Chapter 6

Firm-level Analysis of Globalization: A Survey

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CHAPTER 6

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This paper extensively reviews empirical studies that analyze the various impacts of the globalization phenomenon on corporate activities by using micro data. First, we set up a flow chart describing how globalization leads to national productivity enhancement. Secondly, we summarize the hypotheses and the methods explored in 13 lines of literature on globalization, which this flow chart maps. Thirdly, we discuss further possible avenues for micro data analysis. Finally, we provide some suggestions on statistics-related policies.

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1. Introduction

Micro data analysis of corporate firms or establishments has totally redefined the scope of empirical policy studies since the latter half of the 1980s. It has been proved to be one of the most effective ways of investigating microeconomic causality and understanding macroeconomic consequences.

Micro data relating to productive sectors have been collected by the central government of each country. In particular, a census of manufacturing is the most important, well-developed primary set of statistics used in quantifying economic activities in the form of secondary statistics such as national accounts and input-output tables. To pinpoint the nature of economic activities, a manufacturing census typically collects data at the establishment level, rather than at the firm level. In addition, some countries have developed firm-level statistics in order to capture the sophisticated nature of corporate structures. Particularly at higher stages of development, some firms become big and operate multiple establishments as well as affiliates, both domestic and foreign, to conduct various economic activities at the same time. Internal corporate structure, together with various inter-firm relationships, becomes an important feature of firms, particularly in the globalised era.

Some studies construct their own micro data relating to establishments or firms. However, typical papers reviewed in this paper employ ready-made government data sets, though extensive cleaning-up is usually required. Since such micro data contain confidential information, their usage used often to be restricted by laws on the use of statistics. However, the accumulation of invaluable research papers using micro data has encouraged national statistical authorities to let researchers have access to micro data subject to certain rules. As a result, the number of countries in which micro data are accessible for researchers has gradually increased.

The usage of micro data has substantially strengthened the basis of empirical research. Compared with traditional aggregated data at the macro or sectoral level, micro data at the establishment or firm level have a number of strong points. In particular, with micro data, econometric controls for industry characteristics are much easier. 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 so as to analyze the dynamic heterogeneous transformation of corporate activities. In other words, micro data allow us to provide a versatile empirical basis for rigorous econometric exercises investigating the heterogeneity of firms. Although a micro or panel data set is typically huge, the recent development of personal computers has made such analyses much easier and quicker than before. The advancement of econometrics on the usage of micro and panel/longitudinal data has also worked as a strong backbone of the development of the vast academic literature.

In the context of international trade literature, empirical analysis of globalizing corporate activities certainly requires the viewpoint of individual corporate firms. Globalization provides both enhanced competitive pressure and new opportunities in business for corporate firms. How they adapt to globalization depends heavily on the heterogeneous characteristics of individual firms. For example, the conclusion of a bilateral free trade agreement yields different impacts across firms. Some firms may start exporting or continue to export while others may stay in the domestic market. The use of firm-level data enables us to directly examine the relationship between firms' characteristics and their export status, and to investigate what characteristics would be the key in globalizing corporate activities.

The formal introduction of firm heterogeneity in the theoretical literature of international trade is very recent. International trade theory has had a strong tradition of keeping a general equilibrium framework and has experienced a long-term struggle in incorporating the globalizing of corporate activities in a rigorous theoretical model. Economic literature has lagged behind international business literature in dealing with multinational enterprises or foreign direct investment; in international business literature, individual corporate strategies are analyzed typically without any consideration of economic equilibria. A major breakthrough came with Melitz (2003) in which the co-existence of heterogeneous firms is admitted without imposing rigorous market clearing conditions. By this important change in mindset, a more rigorous theoretical underpinning of economic logic became possible.

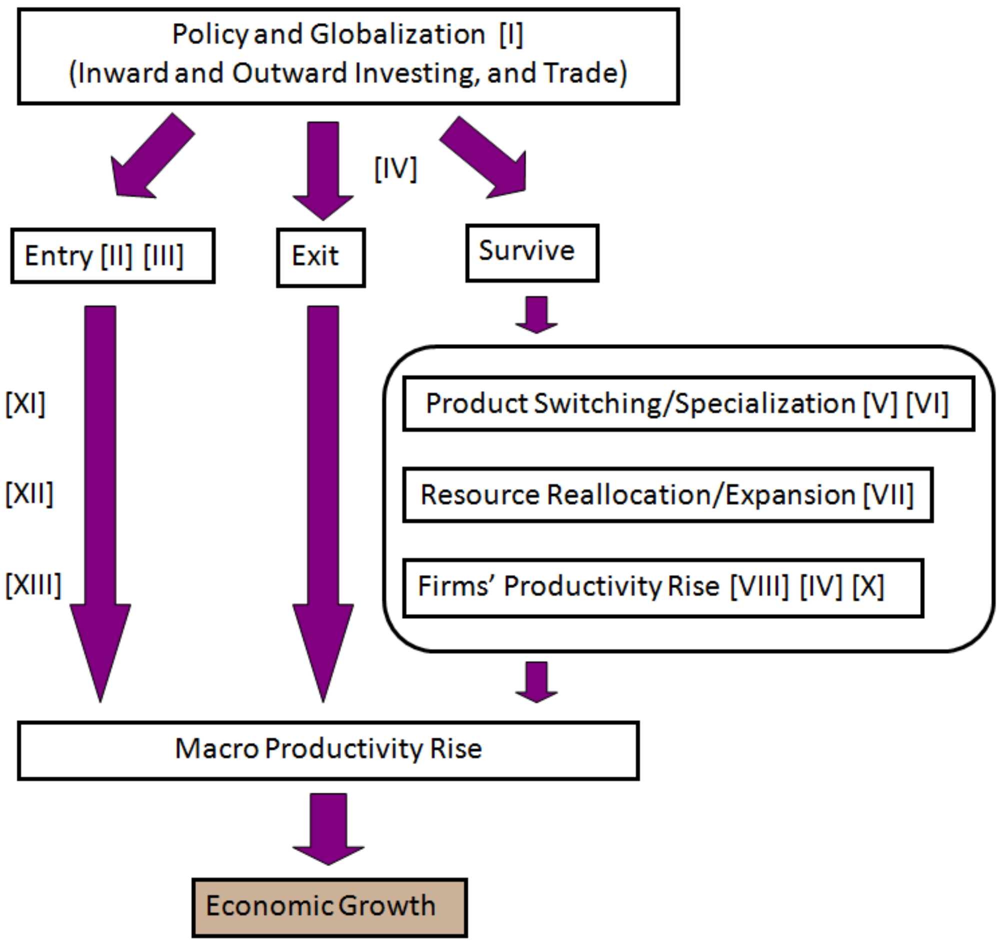
The aim of this paper is to review empirical studies that analyze the impact of globalization on corporative firms by using micro data. It is worthwhile conducting a serious survey of the literature in an organized manner now, because micro data analysis on the impact of globalization has been substantially accumulated. Indeed, there already exist some review papers in *each* literature on micro data analysis. In contrast to these existing review papers, this paper reviews 13 literatures in an organized manner. In micro data analysis, we can find similar methods and hypotheses throughout the literature. This becomes clearer if they are compared side-by-side. Since such a comprehensive survey highlights shortfalls or missing links in the micro data analysis, our paper should contribute greatly to researchers seeking future work/directions. In addition, such a review paper is convenient for researchers to compare empirical results based on a new dataset with previous results in other countries. It seems particularly useful for East Asian economists because empirical research along this line in East Asia is relatively lagging compared with North America and Europe, and statistical data, not fully explored, are still abundant in East Asia. Such a collection of micro data analysis would also be useful for policy makers, who need to know what sort of policy guidance they can obtain from giving researchers access to micro data.

The rest of this paper is organized as follows: The next section reviews various literatures. In Section 3, we discuss possible avenues for micro-data analyses and issues on statistics-related policies. Section 4 concludes the paper.

