9%
Source: SI, 1996 and 2006.		

Focusing now only on the subset of domestic plants, we attempt to get insight of whether or not there is export-spillover effect from the presence of MNEs. We attempt to describe whether a concentration of MNEs in one industry affects the exporting decision of the industry's domestic plants, through the three channels considered. The analysis is done by examining how the entry rates vary across two different industry groups classified by the export spillover variables.

Consider, first, the export-spillover impact through the technology channel. Here, we compare the entry rates between the group of industries with high and low levels of foreign technology capability (*FTECH*). Figure 4.2, which gives this comparison for the whole manufacturing, provides evidence to suggest an important role played by the technology channel. The comparison in terms of $ENX2_{j,t}$, in particular, implies that the extent of domestic plants' export participation is higher in the industries where technology adoption by MNEs is advanced. This, however, is not clear in terms of $ENX1_{j,t}$, which is about the same for the two industry groups.

Figure 4.2. Exporting Entry Rates of Domestic Plants in Indonesian Manufacturing by Groups of Foreign Technology Capability (*FTECH*), Average 1996 and 2006.



Source: SI, 1996 and 2006.

Looking at a more disaggregated industry level, the key observation in terms of $ENX2_{j,t}$ generally remains. This is shown in Table 4.2b where the rates are consistently higher for the group of high *FTECH* across most of the broad industries defined at the two-digit ISIC level. The picture, however, is different for $ENX1_{j,t}$. Here, a substantial variation in the rates between the two groups is observed (see Table 4.2a). There is not much we can learn from this variation, unfortunately, at least in terms of industry's factor intensity as one usually expects. To illustrate, the pattern of comparison between the two groups (i.e., between the high and low *FTECH*) is the same for textile and garment as well as for machinery and equipment industries. This is despite the general understanding that the former is more labor intensive while the latter is more capital intensive.

Table 4.2. Exporting Entry Rates of Domestic Plants in Indonesian Manufacturing by Groups of Foreign Technology Capability (*FTECH*) and Major Industry, Average 1996 and 2006.

a) In terms of number of plants (*ENX1*)

ISIC / Industry	Low *FTECH*	High *FTECH*
31 Food and beverage	43.0%	25.7%
32 Textile and garments	29.3%	35.1%
33 Wood products	34.2%	25.4%
34 Paper products	39.3%	44.4%
35 Chemical, rubber and plastics	38.2%	25.0%
36 Non-metallic mineral products	33.8%	38.0%
37 Basic metal industries	22.5%	16.7%
38 Machinery and transport equipment	12.8%	37.9%
39 Other manufacturing	16.4%	17.6%

b) In terms of value added (*ENX2*)

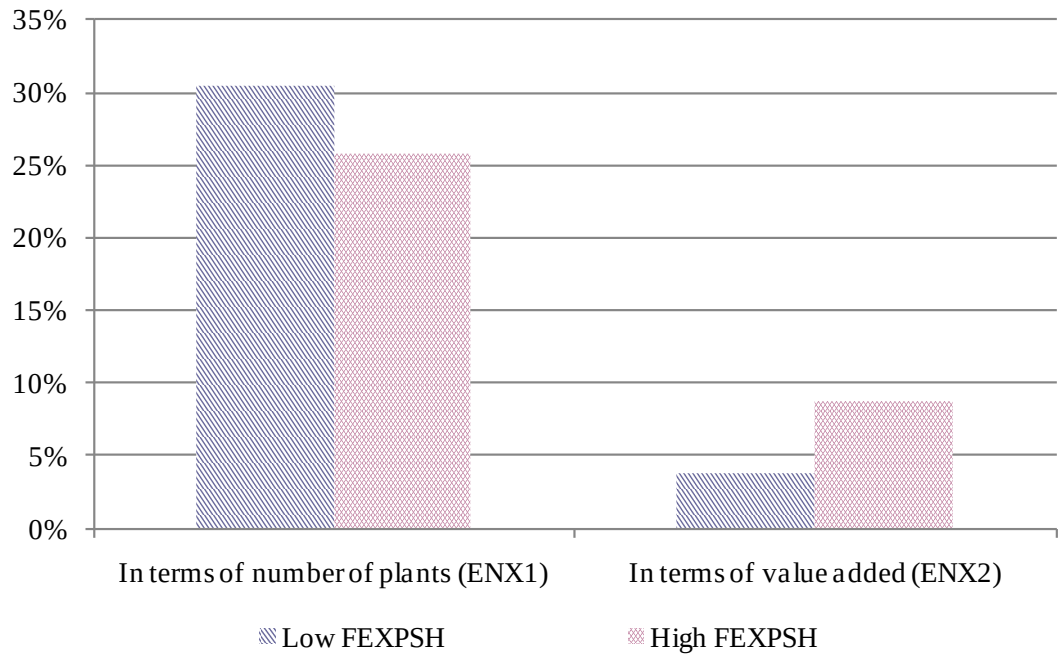
ISIC / Industry	Low *FTECH*	High *FTECH*
31 Food and beverage	9.7%	14.0%
32 Textile and garments	5.9%	17.1%
33 Wood products	14.0%	7.0%
34 Paper products	2.4%	12.7%
35 Chemical, rubber and plastics	8.9%	15.1%
36 Non-metallic mineral products	80.0%	36.2%
37 Basic metal industries	0.6%	0.1%
38 Machinery and transport equipment	3.6%	2.0%
39 Other manufacturing	38.4%	0.2%

Source: SI, 1996 and 2006.

