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Abstract

This paper applies the job creation (JC)/ destruction (JD) method to the micro data of Japanese manufacturing firms and provides a bird's eye portrait of the dynamism of globalizing firms in terms of domestic employment, domestic establishments, domestic affiliates, and trade. It examines gross and net changes in domestic operations and trade by multinational enterprises that expand operations abroad (expanding MNEs), compared with non-expanding MNEs and local firms, in the periods of 1998-2002, 2002-2006, 2006-2008, and 2008-2010. It also conducts the Kolmogorov-Smirnov test to investigate whether the changes in domestic operations and trade by expanding MNEs are larger than those by other firm types. Major findings are the following: (i) gross changes in domestic employment/operations are much larger than net changes, showing restructuring dynamism and firm heterogeneity, (ii) de-industrialization or the shrinkage of the manufacturing sector is not salient except for 1998-2002 although a slight declining trend in manufacturing activities has been observed recently, (iii) expanding multinational small and medium enterprises (SMEs) tend to enlarge domestic employment/operations, compared with other types of SMEs, (iv) expanding MNEs intensify headquarters activities, probably within international production networks, and (v) expanding multinational SMEs are likely to expand exports and imports more than other types of SMEs, suggesting active operations in international production networks particularly in East Asia

Keywords: De-industrialization, Foreign direct investment (FDI), Multinational enterprises (MNEs), Job creation and destruction, International production networks

JEL classification: F23, F61, F66

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1. Developing a statistical portrait of de-industrialization

Does the globalization of corporate activities reduce or enhance domestic employment and operations? In the era of international production networks (Ando and Kimura (2005)) or the 2nd unbundling (Baldwin (2011)), firms must globalize their activities in order to maintain or strengthen their international competitiveness. The question is whether such moves are benevolent for the home country as a whole or not. This is a crucial question not only for academic debates but also for actual policy discussion. People tend to believe that outward foreign direct investment (FDI) immediately results in a reduction in domestic employment and operations. Such anti-globalization sentiments are sometimes too emotional and possibly mislead the direction to go. The recent empirical literature that uses micro/panel data at the establishment or firm level has mostly claimed that FDI does not necessarily cause job destruction at home or rather sometimes has positive effects on domestic employment. However, these works do not yet seem to be convincing enough for the general public.

One of the recent literatures has inclined to detect causality from FDI to domestic employment.[1] To rigorously verify causality in econometrics, existing studies often throw away a large number of samples. In order to purify the effect of FDI on domestic employment, the investigation tends to focus only on firms with the first FDI in a certain period, sometimes by destination to distinguish vertical FDI from horizontal FDI, and exclude a large number of firms that have already had foreign affiliates. Applying a matching technique purifies the comparison, but the sample set is further slimmed down. Although such steps are necessary to detect causality, the overall picture must be given up. In the whole samples for the Japanese manufacturing firms, firms with the first FDI consist of just a small subset. There are many firms that have already had FDI, and such firms will increase, maintain, or decrease the number of foreign affiliates. Many multinational enterprises (MNEs) have foreign affiliates both in East Asia and developed countries, and new establishments of foreign affiliates occur mostly in East Asia. Many firms without foreign affiliates also have various forms of globalizing activities such as exports, imports, and transactions with MNEs. These

[1] For example, see Wagner (2011) for Germany and Hijzen, Jean, and Mayer (2011) for France. Similar attempts are found for the case of Japan in Hijzen, Inui, and Todo (2007), Edamura, Hering, Inui, and Poncet (2011), Hayakawa, Matsuura, Motohashi, and Obashi (2013), and Tanaka (2012a).

facts suggest that sample sets used by logically rigorous empirical studies might not properly represent the whole sample.

Another active literature picks up MNEs only and estimates a labor demand function in order to quantify the effects of foreign operations on domestic employment.[2] This is also a meaningful direction of research in order to trace changes in the internal structure of MNEs. However, a comparison with non-MNEs is not explicitly incorporated in this line of empirical studies.

To provide useful insights for constructive policy discussion, we believe that a comprehensive data survey even without rigorous econometric analysis is still necessary. This paper thus does not pursue a pinpointed causality issue for new MNEs or estimate a labor demand function of a specific group of firms, but instead, tries to provide a bird's eye portrait of the issue of globalizing corporate activities and domestic operations in Japan. We try to keep the whole samples as far as possible based on our database. While honestly assessing the quality of data, we present a holistic view of the current status of de-industrialization in the Japanese manufacturing sector. We examine not only domestic employment but also other aspects of domestic corporative operations such as the number of domestic establishments, the number of domestic affiliates, exports and imports. In addition, we investigate several sample periods, rather than focusing on a single specific period, to capture the evolving features of globalizing corporate activities and domestic operations.

This paper applies the job creation (JC)/destruction (JD) method for the Japanese manufacturing firms. The JC/JD method has several advantages for our purposes. First, the method can explicitly take into account the highly heterogeneous characteristics of individual firms and, at the same time, effectively bridge a gap between micro and macro aspects. Based on a series of empirical studies with the US establishment-level data, a seminal work by Davis, Haltiwanger, and Schuh (1996) presents four key facts about JC and JD (p. 17): magnitude, persistence, concentration, and cyclicality. Magnitude means that gross JC and JD are remarkably large, which

[2] Harrison and McMillan (2011) is a representative paper in this literature. For the Japanese data, Yamashita and Fukao (2010) and Kambayashi and Kiyota (2013) explore this direction of research. Ito and Tanaka (2014) provide an interesting extension where the effects of transaction relationship with MNEs expanding foreign operations on domestic suppliers' employment are investigated with a labor demand function.

are much larger than net changes (net JC/JD) in employment, and present dynamism and firm heterogeneity. In the Japanese manufacturing sector, we find large JC/JD rates, which seem to be much smaller than the case of the US, and de-industrialization is not salient except the period of 1998-2002 though a slight declining trend in manufacturing activities is recently observed. Persistence means that plant-level employment changes are highly persistent and do not easily turn around. Although this is not what our study directly checks, we should not assume simple time sequencing between the expansion of foreign operations and the adjustments in domestic employment and operations because such adjustments take time. Concentration means that large JC/JD concentrate in a subset of plants. This is also what we clearly observe when we draw a density function of JC/JD for subsets of firms, which shows a high peak and narrow tails. Cyclicality means that JD rates exhibit greater cyclical variation than JC rates. This is not very clear in our data set, but at least we can see that some manufacturing subsectors present very high JD rates in recessions. With considering these facts, the JC/JD method is appropriate to provide a bird's eye view of the whole manufacturing sector through describing the highly heterogeneous nature of corporate evolution with a connection between micro and macro sides.

Second, the JC/JD method is also powerful in comparing different subsets of establishments or firms. The existing literature using JC/JD method sets up various subsets of establishments or firms in terms of sectors/subsectors, regions, establishment/firm size, and others. In this context, one of the important findings in the literature is that small firms present more dynamism with larger JC and JD than large firms.[3] We will conduct a comparative study in the following three dimensions: manufacturing subsectors, small medium-sized enterprises (SMEs) versus large firms, and expanding multinationals (MNEs) (increasing the number of foreign affiliates) vs. non-expanding MNEs vs. local firms (without foreign affiliates).[4] To investigate

[3] See, for example, Faggio and Konings (2003) for transition countries, Fuchs and Weyh (2010) for Eastern and Western Germany, and Hijzen, Upward, and Wright (2010) for the UK.