2. Reviews

Our survey framework is summarized in the form of a flow chart describing how the advancement of globalization or changes in policy measures related to globalization lead to national productivity enhancement (Figure 1). There are multiple aspects of globalization influencing market functioning and various sorts of policy measures accelerating globalization of economic activities. As a consequence of further globalization, some existing firms will be forced to shut down, and some new firms will enter the domestic or international market. On the other hand, the surviving firms will change the variety of products they produce and/or expand their production. Furthermore, such firms will change the primary productive factors they intensively use and/or expand the demand of the productive factors. These changes and expansion should raise the productivity of the surviving firms. In addition to the rise of such firms' productivity, due to the closure of firms with low productivity and the new entrants, the national productivity should rise, which leads to significant economic growth.

Figure 1. The Flow Chart on Globalization and Economic Growth



Our framework consists of 13 literatures. The first four literatures examine how different the responses to the measures are across firms. The first literature is about the selection of exporters and investors [I]. For example, it examines what kind of firms invests abroad. The second and third literatures investigate the kind of countries that multinational enterprises (MNEs) invest in [II] and the mode(s) of entry they use, respectively. These literatures are well-known location choice and entry mode choice analyses. The fourth literature examines the characteristics of firms that survive and exit from the domestic and international markets [IV].

The next six literatures discuss the strategies employed by the surviving firms. The fifth and sixth literatures analyze the products that surviving firms produce. The fifth one looks into the decisions made on the number of products and investigates what kind of firms produces a larger number of varieties [V]. The sixth one examines the changes in the product line as the surviving firms change their production [VI]. The seventh literature is similar to the sixth one and investigates the changes in the factors of production that surviving firms undergo as they change their inputs [VII]. The eighth literature tackles the impacts of outward FDI on MNEs' productivity at home [VIII]. The ninth literature analyzes the impacts of inward FDI on domestic firms' productivity [IX]. It has two topics: direct impacts (cross-border M&A) and indirect impacts (spillover). The tenth literature examines the impacts of firms' geographical concentration on corporate performance [X].

The last three literatures analyze the relationship with macro economy: national production [XI], national demand on productive factors [XII], and national productivity [XIII]. For example, the last literature examines the channel that contributes the most to the rise in the national productivity: the active entry and exit of firms and the efficiency gain of the surviving firms.

In the following, we provide extensive surveys on these 13 literatures.

2.1. Selection in Investing and Exporting

Since the last decade, numerous theoretical papers on the relationship between firms' overseas activities and their productivity have been written. The main theme of this line of research is "firm heterogeneity". The pioneering study of Melitz (2003) theoretically shows that exporting firms have relatively high productivity despite paying sunk cost for export. Since firms with high productivity can obtain high operating profit, they obtain non-negative gross profit even if they incur sunk cost for export. The Melitz model has also been applied in the context of firms' outward investing by Helpman, Melitz, and Yeaple (2004), and the finding is that investing firms have relatively high productivity. These selections based on the level of productivity are called "selection effect" in exporting and investing activities.

Recently, these theoretical studies have become complicated as there are multiple choices in the models the firms would employ. For example, the model of Helpman, et al. (2004) has four options: exit, serving only the domestic market, serving not only the domestic market but also the international market through exporting, and serving not only the domestic market but also the international market through investing. Recent studies have proved to be more flexible as they introduce more options. Antras, Grossman, and Helpman examine what kind of partners the firms supply their products to[1]. There are two dimensions in partner firms: domestic/overseas and intra-firm group/inter-firm group. For example, Antras and Helpman (2004) show that the firms with the highest productivity supply their products to the overseas intra-firm group partners. On the other hand, Grossman, Helpman, and Szeidl (2006) extend 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 process of goods (finished goods and intermediate goods). According to not only the firms' productivity

[1] See Antras (2003, 2005), Antras and Helpman (2004), Grossman and Helpman (2002, 2003, 2004, 2005), Grossman, Helpman, and Szeidl (2005), Helpman (2006), and Nunn (2007).

but also the trade costs of each good, there are many cases in the firms' production location patterns.

These theoretical propositions have been tested by many empirical studies. The hypothesis by Melitz (2003) has been tested in many countries. In those studies, the following equation is estimated:

$$\Pr(\text{Export}_{it} = 1) = \beta_0 + \beta_1 \text{ Productivity}_{it} + \boldsymbol{\gamma} \mathbf{X}_{it} + \varepsilon_{it}.$$

Export_{it} is an indicator variable taking unity if firm i is engaged in exporting activity at time t and zero otherwise. Productivity_{it} denotes firm i's productivity at time t. $\mathbf{X}$ is a vector of the several control variables. In this equation, β_1 is expected to be positively estimated by probit/logit estimation method. The representative papers are as follows: Bernard and Jensen (1999) for the US; Clerides, Lach, and Tybout (1998) for Colombia, Mexico, and Morocco; Bernard and Wagner (2001) for Germany; Delgado, Fariñas, and Ruano (2002) for Spain; Greenaway and Kneller (2004) for the United Kingdom; Hallward-Driemeier, Iarossi, and Sokoloff (2002) for East Asian countries (Indonesia, Korea, Malaysia, the Philippines, and Thailand); Aw and Hwang (1995), Liu, Tsou, and Hammitt (1999), Aw, Chung, and Roberts (2000), and Aw, Roberts, and Winston (2007) for Taiwan; Aw, et al. (2000) and Hahn (2004) for Korea; Baldwin and Gu (2003) for Canada; and Kimura and Kiyota (2006) and Murakami (2005) for Japan. Most of these studies find evidence that more productive producers self-select into the export market.[2]

The hypothesis by Helpman, et al. (2004), i.e., the selection of investing, has also been empirically tested by several papers such as Murakami (2005) and Kimura and

[2] Wagner (2007) provides a synopsis of findings from 54 empirical studies covering 34 countries on the firm-level relationship between exports and productivity. Most of the findings for pre-entry differences surveyed present evidence in favor of the self-selection hypothesis.

Kiyota (2006). As well as the hypothesis by Melitz (2003), for example, the following equation is estimated:

$$\Pr(\mathrm{FDI}_{it} = 1) = \beta_0 + \beta_1 \text{ Productivity}_{it} + \boldsymbol{\gamma}\ \mathbf{X}_{it} + \varepsilon_{it}.$$

FDI_{it} is an indicator variable taking unity if firm i is engaged in FDI at time t and zero otherwise. As a result, the previous studies obtain the results supporting the selection of investing. In addition, although Helpman, et al. (2004) consider outward FDI, there are numerous papers analyzing inward FDI showing that foreign-owned firms are more productive than domestic firms. These papers include the following: Doms and Jensen (1998) for the US; Girma, Thompson, and Wright (2002) for the UK; Hallward-Driemeier et al. (2002) for East Asian countries (Indonesia, Korea, Malaysia, the Philippines, and Thailand); and Fukao and Murakami (2005), Fukao, Ito, and Kwon (2005), and Kimura and Kiyota (2007) for Japan.

Recently, more complicated theoretical hypotheses have also come to be tested by empirical analysts. The theoretical works of Antras, Helpman, and Grossman are 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 are more productive than those trading with overseas inter-firm group firms.[3] However, Murakami (2005) finds that the latter type of firms is more productive. Furthermore, the theoretical prediction by Grossman, et al. (2006) is also partly supported by Aw and Lee (2008).

[3] Tomiura (2007) is the extended version of Tomiura (2005). Using Japanese firm-level data, Tomiura (2005) distinguishes the foreign outsourcing from domestic outsourcing. His finding is that only a few firms (less than three percent) outsource their production to abroad and that productive firms or firms with labor-intensive products outsource more.