A favorable export spillover impact from the presence of MNEs is also observed through the information channel. This is depicted by Figure 4.3 for the whole manufacturing sector and in terms of $ENX2_{j,t}$. The $ENX2_{j,t}$ is higher for the group of industries with high levels of foreign exporting activities, proxied by $FEXPSH$. This inference, however, is not supported by the figure in terms of $ENX1_{j,t}$. In fact, $ENX1_{j,t}$ rather conflicts with the

inference, since it is actually lower for the group of industries with high levels of foreign exporting activity. Nevertheless, one still can argue for the superiority of the domestic plants operating in industries with high levels of foreign exporting activity. Looking at the pair of $ENX1_{j,t} - ENX2_{j,t}$ for the two groups, one can infer that, on average, any domestic plant in the industries with high levels of foreign exporting activities actually export more than any domestic plant in the industries with low levels of foreign exporting activity.

Figure 4.3. Exporting Entry Rates of Domestic Plants in Indonesian Manufacturing by Groups of Foreign Exporting Activities (*FEXPSH*), Average 1996 and 2006.



Source: SI, 1996 and 2006.

All these inferences, however, do not hold strongly at the level of broader industry groups. There is a large degree of variation for the comparison in terms of $ENX2_{j,t}$, particularly. As documented in Table 4.3, $ENX2_{j,t}$ comparison for textile and garment (ISIC

32), wood products (ISIC 33), and machinery and transport equipment (ISIC 38) industries accord with the general pattern, but the comparison for the other sectors do not.

Table 4.3. Exporting Entry Rates of Domestic Plants in Indonesian Manufacturing by Groups of Foreign Exporting Activities (*FEXPSH*) and Major Industry, Average 1996 and 2006.

a) In terms of number of plants (*ENX1*)

ISIC / Industry	Low *FEXPSH*	High *FEXPSH*
31 Food and beverage	19.4%	35.4%
32 Textile and garments	36.7%	30.3%
33 Wood products	31.3%	31.6%
34 Paper products	46.8%	38.7%
35 Chemical, rubber and plastics	29.0%	27.3%
36 Non-metallic mineral products	39.1%	29.3%
37 Basic metal industries	18.6%	22.3%
38 Machinery and transport equipment	29.4%	24.7%
39 Other manufacturing	18.8%	16.1%

b) In terms of value added (*ENX2*)

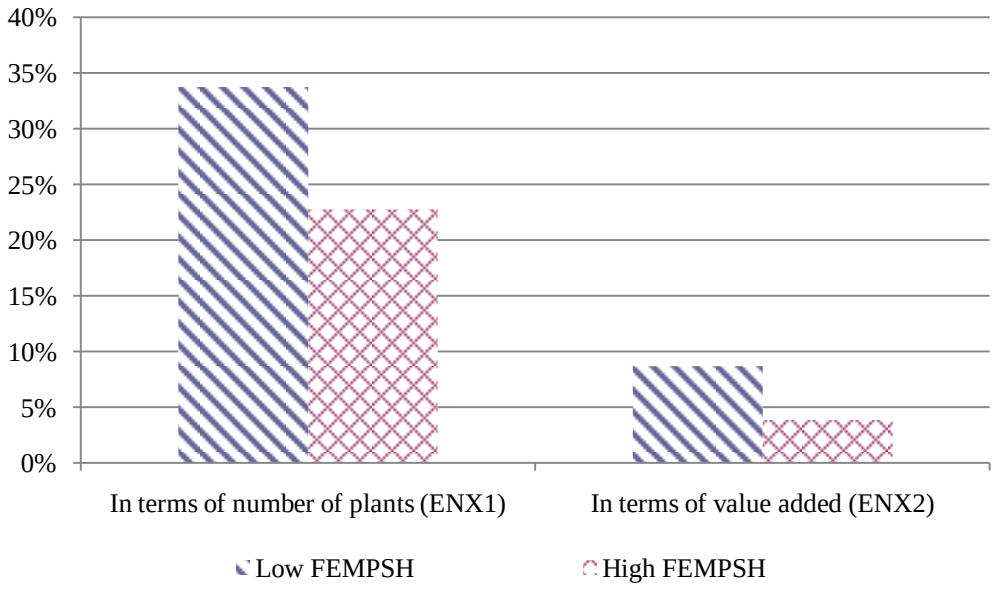
ISIC / Industry	Low *FEXPSH*	High *FEXPSH*
31 Food and beverage	12.4%	10.3%
32 Textile and garments	6.9%	9.0%
33 Wood products	0.1%	10.1%
34 Paper products	3.1%	0.9%
35 Chemical, rubber and plastics	9.7%	9.0%
36 Non-metallic mineral products	19.6%	15.9%
37 Basic metal industries	0.5%	0.7%
38 Machinery and transport equipment	1.9%	3.7%
39 Other manufacturing	38.5%	0.1%

