

GLOBALIZATION AND PRODUCTIVITY: A SURVEY OF FIRM-LEVEL ANALYSIS

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Abstract. Recent empirical studies which utilize plant- or establishment-level data to examine globalization's impact on productivity have discovered many causal mechanisms involved in globalization's impact on firms' productivity. Because these pathways have been broad, there have been few attempts to summarize the several and detailed mechanisms of self-selection and learning at the same time. This paper examines seven pathways so that the clear-cut consequences of the broad picture of globalization become visible. This strategy is useful for detecting missing links within and across the existing studies as well as for finding possible synergy effects among different mechanisms. Insightful policy implications may be derived from the comprehensive comparisons between the seven different pathways of globalization.

Keywords. Firm-level data; Globalization; Productivity

1. Introduction

Microdata analysis of firms and establishments has totally renewed the scope of evidence-based policy studies since the latter half of the 1980s. It has proven to be one of the most effective ways of investigating microeconomic causality and understanding macroeconomic consequences. With microdata, econometric controls for industry characteristics are much easier to implement. Furthermore, once we construct panel (longitudinal) data in which individual establishments or firms are traced over time, time-invariant characteristics of establishments/firms can be controlled, thereby enabling the analysis of the dynamic heterogeneous transformation of corporate activities. In other words, microdata allow us to provide a versatile empirical basis for rigorous econometric exercises investigating the heterogeneity of firms.

In the literature on research of international trade, empirical analysis of globalizing corporate activities such as trade and foreign direct investment (FDI) requires the direct examination of individual corporate firms. Globalization¹ provides both enhanced competitive pressure and new opportunities in business for corporate firms. How they respond and commit themselves to globalization depends heavily on the heterogeneity of firms.

Firms' productivity is considered to be the most important firm characteristic as well as the most versatile performance measure, taking centre stage in the analysis of firms' global activities.² In the research, as Greenaway and Kneller (2007) argue, the direction of causation between firms' performance

and their global activities has been controversial. Firms' productivity and sunk cost for the global activities play important roles in the selection mechanics of firms' global activities. In order to start trading, for example, firms must learn customs procedures in addition to searching for potential foreign partners. Similarly, the potential investors need to investigate the investment climate in the countries in which they are considering investment. These costs discourage less productive firms from globalizing their activities. Such a selection mechanics according to the level of productivity is called the 'selection effect' in global activities. On the other hand, firms' global activities exert a positive impact on their productivity at home. For example, exporting firms may obtain new and superior knowledge. Although the multinational enterprises (MNEs) investing in developed countries might obtain superior technology or knowledge, those investing in developing countries may achieve total cost reduction by utilizing low-priced production factors. These positive effects are called the 'learning effect' in global activities. Notice that perceived causal arrows between productivity and globalizing activities face in opposing directions for these two effects.

The aim of this paper is to derive economic consequences of trade/investment liberalization, rich implications for the policy of assisting firms' global activities and possible directions of future research in microdata analyses, by reviewing existing studies on the selection and learning effects in firms' global activities.³ It is worthwhile to conduct a serious literature survey in an organized manner now because microdata analysis on those effects has substantially accumulated. There already exist some notable review papers in *each* literature line on microdata analysis. However, in contrast to these existing review papers such as Lopez (2005) and Greenaway and Kneller (2007) that focus on only a limited number of pieces of literature in self-selection and learning, this paper covers several other areas of literature related to selection and learning at the same time.

Such a survey with wider coverage has the following advantages. First, the whole picture of the consequences of globalization becomes clear. There are various kinds of global activities, which differently affect the behaviour and performance of firms of heterogeneous types (e.g. domestic and foreign firms). There may be complicated interactions among these heterogeneous firms. Economic causality of consequences would certainly be intricate. It is thus important to integrate and reorganize existing findings in the literature. Second, our survey is useful in identifying shortcomings or missing links within and across the existing studies as well as finding possible synergy effects among the literature. We uncover the applicability of various methods and approaches across the literature. Third, well-balanced insightful policy implications are drawn only from a comprehensive survey of multiple literatures. Therefore, useful feedback from the policy arena to academic literature also becomes possible.

The rest of this paper is organized as follows. The next section reviews various lines of research on the selection and learning effects in firms' global activities. Based on a large number of findings, we derive the economic consequences of trade and investment liberalization in Section 3. In Section 4, we show what existing lines of research have missed and directions for future research. Last, Section 5 concludes the paper.

2. Evidence of Globalization and Firm Productivity

2.1 Selection

This subsection reviews three pieces of literature that investigate the selection mechanics in firms' global activities. We first introduce those in exporting and then those in FDI. Last, the selection mechanics between trade liberalization and firms' survival is examined.

2.1.1 *Exporting*

Melitz (2003) is a benchmark work on the selection mechanism in firms' exporting. It theoretically shows that exporting firms have relatively high productivity. Because firms with high productivity can obtain high operating profit, they obtain non-negative gross profit even if they incur sunk costs for export. This selection based on the level of productivity is called the selection effect in exporting. This theoretical proposition has been tested in many empirical studies, and the results contribute to the clarification of the appropriate target firms for policies intended to encourage exporting. The pioneering empirical work is Bernard and Jensen (1999). There are some survey papers contained in this study (Lopez, 2005; Greenaway and Kneller, 2007; Wagner, 2007).⁴ To test this self-selection mechanism, these papers compare the productivity of firms that start exporting with those of non-exporters, some years before entry into a foreign market. Most of the studies in this literature find that the more productive producers self-select into the export market.

There are two directions taken in the departure from the simple analysis. The first is to examine the selection effect in importing or the selection effects in exporting and importing simultaneously. Muuls and Pisu (2009), Castellani *et al.* (2010) and Vogel and Wagner (2010) found that firms involved in both importing and exporting are better performers than those involved only in exporting or importing. However, no conclusion has been reached as to which requires higher productivity in exporting or importing. Muuls and Pisu (2009) and Castellani *et al.* (2010) find better performance in importers than exporters, whereas the opposite result was found in Vogel and Wagner (2010). The other direction is to investigate the relationship between the selection effect and a trading partner country. Damijan *et al.* (2004) found that a higher productivity level is required for firms starting to export to advanced countries as opposed to starting to export to developing countries.

In sum, in this literature, it is revealed that there exist a certain amount of sunk costs when firms start to export or import and that such costs for exporting differ by the destination. Such sunk costs discourage less productive firms from commencement of trading. The next step will be to further examine both *qualitative* and *quantitative* differences of sunk costs for exporting in comparison with those for importing or among the destinations.

2.1.2 *FDI*

The Melitz model has also been applied in the context of firms' outward investing, by Helpman *et al.* (2004), and it theoretically shows that investing firms have relatively high productivity. This proposition, i.e. the selection of investing, has been empirically tested by several papers such as Murakami (2005) and Kimura and Kiyota (2006). Greenaway and Kneller (2007) is a famous survey paper within this literature. As in the case of the self-selection mechanism in exporting, the previous papers compare the productivity of firms that start investing abroad with those of non-investors and find that investing firms are more productive. In addition, although Helpman *et al.* (2004) considers outward FDI, there are numerous papers analysing inward FDI which show that foreign-owned firms are more productive than domestic firms. Doms and Jensen (1998) show that foreign-owned firms in the USA are more productive.⁵

There are four directions taken in the departure from the simple analysis.⁶ First, some papers investigate the determinants of the productivity cutoff for investing (Yeaple, 2009; Chen and Moore, 2010). These studies find that (1) a larger GDP in a country, (2) a smaller geographical distance between a country and home or (3) a higher tariff rate in a country does lower the productivity cutoff for investing in that country. In other words, even less productive firms can invest in such a 'favourable' country. Furthermore, Yeaple (2009) shows a 'pecking order' mechanics in firms' investment according to their characteristics and host countries' characteristics: the more productive firms invest in a larger number of countries.