2.2. To Which Countries/Regions

The literature in this subsection investigates which countries or regions the MNEs invest in. This is a well-known location choice analysis. Employing the usual new economic geography model (i.e., CES utility function, Dixit=Stiglitz monopolistic competition, and ice-berg trade costs), the literature derives the profit function, which is summarized as:

$$\ln \Pi_r = V_r + \varepsilon_r \qquad \text{and} \qquad V_r = V(\mathbf{X}_r).$$

where $\mathbf{X}$ is a vector of regional characteristics, and ε_r denotes unobservable regional characteristics. McFadden (1974) demonstrates that when ε_r is independent and follows an identical type I extreme value distribution across regions, the probability that the firm locates its affiliate in region r is given as

$$P_r = \frac{\exp(V_r)}{\sum_i \exp(V_i)},$$

The coefficients are estimated using maximum likelihood procedures. The recent references are as follows: Head, Rise, and Swenson (1999) for Japanese MNEs in the US; 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 in the world; Mayer, Mejean, and Nefussi (2007) for French MNEs in the world; Crozet, Mayer, and Mucchielli (2004) for MNEs in France; and Basile, Castellani, and Zanfei (2008) for MNEs in Europe.

There are three topics in this literature. The first introduces various location elements as independent variables. The above-mentioned model usually yields the profit function, which is a function of market size, productive factor prices, price of intermediate goods, and trade costs. As a proxy for the price of intermediate goods, the measure of agglomeration is often used, particularly the number of manufacturing firms. Some studies employ more disaggregated numbers of manufacturing firms, for example, the number of manufacturing firms with the same nationality as firms choosing location (e.g., Head, et al., 1999; Crozet, et al., 2004) or the number of firms belonging to the same firm-group (e.g., Belderbos and Carree, 2002). As part of trade costs, some investment climate measures are examined: free trade zones in the US (Head, et al., 1999), special economic zones and opening coastal cities in China (Belderbos and Carree, 2002), and Objective 1 structural funds and cohesion funds in Europe (Basile et al., 2008).

Second, the validity of proxy variables for location elements is further examined. Head and Mayer (2004) examine the validity of market potential on location choice. In this literature, two measures are proposed: the Harris market potential index (Harris, 1954) and the Krugman-type index used in Redding and Venables (2004). The Harris-type index is simply the sum of distance-weighted real GDP as follows:

$$MP_r^{Hariss} = \sum_{i=1}^{R} \frac{GDP_i}{dist_{i,r}},$$

where $dist_{i,r}$ denotes a great distance between regions i and r. For the intra-regional distance, following the border effect literature (see, for example, Head and Mayer, 2000), the literature uses two-thirds times the radius of surface area in the region. Head and Mayer (2004) employ the Krugman-type market potential index, which is directly derived from the new economic geography model. The Krugman-type measure takes into account the extent of competition (i.e., price index) and is constructed using estimators of importing country dummy variables in the well-known gravity equation, as in Redding and Venables (2004). They find that "*theory does not pay*", in the sense that the Harris market potential outperforms the Krugman's market potential in both the magnitude of its coefficient and the fit of the model to be estimated.

The third topic is to explore the substitution of location by examining inclusive values in the nested-logit model. For instance, using firm-level data on French investments both in France and abroad over the 1992-2002 period, Mayer, et al. (2007) investigate the determinants of location choice and assess empirically whether the domestic economy is losing attractiveness over the recent period or not. The estimated coefficient for inclusive value is strongly significant and near unity, indicating that the national economy is not different from the rest of the world in terms of substitution patterns. Similarly, Disdier and Mayer (2004) investigate whether French multinational firms consider Western Europe and Eastern Europe as two distinct groups of potential host countries by examining the coefficient for the inclusive value in nested-logit estimation. They confirm the relevance of an East-West structure in the country location decision and show that this relevance decreases.

2.3. Entry Mode Choice

The third literature examines by probit or logit analysis which entry mode the MNE chooses. In producing abroad, MNEs need to choose not only host countries but also their entry modes. There are mainly two types of entry modes: greenfield and merger with or acquisition of an existing firm in the foreign country (M&A). The former sets up a new production facility, while the latter acquires an existing firm. The greenfield investment is further decomposed according to the MNEs' share of ownership. While the wholly owned subsidiaries are ones that the MNE has their whole ownership (WOE), joint ventures share ownership with domestic firms (JV). The theoretical framework employed in this literature is often based on the "transaction cost theory" (e.g., Asiedu and Esfahani, 2001) and more recently on the "incomplete contract theory" (Raff, Ryan, and Stahler, 2008a). In this literature, despite a large number of empirical studies in management or commercial science (e.g., Gomes-Casseres, 1990; Hennart and Larimo, 1998; Chang and Rosenzweig, 2001), only a few can be found in economics. Recently, however, studies in this literature have been increasing also in economics (Tse, Pan, and Au, 1997; Makino and Neupert, 2000; Asiedu and Esfahani, 2001; Girma, 2002; Wei, Liu, and Liu, 2005; Raff, Ryan, and Stahler, 2008b; Chun, 2008). At present, this literature seems to suggest two directions.

The first one is to take a number of entry modes into consideration. Most of the studies in this literature examine the binary choice of entry modes: WOE versus JV (Hennart and Larimo, 1998; Makino and Neupert, 2000; Asiedu and Esfahani, 2001) and Greenfield versus M&A (Chang and Rosenzweig, 2001; Girma, 2002). More recently, by employing nested-logit or multinominal logit model, the multinominal choice of entry modes comes to be explored. Wei, et al. (2005) establish a multinominal logit model in which foreign-invested firms are allowed to choose among four entry modes of FDI in China: WOE vs. equity JV vs. contractual JV vs. joint stock companies. Employing a three-stage nested-logit model, Raff et al. (2008b) examine which strategies a firm will use to enter a foreign market: *Will it export goods produced at home (exporter) or will it produce goods in the foreign country* (FDI)*? If it chooses to produce abroad, will it set up a new production facility* (Greenfield) *or will it acquire an existing firm* (M&A)*? If it establishes a new facility, how will it own it: will it choose whole ownership* (WOE) *or create a joint venture where it shares ownership with a* *local firm* (JV)*?*

The other one is to explore the many elements affecting entry mode choice. Three kinds of characteristics are introduced as independent variables: host country/regional characteristics, industrial characteristics, and firm (MNE) characteristics. Examples of country characteristics include host country's experience in attracting FDI, country risk, infrastructure, FDI policy, technological capabilities of domestic firms, and cultural ties with investing countries. Simply speaking, the advantage of *information or access* that domestic firms have plays a crucial role in choosing JV rather than WOE. For example, corruption would motivate joint ventures because local partners can more effectively provide access to "special" treatment. Industry characteristics such as asset intensity, technology intensity, resource intensity, and the extent of input-output relationships with local firms may work in similar ways. Lastly, firm characteristics often taken into consideration are amount of investment and international experience. More recently, the role of MNEs' productivity in entry mode choice is examined (Raff, et al., 2008a, b; Cieslik and Ryan, 2008). In particular, Raff, et al. (2008b) find the ranking of firms' TFP to be as follows: domestic firms, exporters, cross-border M&A MNEs, JV MNEs, and MNEs with wholly-owned subsidiaries.

2.4. Selection in Dead or Surviving Firms

The advancement of globalization and policy measures on globalization have great impacts on firms. The most significant impact would be the closure of some firms. In this literature, it has been empirically investigated that the less productive plants under high pressure from globalization are more likely to shut down. Broadly speaking, we can interpret that this literature is a test of Melitz (2003). For example, trade cost reduction leads to an increase in imports of more foreign-made varieties. The increase in varieties consumable in the domestic market forces firms to decrease production volume per firm and thus the operating profit in each firm. As a result, the threshold of productivity payable for sunk cost rises, and thus domestic firms with lower productivity will be forced to shut down.