[4] Because of the data limitation, we do not take inter-firm relationship into consideration when we compare the performance across different groups of firms. For example, when a firm conducts FDI, transactions with its business partners may increase or decrease; we do not take care of such derived effects in this paper.

differences in the distribution of firms, we also apply the *Kolmogorov-Smirnov* (K-S) test besides the JC/JD method. We find that multinational SMEs expanding foreign operations tend to enlarge domestic employment, domestic operations, and trade, compared with other types of SMEs. Moreover, we find that expanding MNEs intensify headquarters activities.

The paper plan is as follows: the next section introduces our data set for the Japanese manufacturing firms, and section 3 presents basic statistics. The fourth section applies the JC/JD method to investigate gross and net changes in domestic operations and trade. Empirical observation based on the full decomposition with entry and exit of firms is first presented, and then the detailed analysis based on the panel decomposition without entry and exit is conducted for different subsets of firms in terms of the firm size and the status of holding foreign affiliates. Section 5 conducts the Kolmogorov-Smirnov test for changes in domestic operations and trade by different subsets of firms. The last section concludes.

2. The *Kikatsu* Data: its strength and limitation

Our empirical analysis is based on the firm-level statistics, which is conducted by the Ministry of Economy, Trade, and Industry (METI), Government of Japan (the former name was the Ministry of International Trade and Industry (MITI)): *The Basic Survey of Business Structure and Activity (the Kikatsu* hereafter*)*. This database provides detailed information on (parent) firms located in Japan as well as the number, industry, and regional location of their foreign affiliates with no less than 20 percent Japanese ownership. Note that the location of foreign affiliates is not identified on the country basis; instead, the questionnaires have East Asia, North America, and Europe as regional categories.[5] Moreover, although the information on trade is available, the destination/origin of exports/imports is not identified on the country basis; only trade data for some major regions are available besides trade as a whole.

The samples in the survey cover firms with more than 50 workers, capital of more than 30 million yen, and having establishments in mining, manufacturing,

[5] "East Asia" includes all Asian countries east of Pakistan. The questionnaires for the latest few years have additional regional categories.

wholesale/retail trade, and restaurants. Our study employs this survey with data from 1997 to 2011 that is the latest available year for us.[6]

Since the *Kikatsu* is the firm-level statistics, rather than the plant-level, some useful information on the internal structure of a firm for our study is available. For instance, it provides information on the allocation of workers in headquarters (HQ) services and manufacturing activities, the number of domestic/foreign establishments, and the number of domestic/foreign affiliates. By making use of the strength of the *Kikatsu*, we investigate not only domestic employment but also employment engaged in HQ services, employment involved in manufacturing activities, and other aspects of domestic corporative operations such as the number of domestic establishments, the number of domestic affiliates, exports, and imports.

Another strength of the *Kitatsu* is that the coverage of manufacturing sector is claimed to be at the "census" level (see manufacturing subsectors in the next section). On the other hand, the coverage of services sector is incomplete, though it has been expanded over time. Therefore, this study concentrates on manufacturing firms in investigating globalizing corporate activities and domestic operations by Japanese firms. The overall trend of the coverage for Japanese manufacturing firms by *Kikatsu* data is presented in Table A.1 and is briefly discussed in Appendix 1.

While the *Kitatsu* has several advantages, it also has limitations related to the "census" coverage, which is particularly serious for our study. One issue is on size censoring. As mentioned above, the survey cover firms with 50 or more than 50 workers. Thus, firms less than 50 workers are not included in the survey. If a firm has workers close to 50 and lowers employment below 50, it is dropped from the survey even if it continues to exist. If this firm increases workers and exceeds 50, it may appear in the survey. Moreover, although the percentage of collecting effective questionnaire is relatively high, some firms that continue to exist may not return the questionnaires in some years. Although the establishment year of a firm is available, a specialized survey for exit does not exist. Furthermore, the information on merge and acquisition (M&A) is not available.

Our empirical results based on the *Kitatsu* must thus be carefully interpreted,

[6] While the data for 1997 is used to identify entry firms in the analysis in the period of 1998-2002, the data for 2011 is used to identify exiting firms in the analysis in the period of 2008-2010.

considering these limitations. Our analysis, however, tries to provide valuable information, which has not been sufficiently presented yet, by making advantage of the strengths of the database as mentioned above.

3. Basic statistics

This section presents basis statistics of Japanese manufacturing firms in our database. We first discuss subsectoral features of Japanese manufacturing firms, based on Tables 1 and 2. Table 1 shows subsectoral shares of our interested domestic operations and trade in 2010, and Table 2 presents shares of SMEs in each subsector for each variable.[7] In terms of the number of firms, domestic employment, domestic establishments, and domestic affiliates, major subsectors are food processing (sector 1), chemicals (sector 9), and machineries (sectors 18-21), particularly general machinery, electric machinery, and transport equipment (18-20). While major subsectors in terms of exports are general machinery, electric machinery, and transport equipment, major subsectors in terms of imports are petroleum and coal products (sector 10) and iron and steel (sector 15) in addition to machineries (sectors 18-21, mainly 18-20).

== Table 1 ==

== Table 2 ==

The majority of manufacturing firms in Japan are SMEs in terms of the number; close to 80 percent are SMEs (Table 2). SMEs' portion becomes lower from the perspective of domestic operations; shares of SMEs are around a quarter for domestic employment (not only domestic employment in total but also employment engaged in HQ services and manufacturing activities), close to a half for domestic establishments, and a quarter for domestic affiliates. On the other hand, trade is dominated by large firms; the portion of SMEs is only five percent for exports and 10 percent for imports.

To capture the overall patterns of Japanese manufacturing MNEs, let us look

[7] SMEs are defined as firms with no more than 300 workers.

at the composition of Japanese manufacturing MNEs in 2010 (Table 3). Around 90 percent of Japanese manufacturing MNEs go at least to East Asia, regardless of whether SMEs or large firms, indicating Japanese active investment in East Asia. Although some MNEs go to North America and/or Europe in addition to East Asia, SMEs are relatively active in East Asia (51 percent of MNEs with affiliates in East Asia) while large firms are relatively active in North America and Europe (67 percent of MNEs with affiliates in North America and 81 percent of MNEs with affiliates in Europe). In terms of subsectoral composition, around a half of manufacturing MNEs are machineries, respectively. These subsectors are one of major subsectors of Japanese manufacturing firms in general, but subsectoral shares among manufacturing MNEs are larger, compared with those in Table 1. It suggests that these subsectors are active abroad by more than proportionally.