Second, the perspective of the firms' boundary, i.e. intra-firm or inter-firm, is introduced. Antras and Helpman (2004) theoretically shows that the firms with the highest productivity supply their products to their overseas intra-firm group partners (i.e. FDI) rather than to the overseas inter-firm group partners and the domestic inter-/intra-firm group partners. This theoretical proposition is partly supported by the empirical analysis of Tomiura (2007). Tomiura empirically shows that, in Japan, investing firms are more productive than exporting firms, and that the firms trading with overseas intra-firm group firms (i.e. FDI firms) are more productive than those trading with overseas inter-firm group firms (i.e. foreign outsourcing firms).⁷

Third, the more complicated investment patterns are examined. Grossman *et al.* (2006) extend theoretically the study of Helpman *et al.* (2004) in terms of both the economic development of potential host countries (developed and developing countries) and the production processes of goods (finished and intermediate goods). According to not only the firms' productivity but also the trade costs of each good, there are many different variations in the firms' production location patterns. In the empirical field, Aw and Lee (2008) extend the model in which firms have four options: domestic production, FDI to a developing country (China), FDI to a developed country (USA) and FDIs to both developed and developing countries (China and the USA). Then, for Taiwanese firms, they examine the ranking of firms' productivity according to their chosen option and found it to be as follows: domestic production, FDI to China, FDI to the USA and both FDI to China and FDI to the USA.

Fourth, there are a few studies that investigate which entry mode the MNE chooses according to its productivity. There are two main types of entry mode: greenfield and merger with or acquisition of an existing firm in the foreign country (M&A). In the former case, a company sets up a new production facility, whereas in the latter case, it acquires an existing firm. Greenfield investment is further decomposed according to the MNEs' share of ownership. Some subsidiaries are wholly owned (WOE), whereas joint ventures share ownership with domestic firms (JV).⁸ Using Japanese firm-level data, Raff *et al.* (2008) find the ranking of firms' TFP to be as follows: domestic firms, exporters, cross-border M&A MNEs, JV MNEs and WOE.

As a result, according to this literature, there exists a certain amount of sunk costs associated with investing abroad, and furthermore, that the amounts differ along various dimensions: host countries, FDI types and entry modes. These differences in sunk costs result in the different global activities pursued by firms according to their productivity. It will be necessary to further investigate the more rigorous order in sunk costs among various kinds of FDIs by examining the selection mechanics in those FDIs comprehensively.

2.1.3 Survival

The advancement of globalization and the policy measures related to globalization have great impact on firms' survival. The survival and exit of firms result in changes that lead to a more efficient industrial structure, but if policy makers intend to mitigate such adjustment, it is important to know which kinds of firms are likely to survive.

On one hand, from the viewpoint of importing countries, trade liberalization, for example, tariff reduction, in a country induces the closure of some firms within that country. For example, trade cost reduction leads to an increase in imports of more foreign-made varieties. More competition and an increase in varieties available in the domestic market force firms to decrease production volume per firm and thus the operating profit in each firm. As a result, the threshold of productivity payable for fixed cost rises, and thus domestic firms with lower productivity will be forced to shut down (Melitz, 2003; Bernard *et al.*, 2007). Previous studies that investigate the survival of firms in importing countries include Baggs (2005), Bernard and Jensen (2007), Bernard *et al.* (2006a, 2006b) and Greenaway *et al.* (2008). By employing a probit model using firms' death as a dependent variable, these papers

investigate whether or not firms/plants under high pressure from globalization (e.g. trade cost or import penetration) are more likely to shut down. For example, Bernard *et al.* (2006a) find that, as trade costs (the sum of duty, freight and insurance premiums) fall, plant closure is more likely to happen. Furthermore, they introduce trade costs multiplied by a plant's productivity and find its coefficient to be negative, as implied by the theory.

On the other hand, from the viewpoint of exporting countries, trade liberalization in a target country decreases the threshold of productivity for exporting and will enhance the probability of survival in both the domestic and export market for existing exporters. The exporters' survival is often examined by employing a Cox proportional hazards model. Examples include Baggs (2005), Pérez *et al.* (2004) and Kimura and Fujii (2003), though these papers do not explicitly distinguish survival in domestic markets from that in foreign markets.⁹ In particular, the latter two papers found a lower probability of exit for exporting firms.

In sum, this literature showed that trade liberalization has asymmetric effects on firms' survival; whereas trade liberalization at home reduces the survival rate of firms in the home country, trade liberalization in foreign countries raises their survival rate. More detailed analysis will contribute to enhancement of our understanding of firms' survival. It may include, for example, an analysis of the impact of trade liberalization in a foreign country on the survival of firms exporting to that country in the market of that country.

2.2 *Learning*

In this subsection, we review important literature on the learning effect in firms' global activities. We first introduce those in exporting and outward FDI. Then, two pieces of literature on inward FDI are reviewed.

The word 'learning' is here defined in the broad sense. It literally suggests dynamic effects on productivity or other performance measures as a result of gaining experience and obtaining new knowledge through conducting some sort of globalizing activities. However, productivity gains or the betterment of performance measures, both static and dynamic, may also be derived directly from a new form of business that introduces globalizing activities even without any sort of dynamic technological improvement. Learning here refers to causal effects of globalizing activities on productivity or other performance measures in general.

As Lopez (2005) noted, traditional trade policies heavily rely on the extent of learning by exporting and learning effects of FDI. Thus, the empirical results here are quite important because those results become the micro-level evidence for supporting such policies. If there are no rewards from exporting or FDI, then policies designed to increase the number of exporters/investors or attract FDI may be wasting resources.

2.2.1 *Exporting*

The identification of the learning effect of exporting is one of the most important issues.¹⁰ In this literature, there are severe endogeneity issues. First, as mentioned in Section 2.1.1, firms' international activities have a selection effect which yields selection bias in the ordinary least square estimates. Second, because a firm's decision to export and its performance should be jointly determined, the ordinary least square estimates suffer from a simultaneity bias. To tackle these endogeneity issues and examine only the learning effect, previous studies use instruments or the matching method.¹¹ In particular, the propensity score matching method of Rosenbaum and Rubin (1983) is often employed because there are enough matching pairs to use firm/establishment-level data.

The use of matching techniques to distinguish the post-exporting effect from the selection effect, pioneered by Wagner (2002) for Germany and Girma *et al.* (2004) for the United Kingdom, has

stimulated a number of empirical studies which test such a learning-by-exporting effect.¹² The leading papers include Arnold and Hussinger (2005) for Germany, Yasar and Rejesus (2005) for Turkey and Alvarez and López (2005) for Chile. According to a comprehensive survey by Wagner (2007), supportive evidence for the learning-by-exporting hypothesis is detected in only some of the previous studies.¹³ However, a significant positive effect of the export experience on firm's productivity has been found in several recent studies such as Van Biesebroeck (2005) for sub-Saharan African countries, De Loecker (2007) for Slovenia and Lileeva and Trefler (2007) and Serti and Tomasi (2008) for Italy. In particular, in one new direction of analysis on the selection effect of exporting (see Section 2.1.1), De Loecker (2007) examines the learning effect of exporting according to destinations of exports, by employing firm-level data in Slovenian manufacturing in the period 1994–2000. Interestingly, the author finds that the productivity gains are higher for firms exporting to high-income regions.¹⁴

In short, this literature found the existence of learning-by-exporting, and further, noted that it differs by export destinations. Specifically, firms starting to export to the more advanced countries enjoy larger positive benefits. The next step would be to clarify what characteristics of destination countries and what sorts of exports yield such a difference in learning-by-exporting.

2.2.2 FDI

Firms' investments abroad may raise their productivity. Due to the same reasons as in the case of learning-by-exporting, the identification of such a learning effect in FDI is an important issue. The previous papers in this literature also use the instrument variable method or matching method. However, those studies do not necessarily succeed in detecting a positive causal effect of investing on firms' productivity. Papers analysing the learning effect in investing include Navaretti and Castellani (2004) for Italian MNEs, Hijzen *et al.* (2006) and Navaretti *et al.* (2006) for French MNEs and Hijzen *et al.* (2007) and Ito (2007) for Japanese MNEs. Navaretti and Castellani (2004) find significantly positive impacts, but Hijzen *et al.* (2007) and Ito (2007) do not.