Source: SI, 1996 and 2006.

Finally, there is rather weak descriptive evidence for the export-spillover impact through the competition channel. The picture for the whole of manufacturing, as illustrated by Figure

4.4, shows that the extent of domestic plants' export participation, measured both by $ENX1_{j,t}$ and $ENX2_{j,t}$, is lower for the group of industries with high levels of foreign presence, proxied by *FEMPSH* . Thus, the opportunity for domestic plants to become exporters seems to be lower in industries with a domination of MNEs.

Figure 4.4. Exporting Entry Rates of Domestic Plants in Indonesian Manufacturing by Groups of Foreign Presence (*FEMPSH*), Average 1996 and 2006.



Source: SI, 1996 and 2006.

This pattern, however, tends to hold only when the entry rate is measured by $EN1_{j,t}$ but not when measured by $ENX2_{j,t}$. Table 4.4 highlights this, where the pattern observed in manufacturing as a whole seems to be directed by the very high $ENX2_{j,t}$ occurring in non-metallic mineral and other manufacturing industries (i.e., ISIC 36 and ISIC 39, respectively). Thus, the $ENX2_{j,t}$, as well as the comparison of it between the two groups in other sectors,

indeed indicates a favorable performance in the export participation of domestic plants operating in the industries with MNE domination.

In summary, all figures and tables seem to point to several basic facts about the export participation of domestic firms and its relation to the channel of export spillover from the presence of MNEs.

First, while the magnitude of entry into exporting is higher for domestic plants, compared to that of foreign plants, the extent of the exported output is still much larger for foreign plants than for domestic plants, on average for each plant.

Secondly, advanced technology adoption by MNEs, as well as MNEs' strong exporting activities, increased the extent of entry of domestic plants into export markets. This is not only in terms of the plants' participation, but also in terms of the output these firms export. Meanwhile, there is a rather weak indication of the positive impact of the competition channel in improving the export participation of domestic plants.

Table 4.3. Exporting Entry Rates of Domestic Plants in Indonesian Manufacturing by Groups of Foreign Presence (*FEMPSH*) and Major Industry, Average 1996 and 2006.

a) In terms of number of plants (*ENX1*)

ISIC / Industry	Low *FEMPSH*	High *FEMPSH*
31 Food and beverage	37.7%	13.7%
32 Textile and garments	45.8%	24.4%
33 Wood products	32.3%	25.3%
34 Paper products	46.8%	33.3%
35 Chemical, rubber and plastics	31.8%	24.6%
36 Non-metallic mineral products	38.9%	38.2%
37 Basic metal industries	20.7%	19.5%
38 Machinery and transport equipment	60.2%	25.5%
39 Other manufacturing	20.6%	9.2%

b) In terms of value added (*ENX2*)

ISIC / Industry	Low *FEMPSH*	High *FEMPSH*
31 Food and beverage	11.4%	13.3%
32 Textile and garments	6.9%	7.9%
33 Wood products	6.2%	45.6%
34 Paper products	2.4%	12.3%
35 Chemical, rubber and plastics	7.5%	27.7%
36 Non-metallic mineral products	52.7%	19.7%
37 Basic metal industries	0.5%	1.1%
38 Machinery and transport equipment	3.4%	2.2%
39 Other manufacturing	40.7%	0.6%
Source: SI, 1996 and 2006.		

Thirdly, there is substantial variation in the impact of the presence of MNEs on domestic plants' export participation across industries within the manufacturing sector. It is difficult to establish the reason for this variation, however, even when it is examined at the two-digit ISIC sectoral level.

4.2. Regression results and discussion

As suggested by the descriptive analysis, and bearing in mind a potential variation of regression results across industries, this subsection is structured to firstly start with the presentation of the estimation results for the whole manufacturing, followed by the presentation of the results for the estimation at the two-digit ISIC industry level.