== Table 3 ==

In our sample based on the panel dataset for each period, the number of manufacturing MNEs slightly increases from 2621 in 1998-2002, 2863 in 2002-2006, 2999 in 2006-2008, to 3185 in 2008-2010 in the sample, which are the sum of the number for MNE1 and MNE2 (Table 4).[89] MNE1 and MNE2 refer to manufacturing MNEs that increase the number of foreign affiliates in each period (expanding MNEs) and manufacturing MNEs that do not increase the number of foreign affiliates (non-expanding MNEs), respectively, and manufacturing firms other than MNEs in our dataset are regarded as local firms ("Local" hereafter). As one can see in Table 4, not only large firms but also SMEs are aggressive in expanding their operations abroad until the first half of the 2000s, and still active even in the latter half of the 2000s with the Global Financial Crisis (GFC) in shorter periods (two-year-span); portions of MNE1

[8] We define manufacturing firms in our panel data as those categorized into manufacturing sectors at the beginning and/or the end of each period. Moreover, subsectors of manufacturing firms in our panel data are based on those at the beginning of each period except the case that the firm is categorized as non-manufacturing at the beginning but as manufacturing at the end of period. In that case, though such cases are not often observed, subsectors are based on those at the end of period.

[9] Similar to the identification of manufacturing sectors, we define MNEs as those having at least one foreign affiliate at the beginning and/or the end of each period.

among MNEs are 45 percent in 1998-2002, 50 percent in 2002-2006, 28 percent in 2006-2008, and 27 percent in 2008-2010. In particular, electric machinery and transport equipment sectors are vigorous in expanding operations abroad; subsectoral shares for MNE1 in Table 4 tend to be larger than those for all-sized manufacturing firms in Table 3. Moreover, most of the expanding MNEs are expanding their operations at least in East Asia (Table 5). In the period of 2002-2006, 95 percent of expanding MNEs increase in the number of affiliates in East Asia, suggesting active expansion of operations in East Asia particularly during this period. On the other hand, during the same period, corresponding shares for North America and Europe in Table 5 are smaller than those in Table 3. It indicates that the portion of expanding MNEs is relatively small for these regions, unlike the case of East Asia.

4. The decomposition of changes in domestic operations and trade

This section applies the JC/JD method to Japanese manufacturing firms and investigates gross and net changes in their domestic operations and trade. In particular, we shed light on changes in domestic operations and trade by MNE1, comparing with those by MNE2 and Local. In addition to gross and net changes in domestic employment, the paper also analyzes gross and net changes in employment engaged in HQ services, employment engaged in manufacturing activities, domestic establishments, domestic affiliates, exports, and imports. Furthermore, in order to capture the evolving features of globalizing corporate activities and domestic operations, we examine these for several sample periods, rather than focusing on only one period.

4.1 The JC/JD method

The relationship between net and gross changes of a concerned variable is as follows:

Net change rate (*Net G*) = gross job creation rate (*C*) – gross job destruction rate (*D*).

The rate of changes g_{it} in a concerned variable for firm *i* between the beginning (t_0) and the end (t) of the period is given by:

$$g_{it} = \frac{(x_{it} - x_{it_0})}{(x_{it} + x_{it_0})/2}.$$

Since the rate of changes is calculated by dividing by the average of a concerned variable, it takes a value between -2 and 2 (-2/2 are in the presence of entry and exit).[10]

The rate of gross job creation (C_{jt}) and the rate of gross job destruction (D_{jt}) in a "group" j in period T are calculated by:

$$C_{jt} = \sum_{i \in S_{jt}\,(g_{it}>0)} w_{it} g_{it} \quad = \quad \frac{\sum_{i \in S_{jt}\,(g_{it}>0)} (x_{it} - x_{it_0})}{\sum_{i \in S_{jt}} (x_{it} + x_{it_0})/2}$$

and

$$D_{jt} = \sum_{i \in S_{jt}\,(g_{it}<0)} w_{it} |g_{it}| \quad = \quad \frac{\sum_{i \in S_{jt}\,(g_{it}<0)} (x_{it} - x_{it_0})}{\sum_{i \in S_{jt}} (x_{it} + x_{it_0})/2},$$

where S_{jt} is the set of firms in group j in period T, and w_{it} is a weight for firm i *in* period T, which is calculated as below,

$$w_{it} = \frac{x_{it} + x_{it_0}}{\sum_{i \in S_{jt}} (x_{it} + x_{it_0})}.$$

Thus, in the analysis of domestic employment, for instance, the rate of net/gross changes in a "group" j in period T is the firm-size-weighted (employment-weighted) rate of changes. Note that "group" j is a subset of the whole manufacturing sector.

This JC/JD method is usually for the analysis of employment, but we apply it to other variables representing domestic operations and trade, in addition to domestic employment. Note that we apply the JC/JD method to the firm-level data, not the establishment/plant-level data, and thus we do not capture the JC/JD within a firm.

4.2 General trends of domestic employment

This subsection analyzes general trends of gross and net changes in domestic employment.[11] Our empirical approach is basically the "panel" decomposition, using a panel database for each period. To grasp the aggregate picture of domestic employment, however, let us first show the results of the "full" decomposition, taking

[10] See Davis, Haltiwanger, and Schuh (1996) and Hijzen, Upward, and Wright (2010) for examples of this method. By using this change rate, positive change and negative change can be treated as a parallel.

[11] See Appendix for the brief discussion on trend of corporate structure of Japanese manufacturing firms, based on the aggregated data of the *Kikatsu* and other databases.

entry/exit of firms into consideration. Figure 1 (a) shows the decomposition of net change rates of domestic employment in 22 manufacturing subsectors as well as the whole manufacturing sector (shown as "total") into four categories of gross changes, together with net changes for each subsector. Four categories for the "full" decomposition are gross job creation (C) by firms that exist at the beginning and the end of each period, gross job creation (C) by entry firms that do not appear at the beginning but exist at the end, gross job destruction (D) by existing firms, and gross job destruction (D) by exiting firms that exist at the beginning but do not appear at the end.[12] On the other hand, Figure 1 (b) presents the contribution of each subsector to the net change rates of the whole manufacturing sector, with a distinction of four categories.

== Figure 1 ==

The results of "full" decomposition for domestic employment provide several interesting insights. First, domestic employment is dynamic, and the heterogeneity across firms in the adjustment of domestic employment is huge (Figure 1 (a)). Both gross changes (C and D) are large (much larger than the net changes) not only in the whole manufacturing sector but also at subsectoral levels. For instance, C/D (-) for the whole sector are 12 percent/-25 percent in four years (1998-2002), 19 percent/-15 percent in four years (2002-2006), and around +/-10 percent in two years (2006-2008; 2008-2010).[13] Although we need to consider possible over-counting of entry and exit, large gross changes suggest the dynamism of domestic employment. Note that while a number of subsectors present active gross changes, aggregate changes (at the whole

[12] In our database, it is difficult to identify explicitly entries and exits of firms. Thus, our definition of entries and exits of firms is as follows: if there is no data at the beginning of the sample period as well as one year before that year and there is data at the end of the sample period, the firm is regarded as an entry firm. If there is data at the beginning of the sample period and there is no data at the end of the sample period as well as one year after that year, the firm is regarded as an exiting firm. Thus, some data are dropped from the original database even in the analysis of the "full" decomposition.