One possible reason why we cannot obtain significantly positive results is the qualitative differences in the impacts of two types of FDI: horizontal FDI (HFDI) and vertical FDI (VFDI). Although HFDI is a strategy to avoid broadly defined trade costs by setting up plants within the target country rather than exporting from the home country, VFDI is a strategy that exploits low-price production factors of the host country. The VFDI firms relocate the activities in which the host country has a comparative advantage and domestically concentrate those in which the home country has a comparative advantage. From a theoretical point of view, the resulting impact of HFDI on productivity at home is ambiguous. Its positive impact comes from the advanced knowledge and technology for producing products in the host country. The net impact of HFDI becomes positive if this positive impact is larger than the negative impact due to the loss of economies of scale. On the other hand, due to the total cost reduction through international vertical division of labour between home and host countries, the impact of VFDI should be positive. Thus, if most of the FDIs are HFDI, we might not really obtain a significantly positive impact.

To take into consideration such a qualitative difference in learning effect, Hijzen *et al.* (2006) and Navaretti *et al.* (2006) examine the learning effects according to FDI type separately. Navaretti *et al.* (2006) classifies the FDI in developing countries and that in developed countries as VFDI or HFDI, respectively. In Hijzen *et al.* (2006), VFDI is defined as investments in developing countries by firms in comparative disadvantage industries, whereas HFDI is defined as investments in developed countries by firms in comparative advantage industries. Contrary to the above predictions, however, both Navaretti *et al.* (2006) and Hijzen *et al.* (2006) find positively significant enhancements in productivity in the French HFDI but not in its VFDI.¹⁵

Last, it is worth introducing the studies that analyse the learning effect in (foreign) outsourcing because the outsourcing plays a role alternative to FDI, i.e. foreign insourcing, as mentioned in Section 2.1.2. The references include Girma and Gorg (2004), Gorg and Greenaway (2004) and Hijzen *et al.* (2009). As confirmed in Section 2.1.2, as in the case of FDI, outsourcing has a selection mechanism, which yields an endogeneity issue in analysing the learning effect of outsourcing. By applying the general method of moments (GMM) estimation technique for Japanese firm-level data, for example, Hijzen *et al.* (2009) investigate the impacts of international outsourcing on corporate performance and find significantly positive impacts. In short, evidence for the existence of a learning effect in FDI is still inconclusive.¹⁶ More analyses focused on host countries or FDI types are necessary to clarify the reasons why we could not confirm its robust existence.

2.2.3 Cross-border M&A

The acceptance of FDI may improve the performance of domestic firms, particularly in the case of inward FDI in the form of cross-border M&A. As introduced in Section 2.1.2, whereas foreign-owned firms are more productive than domestic firms, domestic firms possess a geographic advantage, years of experience in the local market and an ability to navigate the local institutional environment. Thus, on one hand, the M&A MNEs are motivated to acquire the assets of a domestic target firm, combine such assets with their own assets and raise their competitiveness in the host market. On the other hand, integrated with the superior know-how of foreign firms, the local advantages of the target domestic firm could translate into enhanced productivity.

To explore the impacts of cross-border M&A on target domestic firms' productivity empirically, their productivity is examined before and after the M&A. The references include Arnold and Javorcik (2005) and Petkova (2008) for Indonesia, Conyon *et al.* (2002), Girma (2005b), Girma *et al.* (2007) and Harris and Robinson (2002) for the United Kingdom, Bertrand and Zitouna (2008) for France, Salis (2008) for Slovenia, Piscitello and Rabbiosi (2005) for Italy, Fukao *et al.* (2006) for Japan and Chen (2010) and McGuckin and Nguyen (1995) for the USA. As in other literature cited in this paper, there is an endogeneity attributed to selection bias: the higher productivity in the acquired domestic firms may simply be because foreign investors are likely to acquire the more productive domestic firms. With careful examination using instruments or the matching method, most of the above-introduced studies find significantly positive impacts. Furthermore, some of them compare the impacts of cross-border M&A with those of local M&A and find larger impacts in the case of cross-border M&A.

Two research directions emerge. One is to explore which MNEs produce larger positive impacts. Chen (2010) finds in the USA that the country of origin plays an important role in that the impacts of acquisition by developed countries on profits are larger than those by developing countries. The other direction is to examine which domestic firms receive larger positive impacts. The key role of the absorptive capacity of domestic firms is highlighted in Girma (2005b) and Girma *et al.* (2007). The rate of productivity change is sensitive to the pre-acquisition productivity level of the acquired firm. Furthermore, beyond some critical level of initial productivity, the rate of technology transfer through foreign acquisition starts to decline. Girma (2005b) interprets this result as indicating that UK-owned firms that had been operating nearer the domestic technology frontier have less to gain from their association with foreign multinationals.¹⁷

The literature found the positive impacts of cross-border M&A on target domestic firms' performance. Furthermore, it is beginning to uncover the existence of heterogeneity in cross-border M&As' impacts according to foreign firms' characteristics, for example, their nationality, and domestic firms' characteristics, for example, their qualification or preparedness. It will be important to identify further sources of different impacts.

2.2.4 Spillover

In addition to the direct impacts exerted through the cross-border M&A, there are also indirect impacts of FDI on the host economy; domestic firms may benefit from the presence of foreign firms due to some positive externalities accruing from FDI and the presence of multinational firms. Such positive impacts are called 'spillover effects'. Conceptually, there are two kinds of spillover effects: intra-industry spillover and inter-industry spillover. Four paths of spillover effects are suggested in the literature¹⁸: imitation, skill acquisition and proliferation, competition and exports. Imitation is the method of raising productivity by imitating MNEs' superior products and technology. Skill acquisition and proliferation is the route whereby the MNE's know-how and technology are directly transferred to domestic firms, say, by the shift of labour from MNEs to domestic firms. Competition is the phenomenon whereby the MNEs put pressure on domestic firms to use existing technology more efficiently. Exports refer to the means of raising productivity by learning information from MNEs on penetrating the export market and starting export activities (see Section 2.2.1). Through these various routes, domestic firms are expected to be able to obtain positive impacts from MNEs.

Although the spillover effect is tested by a large number of papers, previous studies do not necessarily obtain significantly positive effects. Those studies investigate whether or not a larger mass of MNEs in the industry to which a domestic firm i belongs leads to higher productivity in that firm. Although Chuan and Lin (1999) obtain significantly positive impacts in Taiwan, Haddad and Harrison (1993) for Morocco and Kokko *et al.* (1996) for Uruguay do not. Furthermore, Aitken and Harrison (1999) obtain significantly negative results. Table 2 in Gorg and Greenaway (2004)¹⁹ summarizes the results of many previous studies on the spillover effect and shows that most of these studies do not obtain robust positive impacts.

There are two possible reasons for such unexpected results. The first reason pertains to another aspect of the competition path. The fiercer competition due to the massive entry of MNEs may decrease production per firm, and thus economies of scale would be reduced (Aitken and Harrison, 1999). This reduction works as a negative impact of inward FDI. As a result, if such a negative impact is greater than the above-mentioned positive impacts of the competition path, a significantly negative result is likely to be obtained. The other reason is due to the heterogeneity of the spillover effect. Both MNEs and domestic firms are heterogeneous in a number of characteristics. Therefore, all types of MNEs do not necessarily become sources of positive spillover effect, and all types of domestic firms do not necessarily obtain a spillover effect. The present literature on the spillover effect tries to clarify what kinds of heterogeneity in MNEs or domestic firms are crucial.