Table 4.5 reports the probit regression results of the export participation equation, i.e. equation (3.1), for the whole manufacturing. The sample comprises all domestic plants operating in 1996 and 2006. The regressions are the first step in the Heckman selection model. Some specifications were tested and the table reports the most favorable ones in terms of model fit and estimated coefficients. The industry dummy variables are included at

the two-digit ISIC level.[10] The table reports robust standard errors for the reason of heteroscedastic variance. The Wald test for overall significance in all reported specifications passes at the 1 percent level. The examination for the presence of outliers was done in the experimental stage, and the presented results have been controlled for the outliers (i.e., by introducing a dummy variable which identifies the outliers).

The results provide a strong support for the importance of the technology channel in facilitating export spillovers. The estimated coefficients of $FTECH_{j,t}$, which represent the channel, are positive, large, and statistically very significant in the results of specification (4.1) and (4.2). They support the hypothesis of the existence of the demonstration/imitation effect from the technology brought by MNEs. The magnitude of the coefficients suggests the demonstration effect is substantially important in determining whether or not a domestic plant participates in exporting activities in time *t*.

The results also provide support for the existence of the other export spillover channels, namely the competition and information channels. The estimated coefficients of $FEXPSH$, which represents the effect of the information channel, are positive and highly significant (see the results of specification (4.2) and (4.4)). The concentration of export activities of MNEs in an industry, therefore, increases the likelihood of domestic firms participating in export markets. This supports the hypothesis that domestic firms learn from their foreign counterparts.

[10] At the experimental stage, initially industry dummy variables at the four-digit ISIC level were estimated. However, many industry-level variables were dropped for the reason of perfect collinearity. For this reason, the estimations were tested at the three- and two-digit ISIC level. Finally, the estimations with the two-digit ISIC dummy variables were chosen because they gave better results compared to the other estimations.

Table 4.5. The Determinants of Export Participation in 1996 and 2006: Regression Results

	Dependent variable: $EP_{i,t}$			
	(4.1)	**(4.2)**	**(4.3)**	**(4.4)**
$FTECH_{j,t}$	5.01 (5.51)**			4.54 (4.92)**
$FEXPSH_{j,t}$		0.553 (6.42)**		0.505 (5.62)**
$FEMPSH_{j,t}$			0.77 (2.93)**	0.55 (1.98)*
$EP_{i,t-1}$	1.45 (18.99)**	1.46 (19.20)**	1.46 (19.17)**	1.45 (19.00)**
$EP_{i,t-2}$	0.86 (11.14)**	0.82 (10.54)**	0.84 (10.87)**	0.83 (10.67)**
$SIZE_{i,t}$	0.001 (11.47)**	0.001 (11.44)**	0.001 (11.47)**	0.001 (11.43)**
$(SIZE)^2_{i,t}$	-1.78[b] (9.12)**	-1.81[b] (9.16)**	-1.78[b] (9.18)**	-1.78[b] (9.17)**
$\log(AGE)_{i,t}$	-0.028 (-0.95)	-0.022 (-0.76)	-0.029 (-1.02)	-0.014 (-0.47)
$LP_{i,t}$	5.31[a] (-0.27)	9.49[a] (-0.47)	5.52[a] (-0.28)	7.45[a] (-0.38)
$GOV_{i,t}$	-0.27 (-1.58)	-0.33 (1.90)+	-0.27 (-1.64)	-0.32 (1.84)+
$IMDEP_{i,t}$	0.54 (6.11)**	0.56 (6.32)**	0.53 (5.97)**	0.54 (6.06)**
$LEV_{j,t}$	0.81 (2.80)**	0.96 (3.07)**	0.85 (2.86)**	0.93 (3.05)**
$MES_{j,t}$	-0.00001 (-1.23)	-3.36[c] (-0.38)	-0.00001 (-1.13)	-8.15[c] (-0.8)
$PD_{j,t}$	-2.86 (-1.37)	1.35 (-0.72)	-1.32 (-0.7)	-0.33 (-0.16)
$HI_{j,t}$	-0.53 (1.85)+	-0.61 (2.27)*	-0.46 (-1.64)	-0.55 (2.04)*
$TARIFF_{j,t}$	-0.004 (-1.43)	-0.005 (-1.51)	-0.005 (-1.51)	-0.004 (-1.12)
Dummy year 2006	0.20 (4.05)**	0.14 (3.04)**	0.10 (2.07)*	0.19 (3.82)**
Dummy variables for provinces	Included	Included	Included	Included
Dummy variables for industries	Included	Included	Included	Included
Constant	-1.576 (6.46)**	-1.756 (7.45)**	-1.58 (6.43)**	-1.916 (7.78)**
Observations	8728	8728	8728	8728
Pseudo R-square	50.59	50.77	50.49	50.96

Notes: 1) Robust Z statistics in parentheses

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficient was multiplied by 10^{-09} to improve presentation

b) The coefficient was multiplied by 10^{-08} to improve presentation

c) The coefficient was multiplied by 10^{-06} to improve presentation

It is worth commenting here that while favorable, the finding on the existence of the technology and information channels contradicts a generally presumed behavior of MNEs. It is expected that they will tend to protect the know-how and other important information they posses. Therefore, the finding is not really consistent with findings elsewhere in the literature about the weak impact of productivity spillover from the presence of MNEs (e.g. Hanson 2001; Gorg and Greenaway 2004). As indicated by these studies, the weak spillover effect may be due to the fact that MNEs protect their firm-specific assets very effectively, presumably including their precious information about foreign markets (Greenaway *et al*. 2004, p. 1029).