[13] Gross job creation/destruction are not directly comparable but probably smaller in proportion in the case of Japan than the case of the US where JC/JD amounts to +/-10 percent per year at the establishment level (see Davis, Haltiwanger, and Schuh (1996)).

manufacturing sector level) are dominated by large subsectors, namely, food processing, chemical, and machineries (general machinery, electric machinery, transport equipment, and precision machinery) (Figure 1 (b)).

Second, the Net G extensively changes over time, reflecting changes in internal and external economic conditions. The net changes for the whole manufacturing sector in the "full" decomposition are net job destruction (-12.6 percent) for the period 1998-2002 (after the Asian Financial Crisis), net job creation (4.8 percent) for 2002-2006, net job creation (2.3 percent) for 2006-2008 (almost before the GFC), and even slightly net job creation (0.8 percent) for 2008-2010.[14] This suggests that while de-industrialization advanced in 1998-2002, it is not salient after 2002. It also confirms that as discussed in section 1, it is important to investigate not only a specific sample period but also several sample periods.

Third, as Davis, Haltiwanger, and Schuh (1996) claim in the word "cyclicality," business cycles or boom and bust in the economy affect D more than C. This is particularly salient at the subsectoral level; we observe extremely high D in some subsectors in downturn periods such as 1998-2002 and 2008-2010. Rising industries are built up step by step while the scrapping of declining industries is abrupt in a recession.[15]

Since gross changes induced by entry/exit of firms seem to be too big in Figure 1, we focus only on the results of "panel" decomposition in the rest of the paper.[16] Figure 2 shows the results of "panel" decomposition for domestic

[14] The corresponding figures in the "panel" decomposition without considering entry/exit of firms are smaller in absolute terms than those in the full" decomposition; -10.1 percent in 1998-2002, 3.4 percent in 2002-2006, 1.6 percent in 2006-2008, and 0.3 percent in 2008-2010.

[15] The increase in non-regular workers becomes a serious concern in the 2000s, and whether it is linked with globalizing corporate activities is an important research topic (see Matsuura (2013)). As presented in the Appendix, however, the macro significance of non-regular workers in the manufacturing sector is not as large as the impression obtained from the media exposure.

[16] There should be problems in our data for too big gross changes. As mentioned before, we cannot perfectly identify the entry and exit of firms in our database. Although the returned ratios of the survey are relatively high in the case of *Kikatsu*, some firms that continue to exist may not return the questionnaires in some years. Although we checked data for two years to identify entry firms and exiting firms, some of them may not actually be entry/exiting firms. The size censoring of *Kikatsu* is another source of false entry and exit. Also, if M&A is active, it may induce exits of

employment by distinguishing i) SMEs from ii) large firms.

== Figure 2 ==

Regardless of whether SME or large firms, net changes vary across subsectors, and gross job creation and destruction (C, D) are much larger than net changes not only at the whole sector level but also at subsectoral level, which confirms huge heterogeneity across firms again. However, general trends seem to be different to some extent between SMEs and large firms. In the period of 1998-2002, net changes are net job destruction for both SMEs and large firms, but net job destruction is much larger for large firms than SMEs not only for the whole manufacturing sector (C, D (-), and Net G are 5.8 percent, -13.3 percent, -7.6 percent for SMEs and 4.7 percent, -15.6 percent, and -10.9 percent for large firms) but also for most subsectors. In the period of 2002-2006, net changes are net job creation for SMEs and large firms, but both gross and net job creation are larger for large firms than SMEs (C, D (-), and Net G for the whole sector are 9.4 percent, -7.1 percent, and 2.2 percent for SMEs and 11.1 percent, -7.4 percent, and 3.7 percent for larger firms).[17] Even in the latter two periods, net changes are greater for large firms than SMEs. While large firms have large net job creation in 2006-2008 (2.2 percent for the whole manufacturing sector) and slight net job creation (0.8 percent) in 2008-2010, SMEs have no net change in 2006-2008 (almost zero percent) and slight net job destruction (-1.0 percent) in 2008-2010.

Considering such differences in trends between SMEs and large firms, the following analysis focusing on the differences among the firm type, that is, MNE1, MNE2, and Local, is conducted separately for SMEs and large firms.

4.3 Changes in domestic operations and trade by MNE1, MNE2, and Local

This subsection analyzes gross and net changes in domestic employment,

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firms in our database. Moreover, the rate of changes for entry/exiting firms is 2/-2, which is the largest change rate in an absolute term, based on our calculation method. Therefore, we focus on existing firms in the panel data at the beginning and the end of period hereafter.

[17] Interestingly, net changes in machinery, in particular general machinery and electric machinery subsectors, are larger for SMEs than large firms even in 2002-2006.

other domestic operations, and trade by three types of firms, i.e., MNE1, MNE2, and Local, to capture distinct features of MNE1. Table 6 summarizes gross and net changes in domestic employment by the type of firm and the size of firm. Table 6 also presents those changes in employment engaged in HQ services and manufacturing activities. Figures 3 (a) to 6 (a) show subsectoral gross and net changes in domestic employment by the type of firm and the size of firm, and Figure 3 (b) to 6 (b) show the contribution of each subsector to the net change rates of the whole manufacturing sector, with a distinction of two categories, C and D.

== Table 6 ==

== Figure 3 ==

== Figure 4 ==

== Figure 5 ==

== Figure 6 ==

The most interesting insight for MNE1/SMEs is that net changes for the whole manufacturing sector are larger than MNE2/SMEs or Local/SMEs in all periods, though net changes are net job destruction in 1998-2002 (-5.4 percent) and slight net job destruction in 2008-2010 (-0.7 percent), while large net job creation in 2002-2006 (7.7 percent) and in 2006-2008 (2.6 percent). C is larger and D is smaller for MNE1/SMEs than MNE2/SMEs or Local/SMEs in all periods as well. It suggests that compared with MNE2/SMEs or Local/SMEs, MNE1/SMEs tend to expand domestic employment. In addition, net change rates for employment engaged in HQ services are larger in all periods except the first period 1998-2002 than those for domestic employment. It indicates that MNE1/SMEs intensify HQ services more than proportionally. Furthermore, although net changes (Net G) for employment engaged in manufacturing activities are net job destruction in all periods, Net G for MNE1/SMEs are larger than or almost at the same as those for MNE2/SMEs or Local/SMEs except the last period; Net G in 2002-2006 and 2006-2008 are almost zero and larger for MNE1/SMEs, and Net G

in period 1998-2002 (-6.9 percent) is almost at the same level of Local/SMEs. Furthermore, gross job creation (C) for employment engaged in manufacturing activities is the largest for MNE1/SMEs among three types of firms in all periods. Therefore, the size of manufacturing activities tends to slightly shrink, but it is only recently. Overall, MNE1/SMEs tend to increase domestic employment in total, compared with MNE2/SMEs or Local/SMEs, and intensify HQ services, while they do not significantly decrease manufacturing employment except the period after the GFC.