Studies analysing the heterogeneity of MNEs vis-à-vis the spillover effect are as follow. First, Todo and Miyamoto (2002, 2006) show that, in Indonesia, whereas the MNEs conducting human resource development on site exert a positive influence on the productivity of domestic firms, the MNEs that are not conducting such an effort do not. Second, Banga (2003), Girma and Wakelin (2002) and Karpaty and Lundberg (2004) have investigated the source countries (nationality) of MNEs. For instance, Banga (2003) has confirmed that Japanese FDI is more likely to create spillover for domestic Indian firms than US FDI. One possible reason for this result is that Japanese technology is more widely used, and thus it is easier to imitate than US technology. Third, Girma (2005a) and Girma *et al.* (2008) have studied the types of FDI. For instance, Girma *et al.* (2008) classifies FDI into export- and market-oriented types and shows that only the former type has positive impacts on domestic firms' productivity. The negative aspect of the competition path is also interpreted as small in the export-oriented type of FDI but large in the market-oriented type.

There is also the heterogeneity of domestic firms in terms of their responses when receiving the spillover effect. One point of difference lies in the level of absorption capability of domestic firms as studied by Kokko *et al.* (1996), Girma (2005a), Girma *et al.* (2001), Girma and Gorg (2003) and Kinoshita (2001). For instance, Kinoshita (2001) finds that R&D-intensive domestic firms enjoy more

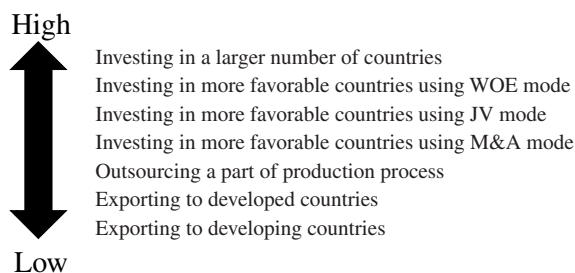


Figure 1. Differences in Firms' Behaviour According to Their Productivity: Trade/Investment Liberalization in Foreign Countries.

Source: Authors' compilation.

benefits from the spillover effect. Another is the domestic firms' geographical proximity to MNEs (Aitken and Harrison, 1999; Sjöholm, 1999; Girma and Wakelin, 2002; Halpern and Murakozy, 2007). However, the robust geographical locality of the spillover effect has not necessarily been detected in the literature. The last is the heterogeneity of domestic firms' input–output relationships with MNEs as studied by Javorcik (2004), Blalock and Gertler (2008), Driffield *et al.* (2002) and Harris and Robinson (2004). These papers found that the closer the input–output relationship with MNEs, the larger the benefits from the spillover effect that the domestic firms enjoy.

Note that most of the empirical studies incorporating the input–output relationship between MNEs and local firms simply utilize input–output tables, rather than pinpointing the nature of innovative information and the channels of its flows. In order to dig into the detailed nature of technology spillover or even intentional technology 'transfer', we need a specifically designed microdata analysis. The Economic Research Institute for ASEAN and East Asia (ERIA) conducts an ambitious 3-year study with extensive questionnaire survey on agglomeration and innovation in ASEAN and tries to investigate innovative information flows among MNEs, local firms, universities/laboratories and others (see Limskul, 2009; Intarakummerd, 2010; Machikita and Ueki, 2010a, 2010b, 2010c, 2010d).

In short, the literature found the existence of spillover effects from MNEs. Furthermore, it reveals that there are various kinds of heterogeneity in the spillover effect according to foreign firms' characteristics and domestic firms' characteristics. Again, it will be important to find more sources of such heterogeneity.

3. Effects of Trade and Investment Liberalization

Microdata analyses reviewed in Section 2 provide new insights into the economic consequences of globalization and policy changes. In the standard analysis of tariff reduction, for example, firms are under perfect competition and do not have their own faces. On the other hand, the effects of globalization or trade/investment liberalization are expected to be different across heterogeneous firms. Different effects are generated in the process of both selection and learning, which provides rich implication for policies.

Let us consider the effects of trade liberalization in *foreign* countries, for example. If we literally believe the results of the microdata analyses in Section 2, heterogeneous firms in the home country are supposed to go into the selection process facing improved conditions in foreign markets. Microdata studies suggest that a hierarchy exists among domestic firms. Self-selection patterns in a new economic environment are illustrated with some simplification in Figure 1. The domestic firms in the least

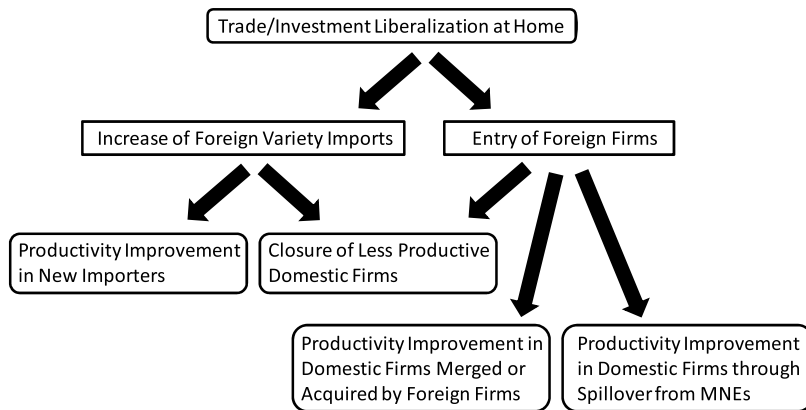


Figure 2. Effects of Trade/Investment Liberalization at Home.

Source: Authors' compilation.

productive firm group do not change their behaviour. However, those in the second and third least productive firm groups start to export to developing and developed countries, respectively. Furthermore, both kinds of firms enjoy learning-by-exporting benefits and raise their productivity.

Firms which have previously exported raise their survival probability and further change their global activities. Less productive firms among them start to outsource a part of their production process to foreign countries and further achieve productivity improvement through learning-by-outsourcing. The more productive firms among them start to become engaged in FDI in foreign countries, and furthermore, may raise their productivity through learning-by-investing.

The pattern of FDI may be gradated in three dimensions. First, firms start to invest in countries with more a favourable environment for FDI, typically large market countries because the productivity cutoff for investing in such countries is lower. Second, the entry mode of FDI differs according to the level of productivity. Among the FDI firms, those with lower productivity choose the entry mode of cross-border M&A, those with medium-level productivity choose the entry mode of joint venture, and those with higher productivity choose the entry mode of wholly owned enterprise. Third, firms in the most productive firm group increase the number of their overseas plants by investing even in the less favourable countries.

Next, suppose that we have trade/investment liberalization in the *home* country. Again, liberalization effects differ widely across heterogeneous firms. Trade/ investment liberalization increases imports of foreign-made varieties and entries of foreign firms into the home country, yielding three noteworthy changes in domestic firms in the home country, which are depicted in Figure 2. The first change comes from the increase in both imports and foreign firms; whereas domestic firms with lower productivity are likely to shut down, the productive domestic firms continue to survive. This is because their increase raises the productivity cutoff necessary for the survival in the home market. The second change is related to the increase in the imports of foreign varieties. As mentioned above, the surviving firms are relatively productive domestic firms. However, among them, the importers of foreign varieties are more productive than non-importers. Moreover, some of them may be new importers, and at least such new importers can improve their productivity.

The third change is based on the entry of foreign firms into the home country. This raises domestic firms' productivity through two channels. The first channel is that, if foreign firms merge with domestic

firms when they enter the market, then the merged domestic firms achieve productivity improvement. If the merging foreign firms come from developed countries, or if the merged domestic firms have a medium level of productivity, such productivity improvement becomes greater. The second channel is that the existence of MNEs *per se* raises domestic firms' productivity, i.e. through spillover effects. In particular, the magnitude of such effects differs according to the existence of MNEs' human resource development, MNEs' nationality, FDI types (export- or market oriented), the level of absorption capability of domestic firms, and the existence of input-output relationships between MNEs and domestic firms.