To test this hypothesis, the following equation is estimated in the literature:

$$\Pr(\text{Death}_{it} = 1) = \beta_0 + \beta_1 \text{ Globalization}_{it} + \beta_2 \text{ Productivity}_{it}{*} \text{ Globalization}_{it} + \boldsymbol{\gamma}\, \mathbf{X}_{it} + \varepsilon_{it},$$

where Globalization$_{it}$ is the measure indicating how high the pressure from globalization a plant i is under time t. By examining the estimate of β_1, it investigates whether plants under high pressure from globalization are more likely to shut down or not. Furthermore, the negative estimate of β_2 implies that, among such plants, those with lower productivity are more likely to shut down.

Previous studies which investigate such hypothesis include Bernard and Jensen (2007), Bernard, Jensen, and Schott (2006a, b), and Greenaway, Gullstrand, and Kneller (2008). Bernard, et al. (2006a) employ the annual average change in industry trade costs in the preceding five years as the globalization measure. They find its coefficient to be negative, which indicates that as trade costs fall, plant death is more likely to happen. Furthermore, they introduce the globalization measure multiplied by plant's productivity and find its coefficient to be negative as implied by theory. On the other hand, Bernard, et al. (2006b) employ the import penetration from low-wage countries (and others). They find that the probability of plant death increases with an industry's exposure to imports from low-wage countries and that plant death is more likely to occur among less productive plants. Greenaway, et al. (2008) also examine the impact of import penetration in addition to other factors such as the extent of comparative advantage.

2.5. Selection in the Number of Varieties

This literature examines whether the more productive firms introduce the larger number of products or not. The logic underlying this hypothesis is basically the same as the Melitz model. Previously, Bernard, Redding, and Schott (2006c) present a theoretical model on the relationship between firms' productivity and the number of varieties. They extend the Melitz model to a general equilibrium model of multi-product firms. In their model, firm productivity in a given product is modeled as a combination of firm-level "ability" and firm-product-level "expertise", both of which are stochastic and unknown prior to the firm's payment of a sunk cost of entry. Higher firm-level ability raises a firm's productivity across all products, lowering the zero-profit cutoff for expertise which the firm finds profitable to enter a product market, thereby expanding the range of products manufactured by the firm.

There are a few previous studies in this literature. First, employing the U.S. data, Bernard, Redding, and Schott (2006d) regress the following equations:

$$\mathrm{Multi}_i = \beta_0 + \beta_1 \, \mathrm{Performance}_i + \boldsymbol{\gamma}\mathbf{X}_i + \varepsilon_i,$$

$$\Pr(\mathrm{Add}_i = 1) = \delta_0 + \delta_1 \, \mathrm{Performance}_i + \boldsymbol{\eta}\mathbf{X}_i + \varepsilon_i.$$

Multi_i is an indicator variable taking unity if firm i produces more than one variety and zero otherwise. Add_i is also an indicator variable taking unity if firm i adds varieties during a period and zero otherwise. Performance represents several firm characteristics: output, employment, probability of export, labor productivity, and TFP. Implied by the theoretical model, both β_1 and δ_1 are estimated to be positively significant.[4] Second, using firm-level data for the Chinese manufacturing sector during 1998-2000, Brambilla (2006) 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 percent 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. Last, Teshima (2008) is suggestive to this literature. Employing Mexican plant-level dataset, he distinguishes process innovation from product innovation and explores impacts of tariff changes on process and product R&D expenditures. As a result, he found that tariff reduction induces to increase process R&D rather than product R&D. This result indicates that trade liberalization encourages firms to improve their cost efficiency rather than to develop new varieties.

2.6. From What Products to What Products

This literature examines the changes in the product line firms undertake due to globalization. Two hypotheses are tested in the literature.

The first hypothesis is whether more product switching in plants under high pressure from globalization can be observed or not. This literature extends conceptually the model in the third literature: selection in dead or surviving firms. That is, it examines differences in response to the globalization among surviving firms:

[4] Although they find a positively significant coefficient for TFP, they point out that measuring the TFP of multiple-product firms is problematic if separate data on output, prices, and inputs at the firm-product level are unavailable.

switching products they produce or not switching. Its test is performed by regressing the following equation:

$$\Pr(\text{Switch}_{it} = 1) = \beta_0 + \beta_1 \text{ Globalization}_{it}$$
$$+ \beta_2 \text{ Productivity}_{it}\text{* Globalization}_{it} + \boldsymbol{\gamma}\, \mathbf{X}_{it} + \varepsilon_{it},$$

where Switch_{it} is an indicator variable taking unity if plant *i* changes its main products at time *t* and zero otherwise. As in the third literature, it assumes that plants under high pressure from globalization are more likely to change their main products and furthermore, among such plants, those with higher productivity are more likely to change their main products. The references in this hypothesis are Bernard, et al. (2006a, b). As in the fourth literature, trade cost reduction and import penetration from low-wage countries are examined as globalization measures and results confirm the aforementioned arguments.

The second hypothesis is that the vertical FDI (VFDI) forces MNEs to specialize in the products they have comparative advantage in producing and as a result, this increases their home production. There are mainly two types of FDI: horizontal FDI (HFDI) and VFDI. While the HFDI is a strategy to avoid broadly defined trade costs by setting up plants within the targeting market/country rather than by exporting from the home country, the VFDI is the one that exploits low-price production factors of the host country. From a theoretical point of view, the VFDI decreases production of the products MNEs do not have comparative advantage but increases production of the products they have comparative advantage. As a result, the VFDI MNEs may increase their production at home.

To empirically test this hypothesis, the literature directly examines the impacts of the VFDI on production at home. Specifically the following equation is regressed:

$$\text{Production}_{it} = \beta_0 + \beta_1\ \text{VFDI}_{it} + \boldsymbol{\gamma}\mathbf{X}_i + \varepsilon_i,$$

where Production_{it} denotes total production values/sales of firm i at home at time t. Variable VFDI is an indicator variable taking unity if firm i conducts the VFDI at time t and zero otherwise. There are several papers analyzing this hypothesis: Hijzen, Inui, and Todo (2007) for Japanese MNEs; Navaretti and Castellani (2004) and Navaretti, Castellani, and Disdier (2006) for Italian MNEs; and Navaretti and Castellani (2004) for French MNEs. Most of the studies simply employ an FDI variable, which takes unity if a firm invests abroad and zero otherwise, rather than the VFDI variable, and find significantly positive results. Only Navaretti, et al. (2006) explicitly distinguish the FDI type. Navaretti, et al. (2006) classify the FDI in developing countries and that in developed countries as VFDI and HFDI, respectively. As a result, they found that MNEs conducting the VFDI increase their production at home.

2.7. From What Resources to What Resources

Similar to the previous literature, this literature investigates the changes in the resources firms employ as they change their inputs. As argued above, the VFDI firms increase the production of the goods they have comparative advantage in producing. Thus, those MNEs increase relatively the demand for resources they intensively use in producing such goods. Since such resources are usually skilled labor or knowledge capital, skill intensity at home should rise in the MNEs. In the HFDI, on the other hand, MNEs might obtain superior knowledge or technology in the host country and as a result, raise the skill intensity at home. In short, this literature examines whether the MNEs investing abroad raise their skill intensity in inputs at home or not.

There are numerous papers in the literature. First, some papers simply analyze whether FDI increases employment at home or not without taking into consideration the quality/skill of employment. The methodology in those papers is qualitatively the same as in the previously mentioned analysis on the impacts of FDI on production at home:

$$\text{Employment}_{it} = \beta_0 + \beta_1 \text{ FDI}_{it} + \boldsymbol{\gamma}\mathbf{X}_i + \varepsilon_i,$$

where Employment_{it} denotes total employment of firm i at home at time t. A variable FDI is an indicator variable taking unity if firm i invests abroad at time t and zero otherwise. References include the following: Hijzen, et al. (2007) for Japanese MNEs; Castellani, Mariotti, and Piscitello (2008), Navaretti and Castellani (2004), and Navaretti et al. (2006) for Italian MNEs; and Navaretti and Castellani (2004) and Hijzen, Jean, and Mayer (2006) for French MNEs. However, most of the studies have failed to obtain significantly positive results.