On the other hand, large firms depict a different picture. While net job destruction in 1998-2002 for MNE1/large firms is huge (-11.9 percent), they present net job creation in the other periods, 2002-2006 (4.9 percent), 2006-2008 (2.7 percent), and 2008-2010 (1.6 percent) even after the GFC. Net G for the whole manufacturing sector for MNE1/large firms are smaller than Local/large firms but larger than MNE2/large firms in all periods. However, except the first period 1998-2002, gross job destruction (D) for MNE1/large firms is the smallest among three types of firms not only for domestic employment but also for employment engaged in HQ services and employment involved in manufacturing activities. These suggest that the period 1998-2002 seems to be a restructuring period for MNE1/large firms, but after that, the smallest gross job destruction (D) contributes to net job creation. Similar to the case of MNE1/SMEs, HQ services by MNE1/large firms seem to be strengthened in both absolute and relative terms, particularly recently. Manufacturing activities in terms of employment significantly shrink in 1998-2002 (huge net job destruction or -17.5 percent), but they tend to expand in the absolute term in 2006-2008 and 2008-2010 even after the GFC, though they are likely to shrink relatively.

Before moving to the results of other domestic operations and trade, let us discuss some subsectoral features of changes in domestic employment. In 1998-2002, net change for the whole sector is net job destruction for SMEs (Figure 2) and for MNE1/SMEs (Figure 3 (a-i)). However, nine out of 22 subsectors have net job creation for MNE1/SMEs, which is totally different from MNE2/SMEs or Local/SMEs with net job destruction in all subsectors. In 2002-2006, MNE1/SMEs have net job creation not only in the whole sector but also in most subsectors (17 out of 22 subsectors). Moreover, although net job creation for the whole sector is smaller for MNE1/large firms (4.9%) than Local/large firms (6.0 percent), MNE1/large firms have many subsectors with net job creation (14 out of 22 subsectors), which is slightly more

than 13 subsectors for Local/large firms. Subsectoral variation seems to be quite large in both periods, 2006-2008 and 2008-2010, except the case of MNE1/large firms in 2008-2010, which may be partly influenced by the smaller number of firms due to a shorter period.

If we look at subsectoral contribution of MNE1 (Figure 3 (b) to 6 (b)), the general machinery and electric machinery significantly induce net job destruction while transport equipment partially compensate for it for SMEs in 1998-2002. Electric machinery and transport equipment significantly induce huge net job destruction for large firms. In 2002-2006, machineries, particularly general machinery, electric machinery, and transport equipment contribute to large net job creation by SMEs, while transport equipment significantly contributes to huge net job creation by large firms. The electric machinery significantly and positively contributes to the net change at the whole sector for SMEs in 2006-2008 and 2008-2010, while electric machinery and transport equipment contributes to net job creation positively and negatively, respectively, in 2006-2008 and vise versa in 2008-2010 for large firms.

Table 7 summarizes gross and net changes in other domestic operations and trade for the whole manufacturing sector by the type of firm and the size of firm. The major findings are as follows: first, the heterogeneity across firms is huge in terms of domestic establishments, domestic affiliates, exports, and imports, and these domestic operations and trade are also dynamic, similar to domestic employment. Both gross changes (C and D) are much larger than net changes for MNE1/SMEs. In particular, large gross creation (C) contributes to net creation for all of other domestic operations and trade in all periods, unlike MNE2/SMEs and Local/SMEs.

== Table 7 ==

Second, net changes in the number of domestic establishments and domestic affiliates are net creation for MNE1/SMEs, which are greater for MNE2/SMEs or Local/SMEs, in all periods. It suggests that MNE1/SMEs tend to increase in the number of domestic establishments and domestic affiliates more significantly than other SMEs. However, there is a difference between domestic establishments and domestic affiliates; gross destruction (D) for domestic affiliates is the smallest for MNE1/SMEs among three types of firms, while D for domestic establishment is not the smallest for

MNE1/SMEs though they are close to the smallest types of firms.

Third, net changes for domestic establishments are net destruction in all periods for both MNE1/large firms and MNE2/large firms, while net creation in all periods for Local/large firms. It suggests that multinational large firms are likely to restructure (shrink) domestic operations in terms of domestic establishments while conducting activities abroad. In contrast, Local/large firms tend to increase the number of domestic establishments.

Fourth, net changes for domestic affiliates are net creation in all periods except 1998-2002 for MNE1/large firms, while net destruction in all periods for MNE2/large firms and Local/large firms. It indicates that MNE1/large firms tend to be active in expanding domestic operations in terms of domestic affiliates while expanding activities abroad, though other large firms tend to decrease the number of domestic affiliates. This might be because of the necessity of complimentary operations abroad in the case of MNE1/large firms.

Fifth, exports and imports, particularly in 1998-2002 and 2002-2006, expand not only for MNEs but also local firms. Although trade expansion slows down in 2006-2008 and 2008-2010, both exports and imports by MNE1/SMEs still grow unlike other firms. In the case of MNE1/SMEs, gross creation (C) *per se* is large and close to that for Local/SMEs with the largest C. Moreover, gross destruction (D) is the smallest for both exports and imports in most of the cases. This suggests expanding export and import activities or back-and-forth transactions within the production networks by MNE1/SMEs. Note that in the case of large firms, changes in imports in some sectors, particularly the petroleum and coal products, significantly influence net change rate at the aggregate level. Also, note that data for trade in 2006-2008 may already partially reflect the negative impacts of the GFC since the fiscal year for around a half of the firms is from April to March. That is, the data in 2008 for these firms is based on activities from April 2008 to March 2009. Indeed, trade changed rapidly just after the GFC occurred, unlike other variables such as other domestic operations, though the recovery of trade was also rapid particularly in machinery sectors.[18] Thus, trade data in 2006-2008 may already reflect partially the negative impacts.

[18] See Ando and Kimura (2012) for the movement of Japanese monthly exports, the impacts of the GFC, and the response of production networks in East Asia facing the GFC (and the Great East Japan Earthquake).

5. The *Kolmogorov-Smirnov test for* changes in domestic operations and trade

Figure 7 shows kernel density estimates of net change rates of domestic employment by the type of firms, separately for i) SMEs and ii) large firms, in all periods. MNE1/SMEs' density is lower at the peak around a zero change rate and seems to be biased toward the right compared with densities of other SMEs. On the other hand, MNE1/large firms' density in 2002-2006 in particular seems to be biased toward the right compared with densities of other large firms, while such a bias is not clear in other periods.

== Figure 7 ==

To compare net changes in domestic operations and trade for MNE1 with those for MNE2 and Local, this section applies the *Kolmogorov-Smirnov* (KS) test to their net change rates. Let *F* and *f* denote the cumulative distribution functions (CDF) of net change rates (*g*) that correspond to two groups of firms to be compared. Stochastic dominance can be tested by evaluating two null hypotheses as follows:[19]

(i) Two-sided test

$H_0: F(g) - f(g) = 0$ all $g \in \mathbb{R}$ $\quad (H_1: F(g) - f(g) \neq 0$ some $g \in \mathbb{R})$,

(ii) One-sided test

$H_0: F(g) - f(g) \leq 0$ all $g \in \mathbb{R}$ $\quad (H_1: F(g) - f(g) > 0$ some $g \in \mathbb{R})$.