Leakages of the protected know-how may nevertheless happen. As indicated elsewhere, much of the information spillover from MNEs relating to export markets could in fact be transferred by activities which are very hard to measure, and some of this may even be very difficult to link to the presence of MNEs. Personal contacts, for example, provide an avenue for information spillover. Therefore, our finding to some extent proves the existence of these kind of activities.

Meanwhile, the estimated coefficients of $FEMPSH_{j,t}$ are positive and statistically significant in the result of specification (4.3) and (4.4). Thus, the degree of importance of MNEs in an industry is positively related to the likelihood of domestic plants' export participation in that industry. This finding underlines the alternative hypothesis that pressures from MNEs are able to improve the productivity of domestic plants, which in turn creates more opportunities for these plants to sell in international markets.

Table 4.6 reports the OLS regression results of the export intensity equation (i.e., equation (3.2)) for all domestic plants which were exporting in 1996 and 2006. This is the second step of the Heckman estimation model for sample selection.

Table 4.6. The Determinants of Export Intensity in 1996 and 2006: Regression Results

	Dependent variable: $EXP_{i,t}$			
	(4.5)	**(4.6)**	**(4.7)**	**(4.8)**
$FTECH_{j,t}$	0.22 (-0.53)			0.003 (-0.01)
$FEXPSH_{j,t}$		0.37 (9.92)**		0.37 (9.61)**
$FEMPSH_{j,t}$			-0.101 (-0.92)	-0.14 (-1.29)
$SIZE_{i,t}$	6.15[c] (-0.87)	6.6[c] (-0.99)	4.67[c] (-0.66)	6.31[c] (-0.92)
$(SIZE)^2_{i,t}$	2.64[a] (-0.07)	-2.48[a] (-0.07)	9.05[a] (-0.25)	-2.93[a] (-0.08)
$\log(AGE)_{i,t}$	-0.08 (8.37)**	-0.07 (7.38)**	-0.08 (8.41)**	-0.07 (7.41)**
$LP_{i,t}$	-9.53[b] (2.94)**	-7.43[b] (2.36)*	-9.27[b] (2.88)**	-7.51[b] (2.32)*
$GOV_{i,t}$	-0.08 (-1.44)	-0.12 (2.14)*	-0.08 (-1.33)	-0.13 (2.25)*
$IMDEP_{i,t}$	-0.009 (-0.32)	0.003 (-0.12)	-0.006 (-0.2)	0.006 (-0.24)
$LEV_{j,t}$	-0.02 (-0.35)	0.04 (-0.64)	-0.02 (-0.36)	0.04 (-0.67)
$MES_{j,t}$	6.25[c] (1.67)+	6.37[c] (-1.43)	4.57[c] (-1.06)	6.84[c] (-1.45)
$PD_{j,t}$	-2.89 (4.22)**	-1.5 (2.36)*	-3.29 (5.16)**	-1.19 (1.76)+
$HI_{j,t}$	-0.27 (2.34)*	-0.12 (-0.92)	-0.29 (2.45)*	-0.14 (-1.05)
$TARIFF_{j,t}$	0.002 (1.97)*	0.003 (3.08)**	0.002 (1.96)+	0.003 (2.71)**
Dummy year 2006	0.05 (2.83)**	0.07 (4.24)**	0.05 (2.91)**	0.07 (4.00)**
Inverse Mills ratio	-0.09 (7.49)**	-0.08 (6.61)**	-0.09 (7.49)**	-0.08 (6.60)**
Dummy variables for provinces	Included	Included	Included	Included
Dummy variables for industries	Included	Included	Included	Included
Constant	0.9 (10.51)**	0.64 (8.21)**	0.93 (10.97)**	0.66 (8.33)**
Observations	2379	2379	2379	2379
R-squared	0.32	0.36	0.32	0.36

Notes: 1) Robust F statistics in parentheses

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficient was multiplied by 10^{-11} to improve presentation

b) The coefficient was multiplied by 10^{-09} to improve presentation

c) The coefficient was multiplied by 10^{-06} to improve presentation

The coefficient of inverse Mills ratio is statistically significant in all specifications at the 1 percent level, implying that the disturbance in the export participation and export intensity

equation is correlated. As explained, the use of the Heckman method corrects the potentially biased estimates from this correlation. The F-test for overall significance passes at the 1 percent level and White's robust t-statistics were used to correct for heteroscedasticity.