Failure to get positive results seems to be natural because these papers do not distinguish between skilled and unskilled labor. If skilled labor increases and unskilled labor decreases at home, total employment may remain unchanged. Therefore, the second approach is to directly examine whether the ratio of skilled labor to unskilled labor rises or not. The literature estimates the following equation:

$$\text{Skill-intesity}_{it} = \beta_0 + \beta_1 \text{ FDI}_{it} + \boldsymbol{\gamma}\mathbf{X}_i + \varepsilon_i,$$

where skill intensity is a share of managers and clerks or a share of non-production workers in total employments at home. This examination would be an appropriate approach for its test. References are Castellani, et al. (2008) for the Italian MNEs and Hijzen et al. (2006) for the French MNEs. Unfortunately, most of the results in these papers are insignificant.[5]

2.8. Impacts of Exporting and Outward FDI

Contrary to the first literature (see Section 2.1), i.e., selection of investing and exporting, this literature examines whether those overseas activities give a positive impact on productivity at home or not. Such a positive effect is called "learning effect". Exporting firms may obtain new and superior knowledge. While the 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. As a result, those firms may succeed in raising their productivity at home. To examine the learning effect of exporting and investing, the following equations are estimated:

$$\text{Productivity}_{it} = \beta_0 + \beta_1 \text{ Export}_{it} + \boldsymbol{\gamma}\mathbf{X}_{it} + \varepsilon_{it},$$
$$\text{Productivity}_{it} = \eta_0 + \eta_1 \text{ FDI}_{it} + \boldsymbol{\rho}\mathbf{X}_{it} + \varepsilon_{it},$$

where Export_{it} and FDI_{it} are indicator variables taking unity if firm i starts to export and to invest at time t, respectively. In this literature, there is a severe endogeneity issue: exporters or investors by their nature have higher productivity than non-exporters or non-investors (selection effect). To tackle this issue, previous studies use instruments or the matching method. In particular, the propensity score matching method is often employed because there are enough matching pairs in using firm/establishment-level data.

The use of matching techniques to distinguish post-exporting effect from selection

5 Verhoogen (2008) investigates wage dispersion between skilled and unskilled during export boom in Mexico. Focusing on the period of the late-1994 peso crisis in Mexico, he finds that the more productive plants significantly increased the exporting, skilled wages, unskilled wages, and wage dispersion between skilled and unskilled.

effect, pioneered by Wagner (2002) for Germany and Girma, Greenaway and Kneller (2004) for the UK, has stimulated a number of empirical studies testing such a learning-by-exporting effect. 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 of the learning-by-exporting hypothesis is detected in some previous studies only.[6] However, a significant positive effect of 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. For example, De Loecker (2007) examines the learning from exporting in Slovenian manufacturing firms in the period 1994-2000. Interestingly, the author finds that the productivity gains are higher for firms exporting to high-income regions.

On the other hand, empirical studies do not necessarily succeed in detecting a positive causal effect of investing on firms' productivity.[7] Papers analyzing 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

[6] The accumulated empirical findings of the relationship between exports and productivity are summarized by Wagner (2007) as follows: there is evidence in favor of self-selection of more productive firms into export markets, but nearly no evidence in favor of the learning-by-exporting hypothesis. 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 and find evidence in line with the big picture of the literature clarified by Wagner.

[7] Hijzen, Inui, and Todo (2009) investigate the impacts of international outsourcing on corporate performance and find its significantly positive impacts.

qualitative differences between the impacts of the HFDI and those of the VFDI. From a theoretical point of view, the resulting impact of the HFDI on productivity at home is ambiguous. Its positive impact comes from excellent knowledge or technology of producing products in the host country enabling investing firms to produce the products at home more efficiently. The resulting impact of the 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, the impact of the VFDI should be positive as long as such an impact is being examined on only the domestically remaining production process. The VFDI is expected to force firms at home to relocate their resources and to achieve improvements in their productivity. 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) classify the FDI in developing countries and that in developed countries as VFDI and HFDI, respectively. In Hijzen, et al. (2006), the VFDI is defined as investments in developing countries by firms in comparative disadvantage industries while the HFDI is defined as investments in developed countries by firms in comparative advantage industries. Contrary to these 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.

2.9. Impacts of Inward FDI

This section reviews the studies that analyze the impacts of inward FDI on domestic firms' performance. Impacts are either direct or indirect. Acquisition by foreign-owned firms results in the direct transfer of these firms' superior knowledge to the acquired domestic firms, ending up with a rise of performance of the domestic firms after the acquisition. Meanwhile, domestic firms may benefit from the presence of foreign firms due to some positive externalities accruing from FDI and the presence of multinational firms. In this section, we discuss the studies analyzing these two impacts separately.

2.9.1. Cross-border M&A

This subsection examines the impacts of cross-border M&A on the performance of target domestic firms. On the one hand, as introduced in the first literature, foreign-owned firms are more productive than domestic firms. On the other hand, the target domestic firms possess a locational advantage, years of experience in the local market, and an ability to navigate the local institutional environment. As a result, when integrated with the know-how of foreign firms, the local advantages of the target domestic firm could translate to enhanced productivity (Petkova, 2008). Thus, the impacts of cross-border M&A are expected to be positive.

To empirically explore such impacts through propensity score matching, the domestic firms' productivity is examined before and after the cross-border M&A. The references include Arnold and Javorcik (2005) for Indonesia, Girma (2005b) for the UK, Bertrand and Zitouna (2008) for France, Fukao, Ito, Kwon, and Takizawa (2006) for Japan, Petkova (2008) for Indonesia, and Chen (2008) for the US. These studies consistently 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 with cross-border M&A.

This literature suggests two directions. One is to explore which MNEs give larger positive impacts. Chen (2008) finds in the US that the country of origin plays an important role: the impacts of acquisition by developed countries on profits are larger than those by developing countries. The other is to examine which domestic firms receive larger positive impacts. The key role of absorptive capacity of domestic firms is found in Girma (2005b). The rate of productivity change following a foreign takeover is higher than the pre-acquisition productivity level of the acquired firm. Furthermore, beyond some critical level of initial productivity, the rate of technology transfer due to 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.[8]

2.9.2. Spillover

This subsection investigates whether the presence of inward FDI raises domestic firms' productivity or not. Such positive impacts are called "spillover effects". Conceptually, there are two kinds of spillover effects: intra-industry and inter-industry. Four paths of spillover effect are suggested in the literature: imitation, skill acquisition and proliferation, competition, and exports. Imitation is the path to raise productivity by imitating MNEs' superior products and technology. Skill acquisition and proliferation is the path whereby the MNE's know-how and technology are directly transferred to domestic firms, say, by the shift of labor from MNEs to domestic firms.

[8] Branstetter, Fisman, and Foley (2006) examine the relationship between intellectual property rights (hereafter IPRs) and international technology transfer. They investigate the impacts of IPRs on technology transfer from U.S. multinational enterprises to their affiliate firms in mostly medium developing 16 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 to understand the cause and consequences of several pathways (imports, learning by exporting, and FDI) of cross-border technology transfer.

Competition is the path whereby the MNEs put pressure on domestic firms to use existing technology more efficiently. Exports refer to the path to raise productivity by learning information from MNEs on penetrating the export market and starting export activities (see learning effects of exports in Section 2.8). Through these paths, 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. A simple way to test the spillover effect is to regress the following equation:

$$\text{Productivity}_i = \beta_0 + \beta_1 \text{ MNEs}_i + \boldsymbol{\gamma}\mathbf{X}_i + \varepsilon_i,$$

where MNEs represents the mass of MNEs in the industry to which a domestic firm i belongs. The significantly positive estimate of β_1 indicates the existence of spillover effect. Although Chuan and Lin (1999) obtain significantly positive impacts in Taiwan, Haddad and Harrison (1993) for Morocco and Kokko, Tansini, and Zejan (1996) for Uruguay do not. Furthermore, Aitken and Harrison (1999) obtain significantly negative results. Table 2 in Gorg and Greenaway (2004)[9] summarizes the results of many previous studies on spillover effect and shows that most of these studies do not obtain robust positive impacts.