The first step (two-sided test) is to determine whether both CDFs are identical or not, and we are interesting in rejecting the equality of distributions. The second step (one-sided test) is to determine whether one CDF dominates the other CDF or not. When the null hypothesis in the two-sided test can be rejected and, at the same time, the null hypothesis in the one-sided test cannot be rejected, it indicates that *F(g)* is to the right of *f(g)* and that *F(g)* stochastically dominates *f(g)*. We conduct this test for a

[19] See, for instance, Delgado, Farinas, and Ruano (2002), Arnold and Hussinger (2010), and Tanaka (2012b) for the detailed explanation and the application of the KS test to examine stochastic dominance between two groups.

comparison between MNE1 (*F(g)*) and MNE2 (*f(g)*) and for a comparison between MNE1 (*F(g)*) and Local (*f(g)*), separately for SMEs and large firms.

Tables 8 and 9 present the results of the KS test. Similar to the case of analysis in previous section based on the JC/JD method, MNE1/SMEs tend to have higher growth rates of domestic employment, compared with other SMEs, except the last period. In addition, net change rates of employment engaged in HQ services and manufacturing activities are larger for MNE1/SMEs than other SMEs until the middle of the 2000s. In the latter 2000s, however, it does not stand any more.

== Table 8 ==

== Table 9 ==

As for large firms, MNE1/large firms tend to expand HQ services, compared with other large firms, except the first period. Moreover, though Local/large firms have the largest net change rates at the aggregate level in the JC/JD analysis in all periods, growth rates of MNE1/large firms tend to be higher than those of other large firms during the middle of the 2000s. Regarding manufacturing activities, MNE1/large firms have large change rates than other large firms only in the first period. Since the middle of the 2000s, we could not identify differences in CDF between MNE1/large firms and other large firms.

As for other domestic operations and trade, net change rates are higher for MNE1/SMEs than MNE2/SMEs or Local/SMEs for domestic affiliates and exports in all periods except the last period and for imports in 1998-2002 and 2002-2006. On the other hand, in the case of large firms, net changes are in most cases higher for MNE1/large firms than MNE2/large firms, but we could not find CDF for MNE1/large firms on the right side of CDF for Local/large firms.

6. Conclusion

This paper applies the JC/JD method and the KS test to the micro data of Japanese manufacturing firms and provides a bird's eye portrait of the dynamism of domestic employment and domestic operations with globalizing corporate activities.

Firms are classified into subsets in three dimensions: subsectors, small or large, and multinationals expanding foreign operations/multinationals not expanding/local firms. Major findings are the following: (i) gross changes in domestic employment and domestic operations are much larger than net changes, showing restructuring dynamism and firm heterogeneity, (ii) de-industrialization or the shrinkage of manufacturing sector is not salient except 1998-2002 though a slight declining trend in manufacturing activities is recently observed, (iii) multinational SMEs expanding foreign operations tend to enlarge domestic employment and domestic operations, compared with other types of SMEs, (iv) multinationals expanding foreign operations are likely to intensify headquarters activities within production networks, and (v) multinational SMEs expanding foreign operations tend to expand exports and imports more than other types of SMEs, suggesting that they extend active operations in international production networks particularly in East Asia.

These results carry profound policy implications. First, in principle, de-industrialization can be stopped or at least delayed if firms are in a favorable environment for effectively utilizing the mechanics of production networks. In Japan, there exists a strong public support for the globalization of corporate activities. Indeed, outward FDI, particularly for extending production networks in East Asia, is pursued not only by large firms but also by SMEs. Both central and local governments aggressively promote such FDI, and even labor unions do not oppose to it. This is because people intuitively know that globalizing firms have actually generated domestic employment and operations. This paper confirms people's intuition that globalizing corporate activities are not necessarily destructing jobs but can rather create domestic employment and operations. Such an effective utilization of fragmentation may further improve the productivity of manufacturing firms not only in Japan but also that of their operations in other East Asian countries.

In this regard, the improvement of location advantages is very important. In an international production network, a firm allocates production processes and tasks to multiple production blocks located at home and abroad. To retain some of the domestic economic activities, the home country must be a favorable place for them; otherwise, all economic activities may move out of the country. It is the responsibility of central and local governments to investigate what sort of economic activities would be appropriate to be kept at home and enhance location advantages for them.

Economic activities suitable for locating in developed countries would be listed as follows: (i) headquarters functions, (ii) research and development (R&D) activities and pilot/mother plants, (iii) highly capital-intensive activities such as system LSI (large scale integration) manufacturing plants, (iv) activities that utilizing agglomeration effects such as automobiles, and (v) activities that use a number of patented and black-boxed technologies such as OEM (original equipment manufacturing) production of laser printers. However, these are just a general notion, and we have to examine the combination of firm-specific assets of leading firms and the niches of location advantages. Firms and location advantages are highly heterogeneous.

Second, the expansion of headquarters function and a sign of relative shrinkage of manufacturing activities indicate a gradual shift in the nature of domestic activities. Whether such a skill shift can be efficiently adjusted within a firm or a firm tends to replace labor in the labor market is one of the issues that we must investigate. For this concern, we need a specialized study because our JC/JD approach at the firm level does not directly observe the movements of individuals within a firm, either across different tasks or across establishments located in different places, or possible firing and new recruitment of labor. The accommodation of skill shift may become an important policy issue.

Another concern is the implication of the shrinkage of manufacturing activities. Can manufacturing firms survive without manufacturing activities at home? According to the theory of production fragmentation, fragmented production blocks cannot be purely capital-intensive or purely labor-intensive; to make fragmentation efficient, each production blocks must carry the combination of various inputs. In this regard, retained production blocks in Japan may need some manufacturing activities with factory workers. This can be a policy concern because whether a firm can keep some manufacturing activities depends on location advantages at home that include the supply of factory workers. The recent debate on possible introduction of unskilled labor from abroad may be interpreted in this context, too.

Third, while our study based on the *Kikatsu* data for more than a decade provides some optimism over the possible de-industrialization of the Japanese economy, quite recent policy debates after the GFC, the Great East Japan Earthquake, and formidable yen appreciation raise big concern about the poor performance of small domestic firms, particularly located in rural areas. The *Kikatsu* data covering firms

with 50 or more workers do not show any shrinkage of workers (and regular workers as well) in the manufacturing sector as shown in Table A.1, even in 2011 and 2012. However, another data source, the Economic Census that also covers small manufacturing firms presents quite different figures (Figure A.1); the employment peaked out in 2007, and a drastic decrease is observed up to 2011. We cannot tell what happens, but one possibility is a poor performance of small manufacturing firms after the GFC. Although this is out of the scope of our study, more investigation is needed beyond the *Kikatsu* data for the assessment of recent economic performance in Japan.

Appendix 1: Trend of corporate structure of Japanese manufacturing firms

Table A.1 present the trend of corporate structure of Japanese manufacturing firms, based on the aggregated data of the *Kikatsu*. According to the *Kikatsu* data, the number of manufacturing firms gradually decreased in the latter half of the 1990s and reached the bottom around 2003. After that, however, the number of firms slightly increased in the latter half of the 2000s before the GFC and slightly decreased in 2009 and 2010, and then in 2011 and 2012 the number seems to return to the level before the GFC. The number of establishments also shows a similar trend. The bottom of employment is also around 2002/2003, but what is interesting is that employment tends to increase after that (even after the GFC), though it dropped in 2009. Regarding affiliates, the number of domestic affiliates seems to have a decreasing trend, while the number of foreign affiliates apparently tends to increase; the increase seems to be accelerated after the GFC. All of these facts suggest that, at least based on the *Kikatsu* data, the manufacturing sector experienced a restructuring period after the Asian Financial Crisis until 2002/2003, but after that, the shrinking of the sector does not seem to be seriously proceeded, including employment.