One important point emerging from the results is a weaker impact of the presence of MNEs once the domestic plants become exporters. The estimated coefficient of *FEXPSH* is the only one that is statistically significant. The estimated coefficients of the other variables representing export spillover channels are statistically insignificant.

Meanwhile, the sign of the estimated *FEXPSH* is positive, which is consistent with the earlier finding from the export participation equation. It implies that the learning process gone through domestic plants, such as improving their knowledge of export markets, still continues even when these plants have successfully entered export markets.

The second point worth elaborating concerns the estimated coefficient of $FTECH_{j,t}$, which is now very statistically insignificant. It suggests a much less important effect for pooled technology once the domestic plants become exporters. This is consistent with the 'self-selection' hypothesis. As explained, the hypothesis implies that firms prepare to become much more productive only before selling to export markets, and not when they are in. Therefore, it is natural to see the higher importance of $FTECH_{j,t}$ as a determinant of export participation, rather than as a determinant of export intensity.

In contrast to its effect gauged by the estimation of export participation, the estimated coefficient of *FEMPSH* is now negative, albeit statistically insignificant. The negative sign indicates that the exports of some domestic plants tend to be lower when there is in fact a strong presence of MNEs. Hence, MNEs seem to crowd out domestic exporters. This finding, while it does not accord with the hypothesis of the positive impact of export spillovers, seems to capture the strategic motive of market-seeking hypothesized for MNEs. Competition in the domestic final-goods market between MNEs and domestic firms could

decrease market prices, which in turn could lead to the exit of some domestic producers (Markusen and Venables 1999).

Table 4.7 presents the estimated coefficients of the export spillover variables from the estimation of the export participation and export intensity equations at the more disaggregated two-digit ISIC level. To save space, Table 4.7 summarizes the results by presenting only the estimated coefficients of the export spillover variables. The complete results are available from the author upon request.

Focusing on all variables representing the export spillovers, the most obvious observation is a large variation in the estimated coefficients across the industries. This confirms the earlier observation drawn from the descriptive analysis. Having mentioned about this, nonetheless, a couple other points are worth discussing, related to the varied coefficients.

First, much of the positive MNE spillover impact on domestic plants' export participation which flows through the technology channel, as we observed earlier for the whole manufacturing, occurs mainly in the food and beverage (ISIC 31), mineral products (ISIC 36), and machinery and transport industries (ISIC 38). The positive relationship between *FTECH* and export participation is only statistically significant for the regressions of plants in these industries. A large technological gap between MNEs and domestic plants, therefore, may exist in these industries. Given the large gap, buying or acquiring the very sophisticated technology as used by the MNEs would give a potentially large marginal benefit for domestic plants that wish to do so. This may, in turn, be translated into the positive and significant estimated coefficient. Another possible explanation stems from the fact that technology upgrading is expensive. Thus, even if a domestic firm has successfully identified the need to upgrade technology, it may not be able to do so simply because, for example, the firm is financially constrained.

Table 4.7. Estimated Coefficients of the Export Spillover Variables from the Regrssions at the Level of Major Industry Groups

a) Export participation estimations

ISIC / Industry	Export spillover variables		
	$FTECH_{i,t}$	$FEMPSH_{i,t}$	$FEXPSH_{i,t}$
31 Food and beverage	6,64 (4.62)**	1,79 (2.62)**	1,02 (5.17)**
32 Textile and garments	4,04 (0.47)	-0.18 (-0.18)	1,003 (2.82)**
33 Wood products	44,24 (1.31)	1,39 (0.78)	0,79 (1.79)+
34 Paper products	15,72 (0.98)	2,52 (1.18)	2,11 (2.14)*
35 Chemical, rubber and plastics	8,45 (1.00)	-2.28 (-1.98)*	0,24 (0.53)
36 Non-metallic mineral products	19,354 (2.01)*	-6.01 (-2.54)*	3,96 (2.96)**
38 Machinery and transport equipment	13,09 (1.85)+	-0.02 (-0.02)	-0.35 (-0.99)
39 Other manufacturing	-28.80 (-0.62)	-0.95 (-0.57)	1,89 (1.61)