One reason for such unexpected results pertains to another aspect of the competition path. The fiercer competition due to the massive entry of MNEs decreases production per firm and thus economies of scale are violated (Aitken and Harrison, 1999). This violation 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.

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9 Crespo and Fontoura (2007) are another important survey paper in this literature.

Other reasons are due to the heterogeneity of the spillover effect. Both MNEs and domestic firms are heterogeneous in several points. Therefore, all types of MNEs do not necessarily become sources of spillover effect, and all types of domestic firms do not necessarily obtain spillover effect. The present literature on spillover effect tries to clarify what kinds of heterogeneity in MNEs or domestic firms are crucial.

Studies analyzing the heterogeneity of MNEs in offering the spillover effect are as follows. First, Todo and Miyamoto (2002, 2006) show that, in Indonesia, while the MNEs conducting human resource development on site give positive influence on domestic firms' productivity, the MNEs that are not conducting such development 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 Indian domestic firms than US FDI. One possible reason of this result is that Japanese technology is the more widely used one, and thus it is easier to be imitated than the US technology. Third, Girma (2005a) and Girma, Gorg, and Pisu (2008) have studied the type of FDI. For instance, Girma, et al. (2008) classify FDI into export-oriented and market-oriented, and show that only the former type has positive impacts on domestic firms' productivity. The negative aspect of competition path is also interpreted as small in the export-oriented type of FDI but large in the market-oriented type.

The other is the heterogeneity of domestic firms in terms of their responses in 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, Greenaway, and Wakelin (2001), Girma and Gorg (2003), and Kinoshita (2001). For instance, Kinoshita (2001) finds that R&D-intensive domestic firms enjoy more benefits from spillover effect. Another is the domestic firms' geographical proximity to MNEs (Sjoholm, 1999; Aitken and Harrison, 1999; Girma and Wakelin, 2002; Halpern and Murakozy 2007). However, the robust geographical locality of spillover effect has not been necessarily detected in the literature. The last is the heterogeneity of domestic firms' input-output relationship with MNEs as studied by Javorcik (2004), Blalock and Gertler (2008), Driffield, Munday, and Roberts (2002), and Harris and Robinson (2004). These papers have found that the closer the input-output relationship with MNEs, the larger the benefits from spillover effect the domestic firms enjoy.

2.10. Impacts of Agglomeration

Although the previous subsection reviews papers analyzing the way in which the existence of MNEs raises indigenous firms' performance, the geographical concentration of any types of firms affects corporate performance generally. Trade costs reduction across nations pushes increasing returns to scale (IRS) technology industry to locate in a small number of countries in which many consumers, input suppliers, and other supporting industries have already located. Manufacturing industries, particularly the IRS technology industry, are concentrated not only in a limited number of countries but also in limited local areas within a country. This subsection examines the impacts of such agglomeration on corporate performance.

There are three kinds of agglomeration economies: technological spillovers, pecuniary externalities, and a competition-based selection process. The first two forces often mean that knowledge and information spillovers cross between firms sharing the same intermediate goods including labor (Marshallian thick labor market effect), and increasing returns to scale at the local input-output level. Rosenthal and

Strange (2004) provides a fully comprehensive review of the cause and consequences of agglomeration economies. Through these pathways, producers in the denser area are expected to be able to obtain such “agglomeration spillover effects”.

The previous studies analyzing such agglomeration spillover effects on corporate performance are as follows: Amiti and Cameron (2007) examine the impacts on corporate wages. They distinguish the cost linkages and demand linkages to identify the location of intermediate input suppliers and final consumers exactly. As a result, they found that there are significant agglomeration effects on wages due to locally restricted cost and demand linkages. Further, Greenstone, Hornbeck, and Moretti (2008) take into account local cost linkages between customers and suppliers more seriously, using the evidence of “Million Dollar Plant” in winning and losing counties. The corporate real estate journal reports not only the county in which the “Million Dollar Plant” chose to locate (the “winning county”) but also one or two runner-up counties (the “losing counties”). They use the TFP of incumbent plants in losing counties as a counterfactual for the TFP of incumbent plants in winning counties in the absence of the plant opening. Their empirical results show that new plant opening induces incumbent plants in winning counties to experience a significant and sharp increase in TFP compared to incumbent plants in losing counties during the five years after opening.

The last force relies on a competition-driven selection process of agglomeration. Relatively inefficient producers find it more difficult to operate profitably when it is easier for consumers to change suppliers within a local area. Since markets with higher demand density stimulate spatial substitutability, inefficient producers lose their market share. That is, inefficient producers in the denser area are easy-to-lose their market share and easy-to-exit than those in the less dense area. As a result, the average productivity in denser markets always becomes higher. Such a selection according to markets density is called a "pro-competitive effect".

There are a few studies on the pro-competitive effects in denser areas. First, Syverson (2004) regresses plant TFP on local demand density. His empirical results show an increase in the lower bound of average productivity in the denser market and a decrease in the level of within-market dispersion of plant productivity in the denser market. Secondly, Combes, Duranton, Gobillon, Puga, and Roux (2009) present an empirical framework to distinguish agglomeration spillover effects (left-truncation of the productivity distribution) from pro-competitive effects (right-shifts in the productivity distribution). Their empirical results based on French establishment-level data suggest that, even if pro-competitive effects are controlled, agglomeration spillover effects still contribute to explain spatial productivity differences in France. Third, Arimoto, Nakajima, and Okazaki (2009) focus on the silk-reeling industry in the early stage of industrial development, and the emergence of clusters during the late 1890s and early 1910s in Japan. They regressed plant TFP on county-level plant density and found that the productivity disparity among plants in a clustered area was smaller and that productivity distribution was severely more truncated than those in non-clustered area.

2.11. Decomposition: Production

So far, we have reviewed studies on firm behavior. As a next step, it is certainly meaningful to examine the impacts of changes in the firm-level behavior on the national economy. The following three literatures analyze the main sources of growth of national production, employment, and productivity. In particular, this subsection reviews two papers that decompose the growth of national production and exports: Bernard, et al. (2006d) and Bernard and Jensen (2004a). We can clarify the relative contribution of active entry and exit on their growth.

Bernard, et al. (2006d) examine the sources of US production growth during 1987-1997. They divide product output Y in year t according to firms that produce the product in both t and t-5 and increase its amount (incumbents), surviving firms that do not produce the product in t-5 but produce it in t (adders), and firms that do not exist in t-5 but produce the product in t (entering firms),

$$Y_{tp} = \sum_{j\in B_{tp}} Y_{tpj} + \sum_{j\in A_{tp}} Y_{tpj} + \sum_{j\in N_{tp}} Y_{tpj}$$

where p indexes products, and B_{tp}, A_{tp}, and N_{tp} represent the set of incumbents, adders, and entering firms, respectively. In particular, they examine percentage decompositions for each product by dividing through by Y_{tp}. Similarly, we can decompose product output reduction according to firms that incumbents that decrease their production, surviving firms that produce the product in t but not in t+5 (droppers), and firms that produce the product in t but die between t and t+5 (exiting firms),

$$Y_{tp} = \sum_{j\in C_{tp}} Y_{tpj} + \sum_{j\in D_{tp}} Y_{tpj} + \sum_{j\in X_{tp}} Y_{tpj}$$

where C_{tp}, D_{tp} and X_{tp} denote the sets of incumbents, droppers, and exiting firms, respectively. In both cases, they find that roughly two-thirds of the average product's output is changed by incumbents. The remaining output is more or less evenly split between firms adding or dropping the product and entering or exiting firms.