These thought experiments are perhaps still too simplistic to directly apply to the real world. However, notice that even only with the heterogeneity of individual firms, effects of trade/FDI liberalization become much richer and more sophisticated than in the simplistic perfect competition setting.

The literature on selection and learning has profound policy implications. Microdata analyses suggest that slight changes in economic environment affect heterogeneous firms in different and sophisticated ways through the selection and learning mechanism. Thus, looking at it the other way around, policies must be carefully designed to take account of firms' heterogeneity. On one hand, sharp targeting may work well. On the other hand, wrong targeting can be ineffective or even harmful. The mechanism of self-selection and static/dynamic learning should be explicitly incorporated in the design and implementation of industrial promotion policies.

4. Directions of Further Research

Although a large number of research papers on the relationship between globalization and productivity have already been published, we believe that vast room still exists for a further extension of the literature, with strong interest held by not only academics but also policymakers. Taking a look across the literatures, we can suggest the following four lines of future research.

The first is the replication of previous studies in countries/regions that have not been fully explored. In particular, because most of the existing studies have analysed developed countries, it is invaluable to replicate them by using developing countries' microdata. As demonstrated by Hsieh and Klenow (2009), developing countries such as China and India have more serious market distortions than developed economies. Such market distortions may generate different consequences in the globalization of corporate activities. Different results are quite often found between developed and developing countries. Comparative studies among countries will surely become a first step for clarifying key factors driving the heterogeneous selection and learning effects.

The second line of future research is to integrate some literature. For example, as introduced in Section 2.1.2, we can find the integration of studies on the selection effect in FDI and the entry mode choice. Specifically, Raff *et al.* (2008) incorporate the firms' choice between FDI and exporting into their choice of FDI modes such as WOE, JV and M&A. Such an examination contributes to clarifying the overall picture of the substitution of overseas activities. The integration of this entry mode study and the learning effect in FDI is another possible example in this direction. At present, the learning effects are examined at best according to simple FDI types (HFDI and VFDI). In addition to this FDI-type dimension, the learning effects of FDI seem to differ according to the entry modes. In particular, the JV and the M&A may yield larger positive impacts on MNEs' performance than the WOE due to the combination of location advantages of the domestic firms with the know-how of the MNEs.

The third line is to examine the applicability of new findings of one literature to other types of literature. Most of the literature is now at a stage of seeking key elements that yield heterogeneity in various kinds of selection and learning effects. In particular, we already know many such elements in the spillover literature. It is insightful to examine whether or not those are crucial in other literatures. Also, it is found that the selection effect, i.e. productivity cutoff, differs by FDI types. In particular,

the recent literature examines the selection effect in the more complicated types of FDI and finds that, for example, investing in multiple countries requires firms to be highly productive (Yeaple, 2009). Like this extension, it may be interesting to analyse the learning effect among various kinds of FDI types, including the complicated type.

Last, because we have already accumulated a sufficient number of empirical studies, meta-analysis should be conducted in each literature set. Such meta-analysis would uncover the possibilities of research design bias and publication bias. The former bias comes from differences in estimation techniques, variable definition and so on. In particular, it is recognized that the smaller the analytical unit (e.g. firm-level), the more serious the research design bias becomes. For example, in the previous papers on the spillover effect from MNEs, Holger and Eric (2001) find some research design biases resulting from the definition of multinationals and from the functional specification, in addition to the publication bias. More recently, on the other hand, Martins and Yang (2009) have collected more than 30 papers on the learning-by-exporting effect and find neither research design bias nor publication bias. We should conduct the meta-analysis also in other literatures. The accumulation of such a meta-analysis certainly leads not only to a methodological improvement but also to a deeper understanding of globalization impacts at the micro level.

5. Concluding Remarks

This paper reviewed empirical studies on the selection and learning effects in firms' global activities and derived economic consequences of trade/investment liberalization, rich implications for policies assisting firms' global activities and possible directions of future research in microdata analyses. With rigorous econometric treatment, we hope that these literature streams in microdata analysis will develop even further, thereby offering strong policy guidance, particularly for economic development.

It is certainly meaningful to point out the need for studies that examine the impacts of changes in firm-level behaviour on national productivity. Some studies such as Foster *et al.* (2001) decompose changes of national-level productivity into those of firm-level productivity and evaluate, say, the contribution of firms' turnover to the changes of national-level productivity. In these kinds of analyses, we should further decompose the productivity changes according to firms' status on global activities (e.g. exporting, importing, FDI, etc). One example is Bernard and Jensen (2004), which find that the exporters surviving during a period are the most important contributors in the national-level TFP growth. Such an analysis will be essential in evaluating the effects of policies intended to encourage firms' global activities.

One big missing link in the literature is a rigorous analysis of the nature and evolution of market structure and inter-firm relationships. Although theoretical models of heterogeneous firms typically have macro closure, interactions among firms and changes in market structure, both of which would affect individual firms' behaviour, do not seem to be well incorporated. Inter-firm relationships such as working in production networks or not are not been formalized in most of the microdata analyses, either. Some articles certainly try to work with agglomeration of economic activities, but the introduction of inter-firm relationships is largely crude rather than explicitly writing down the rule of games among firms. To bridge micro and macro levels, more investigation of market structure and inter-firm relationships seems to be essential.

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Notes

1. In this paper, 'globalization' indicates the reduction of trade/investment costs or the process of increasing the interdependence of the world's markets and business.
2. Bartelsman and Doms (2000) is the first concrete survey of the microdata productivity literature, and Syverson (2010) surveys recent literature to address the question of why businesses differ in their productivity levels.
3. There are some proposed methods to measure firms' productivity which are not covered in this paper. For details on those methods, see Caves *et al.* (1982, 1983), Good *et al.* (1983), Olley and Pakes (1996) and Levinsohn and Petrin (2003).
4. For a large number of references in this literature, see those listed in the survey papers.
5. There is literature that investigates which countries or regions the MNEs invest in. This is a well-known location choice analysis, the findings of which present clues about location elements encouraging inward FDI. The recent references are as follow: Head *et al.* (1999) for Japanese MNEs in the USA; Belderbos and Carree (2002) for Japanese MNEs in China; Head and Mayer (2004) for Japanese MNEs in Europe; Disdier and Mayer (2004) for French MNEs in Europe; Castellani and Zanfei (2004) for large MNEs around the world; Mayer *et al.* (2007) for French MNEs around the world; Crozet *et al.* (2004) for MNEs in France and Basile *et al.* (2008) for MNEs in Europe.
6. Another analysis includes Brambilla (2006), which compares the performance of foreign and domestic firms in terms of introduction of new varieties. His empirical result suggests that firms with more than 50% of foreign ownership create more than twice as many new varieties of products as private domestic firms. Such a larger number of new varieties in foreign firms would be attributed to their higher productivity.
7. Tomiura (2007) is the extended version of Tomiura (2005). Using Japanese firm-level data, Tomiura (2005) distinguishes foreign outsourcing from domestic outsourcing. His finding is that only a few firms (less than 3%) outsource their production abroad and that productive firms or firms with labour-intensive products outsource more.
8. In the literature, greenfield FDI is perceived as adding to the capital stock of the host country and creating jobs. On the other hand, although only the merged domestic firms enjoy a direct transfer of foreign firms' technology (see Section 2.2.3), M&As are often seen as a less beneficial mode than greenfield FDI because of their simple ownership transfer.
9. Sabuhoro *et al.* (2006) focuses on the firms' survival in export markets but does not examine its relationship with trade costs with target countries. In addition, Kimura and Fujii (2003) found a lower probability of exit for multinational firms.
10. In contrast to the selection effect, the learning effect has not been fully examined theoretically in the literature. The major exception is Clerides *et al.* (1998). It examines both the selection and learning effects in exporting by specifying and simulating the general optimization problem of firms, in which each firm faces stochastic cost and foreign demand processes.
11. The economic application of matching estimators has grown in various fields in recent years, i.e. in the evaluation of policy intervention in the labour market (Heckman *et al.*, 1997; Blundell and Costa Dias 2002) and the effects of environmental regulation on the birth ratio of plants at the county level (List *et al.*, 2003). The propensity score matching method has become one of the most useful methods for analysing the impact of an event, along with the traditional instrument variable method.
12. See Greenaway and Kneller (2007), which is an important survey paper in this literature stream.