==Table A.1==

As mentioned in Section 2, however, the *Kitatsu* has size censoring; the survey cover firms with more than 50 workers. Firms less than 50 workers are not included in the survey. Figure A.1 show a rapid declining trend of employment that is hired by manufacturing establishments with no less than four employees after the GFC,

based on the Economic Census (note that this figure is based on the industrial classification of an establishment, not on the industrial classification of a firm). Such a large difference in trend of employment in Table A.1 and Figure A.1 may be partly explained by the decline of employment by firms with less than 50 workers. Since our analysis and discussion are based on the *Kikatsu* data, the possible trend by these very small firms cannot be fully captured.

==Figure A.1==

Table A.2 in turn presents some information on Japanese affiliates abroad, based on the *Kaiji* data (Overseas Business Activities of Japanese Companies), which is conducted by Ministry of Economy, Trade, and Industry (METI), Government of Japan. The effective return ratios of this survey are as low as around 60 percent since the survey is voluntary (i.e., non-compulsory) unlike the other METI database such as the *Kikatsu*, and thus, strictly speaking, time-series may not be compared. However, this table also confirms that manufacturing operations abroad by Japanese firms tend to expand in terms of the number of affiliates, employment, and sales, particularly in East Asia.

== Table A.2 ==

Appendix 2: Non-regular workers

Ratios of non-regular workers corresponding to our data set are presented in Table A.3. Non-regular workers consist of part-time workers (Type 1), *Hiyatoi* or day workers (Type 2), and *Haken* or temporary agency workers (Type 3). Part-time workers are counted with regular workers in our data set while the latter two are not. Although part-time workers occupy 7 to 10 percent of total workers, they are highly concentrated in food processing. The number of *Hiyatoi* is limited. The significance of *Haken* goes up with the deregulation for the manufacturing activities in 2004 and gradually comes down after the economic downturn due to the GFC. Overall, at least in manufacturing firms covered by the *Kikatsu* data, non-regular workers have not been very significant over our sample period, not replacing a large portion of regular workers,

except in food processing industry.

== Table A.3==

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Table 1 Sectoral composition of basic data for manufacturing firms: 2010

Industry classification		Ave firm size	Sectoral share (%)							
			# of firms	Dom employment			Dom establish ement	Dom affiliates	Exports	Imports
				Total	HQ	Mfg				
1	Food processing	384	11.3	10.9	6.6	12.2	15.4	8.3	0.2	1.4
2	Beverages, tobacco, & animal feed	430	1.5	1.6	1.6	1.0	2.9	2.4	0.0	0.4
3	Textiles	173	1.7	0.7	0.6	0.9	0.9	1.2	0.1	0.3
4	Apparel	182	1.9	0.9	0.6	0.8	1.3	1.3	0.0	0.4
5	Wood and wood products	177	1.1	0.5	0.3	0.6	1.1	0.6	0.0	0.5
6	Furniture and fixtures	257	1.0	0.6	0.6	0.5	1.4	0.6	0.0	0.1
7	Pulp, paper, and paper products	251	3.1	2.0	1.2	2.2	2.5	3.4	0.1	0.4
8	Publishing and printing	242	4.6	2.8	2.2	2.6	3.5	2.9	0.5	0.1
9	Chemicals	528	7.2	9.5	10.5	6.8	10.7	12.8	6.7	7.2
10	Petroleum and coal products	439	0.4	0.5	0.5	0.4	0.5	1.3	1.7	27.5
11	Plastic products	250	5.7	3.6	2.6	3.8	4.6	4.5	0.9	0.7
12	Rubber products	481	1.1	1.4	1.1	1.7	0.8	1.7	1.5	2.1
13	Leather and leather products	126	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1
14	Ceramics, clay, and stone products	221	3.4	1.9	1.5	2.0	4.1	5.0	0.9	0.7
15	Iron and steel	382	3.4	3.2	1.9	3.9	2.4	4.2	5.1	10.9
16	Nonferrous metal	375	2.8	2.6	1.8	2.8	2.1	4.1	2.7	5.2
17	Metal products	215	7.9	4.3	4.1	4.3	8.1	4.3	0.4	0.8
18	General machinery	345	12.8	11.1	12.7	10.2	13.1	9.7	14.3	9.1
19	Electric machinery	566	14.0	19.6	19.4	19.3	11.9	15.7	25.5	19.4
20	Transport equipment	739	9.6	17.7	23.8	20.1	5.8	12.1	35.0	7.8
21	Precision machinery	410	2.5	2.6	3.3	2.2	3.3	1.7	3.3	3.0
22	Other manufacturing	302	2.8	2.1	2.8	1.6	3.3	2.1	1.1	2.1
	All manufacturing	400	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Data:authors' calculation, based on METI database.
Note: data are only for 2010. Average firm size is the average of the total employment.

Table 2 By-sector share of SMEs in basic data for manufacturing firms: 2010 (%)

	# of firms	Dom employment			Dom establish ement	Dom affiliates	Exports	Imports
		Total	HQ	Mfg				
1	72.4	26.0	35.1	26.3	34.7	33.7	18.5	47.8
2	71.6	22.4	27.3	34.8	29.6	26.8	32.3	24.8
3	91.5	65.8	65.3	69.6	74.1	51.1	45.5	39.0
4	90.9	59.0	64.0	69.5	66.9	45.3	29.0	56.3
5	88.0	58.7	62.2	61.4	61.8	59.6	89.5	48.5
6	86.5	41.4	45.3	55.1	43.7	40.8	25.2	45.5
7	83.3	39.2	52.0	39.5	59.2	28.1	15.5	17.4
8	84.8	42.2	44.7	44.4	65.3	45.1	6.3	64.3
9	69.5	18.3	23.5	23.9	35.4	16.7	10.7	22.4
10	68.5	18.6	25.0	18.6	49.6	8.2	7.9	3.1
11	81.4	41.0	45.4	46.3	60.3	26.8	13.4	39.2
12	76.5	21.6	26.2	21.0	57.4	9.8	2.5	5.2
13	93.3	78.5	86.6	88.7	82.6	88.9	100.0	95.0
14	84.6	47.8	52.8	48.8	64.2	41.1	11.7	29.5
15	78.7	25.4	36.7	25.5	58.5	19.5	1.9	1.3
16	77.1	26.8	35.0	31.5	49.7	15.2	7.3	16.0
17	85.7	47.0	47.1	53.7	49.9	37.8	34.3	38.0
18	79.9	29.0	32.6	32.7	49.1	26.7	8.0	9.0
19	70.1	16.9	21.5	18.4	40.4	15.0	4.2	10.6
20	66.2	12.5	9.0	13.7	44.7	9.5	1.4	6.0
21	72.4	23.0	24.7	24.2	40.3	18.8	5.5	11.8
22	77.5	31.9	30.8	37.6	45.3	28.7	11.1	12.8
	76.7	24.8	26.0	27.2	46.1	23.3	4.7	9.9

Data:authors' calculation, based on METI database.
Note: data are only for 2010. See Table 1 for industry classification.