On the other hand, Bernard and Jensen (2004a) investigate sources of the US export growth during the period 1987-1992. They decompose its growth rate according to the following types of exports (product index is omitted here):

$$\sum\nolimits_{j\in N\cup B\cup X}\left(\frac{E_{tj}-E_{t-1j}}{E_{t-1j}}\right)=\left(\frac{\sum\nolimits_{j\in N}E_{tj}}{\sum\nolimits_{j\in N\cup B\cup X}E_{t-1j}}\right)+\left(\frac{\sum\nolimits_{j\in B}\left(E_{tj}-E_{t-1j}\right)}{\sum\nolimits_{j\in N\cup B\cup X}E_{t-1j}}\right)-\left(\frac{\sum\nolimits_{j\in X}E_{t-1j}}{\sum\nolimits_{j\in N\cup B\cup X}E_{t-1j}}\right),$$

where E_{tj} denotes plant j's exports at time t. N, B, and X represent the set of plants that do not exist in t-1 and do exist in t, plants that exist in both t and t-1, and plants that exist in t-1 but do not exist in t, respectively. As a result, they find that total direct exports reported by plants in the Census of Manufactures increased by \$80.9 billion from 1987 to 1992. Of that total increase, 87% came from B-type plants, while 13% came from N-type plants less X-type plants. Moreover, the contributions by plants that existed in both years can further be decomposed as follows:

$$\frac{\sum\nolimits_{j\in B}\left(E_{tj}-E_{t-1j}\right)}{\sum\nolimits_{j\in N\cup B\cup X}E_{t-1j}}=\left(\frac{\sum\nolimits_{j\in B_N}E_{tj}}{\sum\nolimits_{j\in N\cup B\cup X}E_{t-1j}}\right)+\left(\frac{\sum\nolimits_{j\in B_B}\left(E_{tj}-E_{t-1j}\right)}{\sum\nolimits_{j\in N\cup B\cup X}E_{t-1j}}\right)-\left(\frac{\sum\nolimits_{j\in B_X}E_{t-1j}}{\sum\nolimits_{j\in N\cup B\cup X}E_{t-1j}}\right),$$

where B_N, B_B, and B_X are sets of plants existing in both t and t-1. In particular, they are sets of plants that do not export in t-1 but do export in t, plants that export in both t and t-1, and plants that export in t-1 but do not in t, respectively. As a result, they find that 61% came from B_B-type plants, while 26% came from B_N-type plants less B_X-type plants.

2.12. Decomposition: Resources

This literature is the second decomposition analysis, the decomposition of national employment growth. As well as the decomposition of production, there are two alternative explanations of aggregate employment growth: active entry of new firms and expansion of employment in incumbent firms. Davis, Haltiwanger, and Schuh

(1996) carefully examine their relative contributions by introducing two measures to capture resource reallocations at plant level: gross job creation rate (*JCR*) and gross job destruction rate (*JDR*). *JCR* can be measured by employment gains summed over all plants that expand and enter between t-1 and t. *JDR* can be measured by employment losses summed over all plants that contract and shut down between t-1 and t. Specifically, job creation and job destruction rates are given by

$$JCR_t = \frac{\sum_{i\in\Omega^+}\left(N_{i,t} - N_{i,t-1}\right)}{\sum_{i\in\Omega} N_{i,t-1}} \text{ and } JDR_t = \frac{\sum_{i\in\Omega^-}\left(N_{i,t} - N_{i,t-1}\right)}{\sum_{i\in\Omega} N_{i,t-1}},$$

where $N_{i,t}$ represents plant i's employment at t. Ω is a set of all plants. Ω^+ is a set consisting of the incumbent plants that raise employment (expanding plants) and the new entrants. Ω^- is a set consisting of the incumbent plants that reduce employment (contracting plants) and the exiting plants. Gross job reallocation can be expressed as the sum of job creation and destruction between t-1 and t, i.e. $|JCR_t| + |JDR_t|$. As a result, in the US manufacturing during 1973-1988, they found that both job creation and destruction rates are about 10%, and that 16% of the creation is driven by expanding plants, and that 3% of the destruction is by exiting plants.[10]

As pointed out in Bernard and Jensen (2004a), one important advantage of the decomposition is that we can group plants into some categories, e.g., by export status or FDI status. Suppose the disaggregation of Ω_+ into $\Omega_+^{throughout}$, Ω_+^{start}, Ω_+^{stop}, and Ω_+^{never}. Of the set Ω^+, $\Omega_+^{throughout}$ includes plants that export in both t-1 and t, Ω_+^{start} includes plants that export only in t, Ω_+^{stop} includes plants that export only in t-1, and Ω_+^{never} includes plants that never export in both times. The same holds true for Ω^-. We can

[10] Blanchflower and Burgess (1996) found that about 50% of each of job creation and destruction is accounted for by just 4% of continuing businesses.

further disaggregate samples according to import status. Indeed, Biscourp and Kramarz (2007) analyze the relationship among export, import, and employment. Their evidences from French manufacturing suggest that there is a strong correlation between increasing imports of finished goods and destruction of production jobs. They also find that such a tendency is stronger for larger firms.

Recently, this literature has tried to clarify the job creation and destruction within a firm: Ariga (2006) and Corseuil and Ichimura (2006). Ariga (2006) investigates the relationship between the horizontal transfers/promotion of employees across ranks and the job creation/destruction inside a large Japanese firm. His finding is that jobs and units are constantly created and destroyed in this firm, and that the job creation and destruction cause horizontal transfers of employees within the firm. On the other hand, Corseuil and Ichimura (2006) study the job creation and destruction due to the birth/death of the job categories (occupation) in incumbent firms (job mix component). First, it turns out that job mix component accounts for 30% of total job creation and 40% of total job destruction. Second, the job mix component of both job creation and destruction are concentrated among non-production/managerial jobs. In sum, their result implies that it is far more important to examine intra-firm reallocation of job categories and labor division within and across industries.

2.13. Decomposition: Productivity

The last decomposition analysis is for national productivity. Its methodology is qualitatively the same as before. The basic decomposition, which is proposed by Foster, Haltiwanger, and Krizan (2001), is the following[11]:

[11] They also propose another formulation.

$$\Delta A_{it}=\underbrace{\left[\sum_{e\in C}s_{et-1}\Delta A_{et}+\sum_{e\in C}\left(A_{et-1}-A_{it-1}\right)\Delta s_{et}+\sum_{e\in C}\Delta s_{et}\Delta A_{et}\right]}_{Continuing\ \ firms}$$

$$+\underbrace{\left[\sum_{e\in N}s_{et}\left(A_{et}-A_{it-1}\right)\right]}_{Entry\ \ firms}-\underbrace{\left[\sum_{e\in X}s_{et-1}\left(A_{et-1}-A_{it-1}\right)\right]}_{Exiting\ \ firms},$$

where A_{it} denotes productivity (labor productivity or multifactor productivity) in industry i at time t. e represents plant index of which industry is categorized in the industry i. s is a share of a plant in the industry in terms of outputs/inputs. C, N, and X are sets of continuing plants, entry plants, and exiting plants, respectively. The multifactor productivity (ln *MFP*) is measured as follows:

$$\ln MFP_{et} = \ln Q_{et} - \alpha_K \ln K_{et} - \alpha_L \ln L_{et} - \alpha_M \ln M_{et},$$

where Q is real gross output, K is real capital, L is labor input, and M is real materials. Factor elasticities are measured via industry cost shares. The index of plant-level labor productivity is measured as the difference between log gross output and log labor input.