13. The accumulated empirical findings on the relationship between exports and productivity are summarized by Wagner (2007) as follows: there is evidence in favour of self-selection of more productive firms into export markets, but almost no evidence in favour of the learning-by-exporting hypothesis. The International Study Group on Exports and Productivity (ISGEP) (2008) further explores the selection and learning effects of exporting by using comparable micro-level panel data for 14 countries and employing identically specified empirical models; it found evidence in line with the big picture described by the literature clarified by Wagner.
14. In the case of the selection effect as well, the learning effect of importing on firms' performance is also examined. Examples include Vogel and Wagner (2010), which found a significantly positive impact.
15. In addition to productivity, there are numerous empirical papers analysing the impacts of FDI on production and employment. The references include the following: Hijzen *et al.* (2007) for Japanese MNEs; Castellani *et al.* (2008), Navaretti and Castellani (2004) and Navaretti *et al.* (2006) for Italian MNEs and Navaretti and Castellani (2004) and Hijzen *et al.* (2006) for French MNEs. Although these papers found significantly positive impacts on production, most of the studies analysing the impacts on employment have failed to obtain significantly positive results. In addition, Castellani *et al.* (2008) and Hijzen *et al.* (2006) examine whether the ratio of skilled labour to unskilled labour rises or not. Although VFDI is expected to raise the ratio, most of the results in these papers are insignificant.
16. The unexpected empirical results may be due to the unit of observation: firm-/plant-level or production activity/non-production activity. For more details, see Obashi *et al.* (2009) and Matsuura *et al.* (2009).
17. Branstetter *et al.* (2006) examine the relationship between intellectual property rights (hereafter IPRs) and international technology transfer. They investigate the impacts of IPRs on technology transfer from US multinational enterprises to their affiliate firms in 16, mostly medium developing countries. Their finding is that the stronger the IPR environment in a country, the more technology is transferred to affiliates locating in the country. Also see Keller (2004), which provides a very useful summary, helping us to understand the cause and consequences of several pathways (imports, learning by exporting and FDI) of cross-border technology transfer.
18. 'Spillover' in this literature line intrinsically indicates 'technological spillover' from FDIs rather than 'pecuniary spillover'. Although the imitation path is a typical example of the former type of spillover, the pecuniary spillover, for example, can stem from buyer-seller linkage between an MNE and an indigenous firm. However, it is difficult to differentiate empirically those two types of spillover, as found below.
19. Crespo and Fontoura (2007) and Smeets (2008) are other important survey papers in this literature. Smeets (2008) provides a comprehensive overview of the empirical literature on FDI knowledge spillovers and its mixed results for magnitude, direction and existence of knowledge spillovers from FDI.

References

- Aitken, B.J. and Harrison, A.E. (1999) Do domestic firms benefit from direct foreign investment? Evidence from Venezuela. *American Economic Review* 89(3): 605–618.
- Alvarez, R. and López, R.A. (2005) Exporting and performance: evidence from Chilean plants. *Canadian Journal of Economics* 38(4): 1384–1400.
- Antras, P. and Helpman, E. (2004) Global sourcing. *Journal of Political Economy* 112(3): 552–580.
- Arnold, J.M. and Hussinger, K. (2005) Export behavior and firm productivity in German manufacturing: a firm-level analysis. *Weltwirtschaftliches Archiv/Review of World Economics* 141(2): 219–243.
- Arnold, J.M. and Javorcik, B. (2005) Gifted kids or pushy parents? Foreign acquisitions and plant performance in Indonesia. CEPR Discussion Paper 5065.
- Aw, B. and Lee, Y. (2008) Firm heterogeneity and location choice for Taiwanese multinationals. *Journal of International Economics* 75(1): 67–179.

- Baggs, J. (2005) Firm survival and exit in response to trade liberalization. *Canadian Journal of Economics* 38(4): 1364–1383.
- Banga, R. (2003) Do productivity spillovers from Japanese and US FDI differ? Mimeo, Delhi School of Economics.
- Bartelsman, E. and Doms, M. (2000) Understanding productivity: lessons from longitudinal microdata. *Journal of Economic Literature* 38(3): 569–594.
- Basile, R., Castellani, D. and Zanfei, A. (2008) Location choices of multinational firms in Europe: the role of EU cohesion policy. *Journal of International Economics* 74(2): 328–340.
- Belderbos, R. and Carree, M. (2002) The location of Japanese investments in China: agglomeration effects, keiretsu, and firm heterogeneity. *Journal of the Japanese and International Economies* 16(2): 194–211.
- Bernard, A. and Jensen, B. (1999) Exceptional exporter performance: cause, effect, or both? *Journal of International Economics* 47(1): 1–25.
- Bernard, A. and Jensen, B. (2004) Exporting and productivity in the USA. *Oxford Review of Economic Policy* 20(3): 343–357.
- Bernard, A. and Jensen, B. (2007) Firm structure, multinationals, and manufacturing plant deaths. *The Review of Economics and Statistics* 89(2): 193–204.
- Bernard, A., Jensen, B. and Schott, P. (2006a) Trade costs, firms and productivity. *Journal of Monetary Economics* 53(5): 917–937.
- Bernard, A., Jensen, B. and Schott, P. (2006b) Survival of the best fit: exposure to low-wage countries and the (uneven) growth of U.S. manufacturing plants. *Journal of International Economics* 68(1): 219–237.
- Bernard, A., Redding, S. Schott, P. (2007) Comparative advantage and heterogeneous firms. *Review of Economic Studies* 74(1): 31–66.
- Bertrand, O. and Zitouna, H. (2008) Domestic versus cross-border acquisitions: which impact on the target firms' performance? *Applied Economics* 40(17): 2221–2238.
- Blalock, G. and Gertler, P. (2008) Welfare gains from foreign direct investment through technology transfer to local suppliers. *Journal of International Economics* 74(2): 402–421.
- Blundell R. and Costa Dias, M. (2002) Alternative approaches to evaluation in empirical microeconomics. *Portuguese Economic Journal* 1(2): 91–115.
- Brambilla, I. (2006) Multinationals, technology, and the introduction of varieties of goods. NBER Working Paper 12217.
- Branstetter, L.G., Fisman, R. and Foley, F.C. (2006) Do stronger intellectual property rights increase international technology transfer? Empirical evidence from U.S. firm-level panel data. *Quarterly Journal of Economics* 121(1): 321–349.
- Castellani, D. and Zanfei, A. (2004) Choosing international linkage strategies in the electronics industry: the role of multinational experience. *Journal of Economic Behavior and Organization* 53(4): 447–475.
- Castellani, D., Mariotti, I. and Piscitello, L. (2008) The impact of outward investments on parent company's employment and skill composition: evidence from the Italian case. *Structural Change and Economic Dynamics* 19(1): 81–94.
- Castellani, D., Serti, F. and Tomasi, C. (2010) Firms in international trade: importers and exporters heterogeneity in the Italian manufacturing industry. *The World Economy* 33(3): 424–457.
- Caves, D., Christensen, L. and Diewert, W. (1982) Output, input and productivity using superlative index numbers. *Economic Journal* 92: 73–96.
- Caves, D., Christensen, L. and Tretheway, M. (1983) Productivity performance of U.S. trunk and local service airline in the era of deregulation. *Economic Inquiry* 21: 312–324.
- Chen, W. (2010) The effect of investor origin on firm performance: Domestic and foreign direct investment in the United States, forthcoming in *Journal of International Economics*, doi:10.1016/j.jinteco.2010.11.005.
- Chen, M. and Moore, M. (2010) Location decision of heterogeneous multinational firms. *Journal of International Economics* 80(2): 188–199.
- Chuan, Y-C. and Lin, C-M. (1999) Foreign direct investment R&D and spillover efficiency: evidence from Taiwan's manufacturing firms. *Journal of Development Studies* 35(4): 117–137.
- Clerides, S.K., Lach, S. and Tybout, J.R. (1998) Is learning-by-exporting important? Micro-dynamic evidence from Colombia, Mexico and Morocco. *Quarterly Journal of Economics* 113(3): 903–948.