Notes: 1) Robust Z statistics in parentheses

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

b) Export intensity estimations

ISIC / Industry	Export spillover variables		
	$FTECH_{i,t}$	$FEMPSH_{i,t}$	$FEXPSH_{i,t}$
31 Food and beverage	0.48 (0.69)	-0.44 (-1.29)	0.17 (1.7)+
32 Textile and garments	-3.02 (-1.06)	-0.91 (-2.52)*	0.17 (1.66)+
33 Wood products	0.83 (0.13)	-0.098 (-0.22)	-0.19 (-2.33)*
34 Paper products	11.09 (2.43)*	1.47 (2.43)*	1.26 (2.43)*
35 Chemical, rubber and plastics	2.79 (1.26)	-0.65 (-1.65)	0.06 (0.32)
36 Non-metallic mineral products	77.93 (1.64)	-9.16 (-0.76)	0.08 (0.11)
38 Machinery and transport equipment	-2.61 (-1.08)	-0.55 (-1.6)	0.17 (1.81)+
39 Other manufacturing	-12.55 (-0.91)	-0.21 (-0.31)	-0.57 (-1.39)

Notes: 1) Robust F statistics in parentheses

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

Secondly, many of the estimated coefficients of *FEMPSH* , which represent competition channels, are negative and statistically significant. This applies to either the export participation or export intensity equation. Consider the former, the negative and statistically coefficients belong to chemical products (ISIC 35) and non-metallic mineral products (ISIC 36) industries. As for the latter, meanwhile, the negative and statistically significant coefficient is recorded for textiles and garments industry (ISIC 32). Thus, in these industries, export performance of the newly domestic exporters is not so favorable. The negative coefficient emphasizes the notion of 'crowding out', by which means that the impact of MNE operations reduces the export opportunity for the domestic plants.

Thirdly, unlike the results for the other export spillover variables, the estimated coefficients of *FEXPSH* tend to be more consistent with the general result of the whole manufacturing. Many of the estimated coefficients are positive and significant, either in the export participation equation or the export intensity equation, or both. This may suggest that the information channel is the 'most popular' channel for spillover. This may be a reasonable argument, given that it should be much easier, and hence cheaper, to achieve some improvement through this channel. Firms, for example, can simple hire new and more capable managers if they want to immediately improve their exporting capabilities. A firm does not necessarily need to send its employees on expensive training courses, for example, if it wants to immediately improve its exporting capabilities; it can simply hire new and/or more capable employees.

5. Summary and Conclusion

This study examines the positive externalities from the presence of MNEs affecting the export performance of domestic firms. It asks whether the existence of the MNEs helps domestic firms to participate and perform well in export markets. The study takes Indonesian manufacturing as a case study, utilizing the rich data of the national manufacturing census.

In its empirical analysis, the study attempts to answer the question stated above by examining the channels through which the positive export spillover effect can be transmitted to domestic firms. In particular, it examines whether or not the pool of technology, and information about foreign markets, brought by MNEs, as well as the competition effect from the MNE operations, are able to increase the likelihood of domestic firms participating in export markets, and to increase the extent of the domestic firms' exports.

The econometric analysis provides evidence for the positive impact of the presence of MNEs on the export participation of domestic plants. This is very clear when the impact is examined at the much-aggregated level of the manufacturing sector as a whole. In particular, estimations produce generally positive and statistically significant relationship between all export spillover variables and the domestic plants' decision to export. This finding reflects the importance of all three channels in facilitating the positive externalities impact from the presence of MNEs. The relationships, however, weaken quite substantially for the plants' export performance after they decide to export. The weakened technology channel suggests that the pooled technology contributed by MNEs is no longer so relevant for the new domestic exporters, which is consistent with the self-selection hypothesis. The role of information channel, meanwhile, seems to be the only important channel at this stage.

All these inference do not hold strongly in the analysis at the level of broad industry groups defined at the two-digit ISIC level. Estimations at this level confirm the observation from the descriptive analysis of a large variation in the spillover impact through the channels. Thus, industry specific factors matters a lot. Having found this, nonetheless, it is worth mentioning that one key observation from the more disaggregated analysis is an indication that many domestic plants often utilize information channels as a way of benefiting from the presence of MNEs to improve their export performance.

Notwithstanding the great variation across industry groups, this study all in all still supports the importance of policies that invite MNEs into the domestic economy. In terms of

the export spillover effect, the most obvious justification can be drawn from the demonstration/imitation effect from technology (i.e., the technology channel) and the acquisition of rich knowledge about the situation of export markets brought by the MNEs (i.e., the information channel). Meanwhile, the competition effect from the presence of MNEs should, in the longer run and through the dynamics of competition, produce a population of more productive exporters. In addition to all these, strengthening trade facilitation seems to be a good policy proposition. As the analyses show, many of the new domestic exporters in the country's manufacturing sector are somehow still constrained. Policies that improve trade facilitation, therefore, should be able to also 'unlock' these constrained exporters.

References

Aitken, B., G. Hanson and A. Harrison (1997), "Spillover, Foreign Investment and Export Behaviour", *Journal of International Economics*, **43**(1-2), pp.103-132.

Aswicahyono, H.H. and H. Hill (1995), "Determinants of Foreign Ownership in LDC Manufacturing: An Indonesian Case Study", *Journal of International Business Studies*, **26** (1), pp.139-158.