There are three novel points. First, since productivity is not a measure representing a kind of volume, we need to aggregate each plant's productivity by using a plausible weight. In the above method, a share of plant's outputs or inputs is used as such a weight. Second, relating to the first point, we need to distinguish between reallocation effect and own effect. Reallocation effect is the productivity growth owing to the more rapid expansion of high productivity plants relative to low productivity plants. Own effect quantifies the importance of productivity growth at individual plants. The three terms in the first bracket take care of them: the first term represents a within-plant component based on plant-level changes (own effect), the second term is a between-plant component that reflects changing shares (reallocation effect), and the third term is the cross term. Third, the between-plant term and the entry and exit terms involve deviations of plant-level productivity from the initial industry index.

Their findings in multifactor productivity in the US manufacturing during 1977-1987 are as follows: the within-component accounts for about half of average industry productivity growth, the between-plant component is negative but relatively small, and the cross term is positive and large and accounts for about a third of the average industry change. Net entry accounts for 26% of the average industry change. A number of similar studies of other countries including United States (Baily et al., 1992), Israel (Griliches and Regev, 1995), Chile and Colombia (Liu 1993), and Australia (Bland and Will, 2001) find that entry and exit of firms or plants within an industry contribute little to productivity growth. On the other hand, Olley and Pakes (1996) for the US, Van Biesebroeck (2008) for China, and Aw, Chen, and Roberts (2001) for Taiwan highlight that firm and/or plant turnover is an important source of industry productivity growth, as well as higher productivity of the continuing firms and/or plants.

Similar to the decomposition of employment, we can group plants into categories, e.g., by export status or FDI status. Bernard and Jensen (2004b) first consider only continuing firms (B), i.e., firms that exist in years t and t+1, and further cut across the cross term, as follows:

$$\Delta A_{it} = \underbrace{\sum_{e\in B}\left(A_{et-1} - A_{it-1}\right)\Delta s_{et}}_{Reallocation\quad Effect} + \underbrace{\sum_{e\in B} s_{et-1}\Delta A_{et}}_{Own\quad Effect}.$$

Second, plants are clustered into four groups based on their export status in the two years (see the notation in Section 2.11.): B_N, B_B, B_X, and B_D (a set of plants that never export). $B \in B_N \cup B_B \cup B_X \cup B_D$. Their decomposition formulation becomes

$$\Delta A_{it} = \underbrace{\sum\nolimits_{B_i \in B} \sum\nolimits_{e \in B_i} \left(A_{et-1} - A_{it-1}\right)\Delta s_{et}}_{Reallocation\ \ Effect} + \underbrace{\sum\nolimits_{B_i \in B} \sum\nolimits_{e \in B_i} s_{et-1}\Delta A_{et}}_{Own\ \ Effect} .$$

As a result, their finding is that continuing exporting plants are the most important group for the national-level TFP growth.

3. Discussion

3.1. Directions of Further Research

Although a large number of research papers on the impact of globalization have already been published, we believe that vast room still exists for a further extension of the literatures, with strong interest held by not only academicians but also policymakers.

Four lines of future research would be suggested. The first is the replication of previous studies in countries/regions which have not been fully explored. We have introduced many related articles in the previous section. Although many papers exist in each literature, most of them are analyses for developed countries. In particular, there are few papers on East Asian developing countries. It would be invaluable to replicate previous studies by using these countries' own micro data. Then, since *de facto* economic linkages are quite strong in East Asia compared with other regions, we might obtain empirical results different from those in previous studies on developed countries or developing countries in other regions. If we reach unusual results, it would be a substantial contribution to the literature to clarify why such results were obtained.

The second one line of future research would be to extend and develop the previous studies along the research line of each literature. For example, there is still room for development in the knowledge spillover literature. We already know that the MNEs' source country or nationality is one of the sources of heterogeneity in the magnitude of the spillover that domestic firms receive, but we do not know why. As a next step, we need to examine what sort of firm nationality characteristics yields such heterogeneity. In addition, previous studies have analyzed the heterogeneity of spillover effects in domestic firms' input-output relationship with MNEs. However, they define such input-output relationships at the industry level due to data limitation. That is, they confirmed that domestic firms *in the industries* having a close input-output relationship *with the industries* in which many foreign-owned firms exist receive larger spillover effects. To closely analyze such heterogeneity of spillover effects, more direct examination is desirable. If the required data are available, we can directly examine whether or not domestic firms that supply their products to or purchase inputs from foreign-owned firms obtain larger spillover effect.

The third line of future research is to make breakthroughs in the existing literatures to develop new literatures. We have introduced selection effects in the relationship between the number of varieties and the firms' productivity in the third literature. Similar to the relationship in overseas activities between selection (the first literature) and learning effects (the eighth literature), on the other hand, starting to produce one more variety might raise the firms' productivity due to, say, the complementary relationship between an existing variety and a newly added variety. The examination of such a learning effect may open a new literature, though we obviously need to take care of the endogeneity issue due to the selection effect. Furthermore, it may be more interesting to investigate whether differences in the learning effect among added varieties exist or not. Clarifying the cause of such differences becomes an important research topic.

The last line of future research is to integrate some literatures. Indeed, as introduced in Section 2.3, we can find the integration of the first and third literatures. Raff et al. (2008b) 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 the third and the eighth literatures is another possible example of this direction. At present, in the eighth literature, the learning effects are examined according to 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 would yield larger positive impacts on MNEs' performance than the WOE due to the integration of location advantages of the domestic firms with the know-how of the MNEs.

3.2. Feedbacks to Related Government Agencies from Statistics Users

From the viewpoint of micro data users, there is a lot of room for improving statistics collected by governments, and for facilitating the way of utilizing them.

First, the basic items included in statistics should be internationally standardized at least to a minimal level. There are vast variations in items available across countries. For example, productivity is one of the most important measures for analyzing the impact of globalization. The most widely-used productivity measure is TFP, which requires in its calculation tangible assets, employment, and so on. If consistent estimates of TFP are desirable, other items such as procurement are also necessary

(Olley and Pakes, 1996; Levinsohn and Petrin, 2003). Ownership information is essential for the analysis of spillover effects. The items on firms' overseas activities are necessary to examine the impacts of outward FDI on domestic economies.

Secondly, firm-level data should be convertible. It is important to be able to link one set of firm-level data in a year with that data in other years, by firm. That is, the firm-level data should have a firm identification code identical through years. Such data enable researchers to enjoy panel data advantage and thus to conduct rigorous micro data analysis. Furthermore, it is desirable that the firm identification code is convertible to that in other firm-level data. Countries usually have multiple micro data. Thus, researchers sometimes need to link one kind of firm-level data with other firm-level data. Without a convertible identification code, the perfect linkage of two data sources is almost impossible. The survey needs to be designed on the assumption that it will be linked with the other existing micro data.

Thirdly, governments should improve the quality of micro data. It is important to not only raise collection rates but also decrease unanswered items, i.e., missing values. It would be good to make a survey for firms mandatory. Face-to-face interaction in collecting information is also effective.

Finally, the use of micro data should be open and rule-based for researchers. It has been obvious that micro data analysis provides invaluable information to policy makers. However, the numbers of countries in which micro data are accessible to is still limited. In East Asia, for example, Singapore and Malaysia do not permit research use at all. Also in Japan, customs data are never available at the firm level, despite the fact that Bernard and Jensen (2004a) proved the usefulness of such data. Better communication between statistics makers and users is hoped for on this matter.

4. Concluding Remarks

This paper has extensively reviewed empirical studies that analyze the globalization phenomenon by using micro data. First, we set up a flow chart describing how the advancement of globalization or changes in policy measures on globalization would lead to national productivity enhancement. Secondly, we summarize the hypotheses and the methods explored in 13 literatures on globalization, mapped by our flow chart. Thirdly, we discuss further possible avenues in micro data analyses. Finally, some suggestions are made for statistics-related policies. With rigorous econometric treatment, we hope that these literatures in micro data analysis will develop even further, offering strong policy guidance, particularly for economic development.

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