- Canyon, M.J., Girma, S., Thompson, S. and Wright, P.W. (2002) The productivity and wage effects of foreign acquisition in the United Kingdom. *Journal of Industrial Economics* 50(1): 85–102.
- Crespo, N. and Fontoura, M.P. (2007) Determinant factors of FDI spillovers – what do we really know? *World Development* 35(3): 410–425.
- Crozet, M., Mayer, T. and Mucchielli, J-L. (2004) How do firms agglomerate? A study of FDI in France. *Regional Science and Urban Economics* 34(1): 27–54.
- Damijan, J.P., Polanec, S. and Prasnikar, J. (2004) Self-selection, export market heterogeneity and productivity improvements: firm level evidence from Slovenia. LICOS Discussion Papers 14804, LICOS – Centre for Institutions and Economic Performance, K.U. Leuven.
- De Loecker, J. (2007) Do exports generate higher productivity? Evidence from Slovenia. *Journal of International Economics* 73(1): 69–98.
- Disdier, A-C. and Mayer, T. (2004) How different is Eastern Europe? Structure and determinants of location choices by French firms in Eastern and Western Europe. *Journal of Comparative Economics* 32(2): 280–296.
- Doms, M. and Jensen, J.B. (1998) Comparing wages, skills, and productivity between domestically and foreign-owned manufacturing establishments in the United States. In R.E. Baldwin, R.E. Lipsey and J.D. Richardson (eds), *Geography and Ownership as Bases for Economic Accounting* (pp. 235–258). Chicago: University of Chicago Press.
- Driffield, N., Munday, M. and Roberts, A. (2002) Foreign direct investment, transactions linkages, and the performance of the domestic sector. *International Journal of the Economics of Business* 9(3): 335–351.
- Foster, L., Haltiwanger, J. and Krizan, C. (2001) Aggregate productivity growth: lessons from microeconomic evidence. In C. Hulten, E. Dean and M. Harper (eds), *New Developments in Productivity Analysis*. Chicago: University of Chicago Press.
- Fukao, K., Ito, K., Kwon, H.U. and Takizawa, M. (2006) Cross-border acquisitions and target firms' performance: evidence from Japanese firm-level data. NBER Working Paper 12422.
- Girma, S. (2005a) Absorptive capacity and productivity spillovers from FDI: a threshold regression analysis. *Oxford Bulletin of Economics and Statistics* 67(3): 281–306.
- Girma, S. (2005b) Technology transfer from acquisition FDI and the absorptive capacity of domestic firms: an empirical investigation. *Open Economies Review* 16(2): 175–187.
- Girma, S. and Gorg, H. (2003) Foreign direct investment, spillovers and absorptive capacity: evidence from quantile regressions. GEP Working Paper 2002/14.
- Girma, S. and Görg, H. (2004) Outsourcing, foreign ownership, and productivity: evidence from UK establishment-level data. *Review of International Economics* 12(5): 817–832.
- Girma, S. and Wakelin, K. (2002) Are there regional spillovers from FDI in the UK? In D. Greenaway, R. Upward and K. Wakelin (eds), *Trade, Investment, Migration and Labour Market Adjustment* (pp. 172–186). New York: Palgrave Macmillan.
- Girma, S., Greenaway, D. and Wakelin, K. (2001) Who benefits from foreign direct investment in the UK? *Scottish Journal of Political Economy* 48(2): 119–133.
- Girma, S., Greenaway, D. and Kneller, R. (2004) Does exporting increase productivity? A microeconomic analysis of matched firms. *Review of International Economics* 12(5): 855–866.
- Girma, S., Kneller, R. and Pisu, M. (2007) Do exporters have anything to learn from foreign multinationals? *European Economic Review* 51(4): 993–1010.
- Girma, S., Gorg, H. and Pisu, M. (2008) Exporting, linkages and productivity spillovers from foreign direct investment. *Canadian Journal of Economics* 41(1): 320–340.
- Good, D., Nadri, I., Roeller, L. and Sickles, R. (1983) Efficiency and productivity growth comparisons of European and U.S. air carriers: a first look at the data. *Journal of Productivity Analysis* 4: 115–125.
- Gorg, H. and Greenaway, D. (2004) Much ado about nothing? Do domestic firms really benefit from foreign direct investment? *The World Bank Research Observer* 19(2): 171–197.
- Greenaway, D. and Kneller, R. (2007) Firm heterogeneity, exporting and foreign direct investment. *Economic Journal* 117(517): 134–161.
- Greenaway, D., Gullstrand, J. and Kneller, R. (2008) Surviving globalisation. *Journal of International Economics* 74(2): 264–277.

- Grossman, G.M., Helpman, E. and Szeidl, A. (2006) Optimal integration strategies for the multinational firm. *Journal of International Economics* 70(1): 216–238.
- Haddad, M. and Harrison, A. (1993) Are there positive spillovers from direct foreign investment? Evidence from panel data for Morocco. *Journal of Development Economics* 42(1): 51–74.
- Halpern, L. and Murakozy, B. (2007) Does distance matter in spillover? *Economics of Transition* 15(4): 781–805.
- Harris, R. and Robinson, C. (2002) Note. *The Review of Economics and Statistics* 84(3): 562–568.
- Harris, R. and Robinson, C. (2004) Productivity impacts and spillovers from foreign ownership in the United Kingdom. *National Institute Economic Review* 187(1): 58–75.
- Head, K. and Mayer, T. (2004) Market potential and the location of Japanese investment in the European Union. *The Review of Economics and Statistics* 86(4): 959–972.
- Head, K., Ries, J. and Swenson, D. (1999) Attracting foreign manufacturing: investment promotion and agglomeration. *Regional Science and Urban Economics* 29(2): 197–218.
- Heckman, J., Ichimura, H. and Todd, P.E. (1997) Matching as an econometric evaluation estimator: evidence from evaluating a job training programme. *Review of Economic Studies* 64(4): 605–654.
- Helpman, E., Melitz, M. and Yeaple, S. (2004) Export versus FDI with heterogeneous firms. *American Economic Review* 94(1): 300–316.
- Hijzen, A., Jean, S. and Mayer, T. (2006) The effects at home of initiating production abroad: evidence from matched French firms. Mimeo, CEPII.
- Hijzen, A., Inui, T. and Todo, Y. (2007) The effects of multinational production on domestic performance: evidence from Japanese firms. RIETI Discussion Paper 07-E-006
- Hijzen, A., Inui, T. and Todo, Y. (2009) Does offshoring pay? Firm-level evidence from Japan. *Economic Inquiry* 48(4): 880–895.
- Holger, G. and Eric, S. (2001) Multinational companies and productivity spillovers: a meta-analysis. *Economic Journal* 111(475): F723–F739.
- Hsieh, C. and Klenow, P. (2009) Misallocation and manufacturing TFP in China and India. *Quarterly Journal of Economics* 124(4): 1403–1448.
- International Study Group on Exports and Productivity (ISGEP). (2008) Understanding cross-country differences in exporter premia: comparable evidence for 14 countries. *Review of World Economics* 144(4): 596–635.
- Ito, Y. (2007) Choice for FDI and post-FDI productivity. RIETI Discussion Paper 07-E-049.
- Javorcik, B.S. (2004) Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *American Economic Review* 94(3): 605–627.
- Karpaty, P. and Lundberg, L. (2004) Foreign direct investment and productivity spillovers in Swedish manufacturing. FIEF Working Paper 194.
- Keller, W. (2004) International technology diffusion. *Journal of Economic Literature* 42(3): 752–782.
- Kimura, F. and Fujii, T. (2003) Globalizing activities and the rate of survival: panel data analysis on Japanese firms. *Journal of the Japanese and International Economies* 17(4): 538–560.
- Kimura, F. and Kiyota, K. (2006) Exports, FDI, and productivity: dynamic evidence from Japanese firms. *Review of World Economics* 142(4): 695–719.
- Kinoshita, Y. (2001) R&D and technology spillovers through FDI: innovation and absorptive capacity. CEPR Discussion Paper 2775.
- Kokko, A., Tansini, R. and Zejan, M. (1996) Local technological capability and productivity spillovers from FDI in the Uruguayan manufacturing sector. *Journal of Development Studies* 32: 602–611.
- Levinsohn, J. and Petrin, A. (2003) Estimating production functions using inputs to control for unobservables. *Review of Economic Studies*, 70: 317–341.
- Lileeva, A. and Trefler, D. (2007) Improved access to foreign markets raises plant-level productivity ... for some plants. NBER Working Paper 13297.
- Limskul, K., ed. (2009) Development of regional production and logistic networks in East Asia. ERIA Research Project Report 2008, No. 4–1, <http://www.eria.org> (last accessed 1 August 2010).
- List, A., Millimet, D., Fredriksson, G. and McHone, W. (2003) Effects of environmental regulations on manufacturing plant births: evidence from a propensity score matching estimator. *Review of Economics and Statistics*, 85(4): 944–952.