Aw, Bee Y. and A.R. Hwang (1995), "Productivity and Export Market: A Firm-level Analysis", *Journal of Development Economics*, **47**(2), pp.313-32.

Aw, Bee Y., S.C. Chung and M.J. Roberts (2000), "Productivity and the Turnover in the Export Market: Micro-level Evidence from the Republic of Korea and Taiwan (China)", *The World Bank Economic Review*, **14**(1), pp.65-90.

Bernard, A.B., J.B. Jensen and R.Z. Lawrence (1995), "Exporters, Jobs, and Wages in U.S. Manufacturing: 1976-1987", *Brookings Papers on Economic Activity, Microeconomics*, 1995, pp.67-119.

Bernard, A.B. and J.B. Jensen (1999), "Exceptional Exporter Performance: Cause, Effect, or Both?", *Journal of International Economics*, **47**(1), pp.1-25.

Bernard, A.B., and J.B. Jensen (2004), "Why Some Firms Export", *Review of Economics and Statistics*, **86**(2), pp.561-69.

Berry, R.A. (1992), "Firm (or plant) Size in the Analysis of Trade and Development", in G.K. Helleiner (ed.), *Trade Policy, Industrialization, and Development: New Perspectives*. Oxford: Clarendon Press, pp. 46-88.

Campa, J.M. (2004), "Exchange Rates and Trade: How Important is Hysteresis in Trade?", *European Economic Review*, **48**(3), pp.527-48.

Caves, R.E., J. Khalilzadeh-Shirazi and M.E. Porter (1975), "Scale Economies in Statistical Analysis of Market Power", *Review of Economics and Statistics*, **57**(2), pp.133-40.

Globerman, S., C.R John and I. Vertinsky (1994), "The Economic Performance of Foreign Affiliates in Canada", *Canadian Journal of Economics*, **27**(1), pp.143-156.

Gorg, H. and D. Greenaway (2004), "Much Ado about Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment?" *The World Bank Research Observer*, **19**(2), pp.171-97.

Greenaway, D., N. Sousa and K. Wakelin (2004), "Do Domestic Firms Learn to Export from Multinationals?", *European Journal of Political Economy*, **20**(4), pp. 1027-43.

Hallward-Driemeier, M.G. Iarossi and K.L. Sokoloff (2002), "Exports and Manufacturing Productivity in East Asia: a Comparative Analysis with Firm-level Data" *NBER Working Paper Series*, No. **8894**, Cambridge, MA: NBER.

Hanson, G.H. (2001), "Should Countries Promote Foreign Direct Investment?" *G-24 Discussion Paper Series*, No. 9, New York and Geneva: UN.

Heckman, J. (1976), "The Common Structure of Statistical Models of Truncation, Sample Selection, and Limited Dependent Variables and a Simple Estimation for Such Models", *Annals of Economic and Social Measurement*, **5**, pp.475-92.

Johnston, J. and J. Dinardo (1997), *Econometric Methods*. Singapore: McGraw-Hill.

Kohpaiboon, A. (2006), "Foreign Direct Investment and Technology Spillover: A Cross-Industry Analysis of Thai manufacturing", *World Development*, **34**(3), pp. 541-56.

Kokko, A., R. Tansini, and M. Zejan. (2001), "Trade Regimes and Spillover Effects of FDI: Evidence from Uruguay", *Review of World Economics*, **137**(1), pp.124-49.

Machikita, T., M. Tsuji, S. Miyahara, and Y, Ueki (2009), "Linked Versus Non-linked Firms in Innovation: the Effect of Economies of Network in East Asia", in K. Limskul (ed.), *Development of Regional and Logistics Networks in East Asia* ERIA Research Project Report 2008, Jakarta: ERIA.

Markusen, J.R., and A.J. Venables (1999), "Foreign Direct Investment as a Catalyst for Industrial Development", *European Economic Review*, **43**, pp.335-56.

Roberts, M.J. and J.R. Tybout (1997), "An Empirical Model of Sunk Costs and Decision to Export", *American Economic Review*, **87**(4), pp.545-64.

Sjoholm, F. and S. Takii (2003), "Foreign Networks and Exports: Results from Indonesian Panel Data", *ICSEAD Working Paper Series*, Vol. 2003-33, Kitakyushu: ICSEAD.

Takii, Sadayuki (2006), "Productivity Differentials and Spillovers in Indonesian Manufacturing", in Eric D. Ramstetter and Fredrik Sjöholm (eds). *Multinational Corporations in Indonesia and Thailand: Wages, Productivity, and Exports*, Hampshire, UK: Palgrave Macmillan, pp.85-103.

Thee, K.W. (2006), "Policies Affecting Indonesia's Industrial Development", *ASEAN Economic Bulletin*, **23**(3).

Wooldridge, Jeffrey M. (2002), *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.