- Lopez, R. (2005) Trade and growth: reconciling the macroeconomic and microeconomic evidence. *Journal of Economic Surveys* 19(4): 623–648.
- Machikita, T. and Ueki, Y. (2010a) Spatial architecture of the production networks in Southeast Asia. ERIA Discussion Paper Series 2010–01, <http://www.eria.org> (last accessed 1 August 2010).
- Machikita, T. and Ueki, Y. (2010b) Search-theoretic approach to securing new suppliers: impacts of geographic proximity for importer and non-importer. ERIA Discussion Paper Series 2010–02, <http://www.eria.org> (last accessed 1 August 2010).
- Machikita, T. and Ueki, Y. (2010c) Innovation in linked and non-linked firms: effects of variety of linkages in East Asia. Forthcoming in *International Journal of Institutions and Economies*.
- Machikita, T. and Ueki, Y. (2010d) The impacts of face-to-face and frequent interactions on innovation: upstream-downstream relations. ERIA Discussion Paper Series 2010–04, <http://www.eria.org> (last accessed 1 August 2010).
- Martins, P. and Yang, Y. (2009) The impact of exporting on firm productivity: a meta-analysis of the learning-by-exporting hypothesis. *Review of World Economics* 145: 431–445.
- Matsuura, T., Motohashi, K. and Hayakawa, K. (2009) How does FDI affect performance at home? An activity-level analysis for Japanese electrical machinery and electronics firms. Keio/Kyoto Global COE Discussion Paper, DP2009–002.
- Mayer, T., Mejean, I. and Nefussi, B. (2007) The location of domestic and foreign production affiliates by French multinational firms. CEPII Working Paper 2007–07.
- McGuckin, R.H. and Nguyen, S.V. (1995) On productivity and plant ownership change: new evidence from the longitudinal research database. *RAND Journal of Economics* 26(2): 257–276.
- Melitz, M. (2003) The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica* 71(6): 1695–1725.
- Murakami, Y. (2005) Are multinational enterprises more productive? A test of the selection hypothesis. *Journal of Asian Economics* 16(2): 327–339.
- Muuls, M. and Pisu, M. (2009) Imports and exports at the level of the firm: evidence from Belgium. *The World Economy* 32(5): 692–734.
- Navaretti, B. and Castellani, D. (2004) Investments abroad and performance at home: evidence from Italian multinationals. CEPR Discussion Paper 4284.
- Navaretti, B., Castellani, D. and Disdier, A-C. (2006) How does investing in cheap labour countries affect performance at home? France and Italy. CEPR Discussion Paper 5765.
- Obashi, A., Hayakawa, K., Matsuura, T. and Motohashi, K. (2009) A two-dimensional analysis of the impact of outward FDI on performance at home: evidence from Japanese manufacturing firms. Discussion papers, Research Institute of Economy, Trade and Industry.
- Olley, S. and Pakes, A. (1996) The dynamics of productivity in the telecommunications equipment industry. *Econometrica* 64(6): 1263–1298.
- Pérez, S., Llopis, A. and Llopis, J. (2004) The determinants of survival of Spanish manufacturing firms. *Review of Industrial Organization* 25(3): 251–273.
- Petkova, N. (2008) Does foreign ownership lead to higher firm productivity? Mimeo, University of Oregon, Department of Finance.
- Piscitello, L. and Rabbiosi, L. (2005) The impact of inward FDI on local companies' labour productivity: evidence from the Italian case. *International Journal of the Economics of Business* 12(1): 35–51.
- Raff, H., Ryan, M. and Stähler, F. (2008) Firm productivity and the foreign-market entry decision. Economics Working Paper 2008–02.
- Rosenbaum, P. and Rubin, D. (1983) The central role of the propensity score in observational studies for causal effects. *Biometrika* 70(1): 41–55.
- Sabuhoro, J.B., Larue, B. and Gervais, Y. (2006) Factors determining the success or failure of Canadian establishments on foreign markets: a survival analysis approach. *The International Trade Journal* 20(1): 33–73.
- Salis, S. (2008) Foreign acquisition and firm productivity: evidence from Slovenia. *The World Economy* 31(8): 1030–1048.
- Serti, F. and Tomasi, C. (2008) Self selection and post-entry effects of exports: evidence from Italian manufacturing firms. *Review of World Economics* 144(4): 660–94.

- Sjoholm, F. (1999) Productivity growth in Indonesia: the role of regional characteristics and direct foreign investment. *Economic Development and Cultural Change* 47(3): 559–584.
- Smeets, R. (2008) Collecting the Pieces of the FDI knowledge spillovers puzzle. *World Bank Research Observer* 23(2): 107–138.
- Syversen, C. (2010) What determines productivity? Forthcoming in *Journal of Economic Literature*.
- Todo, Y. and Miyamoto, K. (2002) Knowledge diffusion from multinational enterprises: the role of domestic and foreign knowledge-enhancing activities. OECD Development Centre Technical Paper No. 196.
- Todo, Y. and Miyamoto, K. (2006) Knowledge spillovers from foreign direct investment and the role of local R&D activities: evidence from Indonesia. *Economic Development and Cultural Change* 55(1): 173–200.
- Tomiura, E. (2005) Foreign outsourcing and firm-level characteristics: evidence from Japanese manufactures. *Journal of the Japanese and International Economies* 19(2): 255–271.
- Tomiura, E. (2007) Foreign outsourcing, exporting, and FDI: a productivity comparison at the firm level. *Journal of International Economics* 72(1): 113–127.
- Van Biesebroeck, J. (2005) Exporting raises productivity in sub-Saharan African manufacturing firms. *Journal of International Economics* 67(2): 373–391.
- Vogel, A. and Wagner, J. (2010) Higher productivity in importing German manufacturing firms: self-selection, learning from importing, or both? *Review of World Economics* 145(4): 641–665.
- Wagner, J. (2002) The causal effect of exports on firm size and labor productivity: first evidence from a matching approach. *Economics Letters* 77(2): 287–292.
- Wagner, J. (2007) Exports and productivity: a survey of the evidence from firm-level data. *The World Economy* 30(1): 60–82.
- Yasar, M. and Rejesus, R.M. (2005) Exporting status and firm performance: evidence from a matched sample. *Economics Letters* 88(3): 397–402.
- Yeaple, S. (2009) Firm heterogeneity and the structure of U.S. multinational activity. *Journal of International Economics* 78(2): 206–215.