Table 3 Composition of manufacturing MNEs: 2010

	All size				i) SMEs				ii) large firms			
	All	E. Asia	N.America	Europe	All	E. Asia	N.America	Europe	All	E. Asia	N.America	Europe
Number of firms with affiliates in each region: ratio to the total number of MNEs (%)												
	100.0	90.8	37.6	22.5	100.0	88.8	21.7	8.3	100.0	93.0	55.1	38.3
By-size share of firms with affiliates in each region (%)												
	100.0	100.0	100.0	100.0	52.4	51.2	30.2	19.2	47.6	48.8	69.8	80.8
By-sector share of firms with affiliates in each region (%)												
1	4.3	4.1	3.8	2.2	3.1	3.0	2.4	0.7	5.7	5.4	4.4	2.5
2	1.0	0.7	1.2	0.8	0.6	0.5	0.5	0.7	1.4	1.0	1.5	0.8
3	1.3	1.5	1.0	0.5	1.8	2.0	1.4	1.4	0.9	1.0	0.8	0.3
4	1.9	2.0	0.5	0.4	3.0	3.3	0.8		0.6	0.7	0.4	0.5
5	0.5	0.5	0.2		0.7	0.7	0.3		0.3	0.3	0.2	
6	0.8	0.8	0.2	0.3	0.8	0.9	0.3	0.7	0.7	0.7	0.2	0.2
7	1.7	1.6	1.0	0.8	1.3	1.3	0.8		2.1	1.9	1.1	1.0
8	1.1	1.1	0.7	1.0	1.1	1.1	0.5	0.7	1.2	1.2	0.8	1.0
9	9.2	8.9	11.2	13.9	6.8	6.5	7.0	9.9	11.8	11.5	13.0	14.8
10	0.5	0.4	0.6	0.7	0.4	0.3	0.5		0.6	0.6	0.6	0.8
11	6.9	7.3	4.4	3.7	8.5	9.1	4.1	1.4	5.1	5.3	4.6	4.2
12	1.6	1.7	1.5	1.8	1.6	1.8		0.7	1.5	1.7	2.2	2.0
13	0.2	0.3			0.5	0.5	0.5		0.0	0.0	-0.2	0.0
14	2.5	2.5	1.5	1.9	2.7	2.8	1.1	2.8	2.2	2.3	1.8	1.7
15	2.4	2.3	1.6	1.0	1.9	1.8	1.1		2.9	2.8	1.9	1.2
16	3.5	3.7	2.8	3.3	3.5	3.8	2.4	3.5	3.5	3.6	2.9	3.2
17	7.3	7.4	5.3	2.3	9.2	9.2	8.1	5.0	5.3	5.4	4.1	1.7
18	16.9	16.7	19.3	20.4	18.8	18.1	27.0	27.7	14.9	15.2	16.0	18.7
19	16.6	17.1	17.4	21.2	16.9	17.3	19.7	24.8	16.4	16.8	16.5	20.3
20	13.2	13.0	16.7	13.6	10.2	9.9	10.0	5.7	16.5	16.1	19.6	15.5
21	3.2	3.0	5.0	6.1	2.9	2.6	6.2	7.8	3.4	3.5	4.4	5.7
22	3.3	3.3	3.9	4.3	3.6	3.6	5.1	6.4	3.0	3.0	3.4	3.9

Data:authors' calculation, based on METI database.

Note: data are only for 2010. See Table 1 for industry classification.

Table 4 The number of manufacturing firms by the type and their sectoral shares

	1998-2002			2002-2006			2006-2008			2008-2010		
	MNE1	MNE2	Local	MNE1	MNE2	Local	MNE1	MNE2	Local	MNE1	MNE2	Local
Number of firms												
	1168	1453	8507	1433	1430	8004	838	2161	8628	865	2320	8640
(SME %)	(44.0)	(47.2)	(83.6)	(40.3)	(57.3)	(85.3)	(37.0)	(55.3)	(85.0)	(41.0)	(56.2)	(84.4)
1st FDI	506			503			208			260		
(SME %)	(68.8)			(65.0)			(66.3)			(71.2)		
By-sector shares (%): all size												
1	4.0	5.7	12.6	4.2	5.6	13.6	4.4	5.0	13.6	4.5	4.7	13.6
2	1.1	1.1	1.9	1.1	1.3	2.0	1.6	1.0	1.7	0.9	1.1	1.8
3	2.0	2.5	2.6	1.8	2.2	2.1	1.6	2.1	2.2	1.4	1.6	1.9
4	1.5	2.6	2.8	1.3	1.8	2.2	0.6	1.9	1.9	1.7	1.8	2.0
5	0.4	0.8	1.3	0.4	0.8	1.2	0.2	0.7	1.2	0.1	0.5	1.3
6	0.7	1.4	1.4	1.0	1.0	1.3	0.1	1.1	1.0	0.7	0.9	1.0
7	1.5	1.4	3.9	2.4	1.3	3.7	1.8	1.9	3.3	1.3	1.9	3.5
8	1.5	2.9	7.1	1.5	1.5	5.7	1.3	1.3	5.6	0.7	1.5	5.6
9	11.6	9.7	6.3	9.9	9.9	6.2	12.4	8.7	6.6	11.0	8.9	6.5
10	0.3	0.6	0.5	0.6	0.6	0.4	0.2	0.6	0.4	0.7	0.5	0.4
11	5.7	5.1	4.7	5.3	6.8	5.0	6.4	5.9	5.1	5.3	6.5	5.4
12	2.0	1.1	1.0	2.0	1.0	1.0	2.1	1.2	1.0	1.7	1.5	0.9
13	0.1	0.3	0.3	0.3	0.3	0.2	0.1	0.2	0.3	0.2	0.2	0.3
14	2.4	2.7	4.5	2.6	2.5	4.4	2.1	2.4	4.0	1.6	2.6	3.9
15	1.6	2.4	3.3	2.4	2.4	3.5	1.9	2.7	3.8	2.8	2.5	3.7
16	3.8	2.8	2.4	3.0	2.4	2.4	3.5	2.7	2.4	3.5	3.1	2.4
17	5.1	7.0	7.7	5.4	6.9	7.8	5.8	7.5	7.7	7.6	7.6	7.8
18	14.8	14.5	11.0	18.4	15.1	11.3	16.0	15.5	11.6	18.2	15.9	11.6
19	18.9	18.6	12.8	18.1	19.4	13.7	17.9	18.5	13.6	16.4	17.4	13.3
20	13.6	9.8	7.6	12.9	10.3	7.4	13.1	13.2	8.0	12.0	13.6	8.1
21	4.5	3.7	2.4	3.5	3.7	2.6	3.8	3.1	2.5	4.4	2.6	2.3
22	2.8	3.2	2.0	2.0	3.1	2.1	2.9	2.9	2.5	3.2	3.2	2.7

Data:authors' calculation, based on METI database.

Note: data are based on balanced panel data for each period. See Table 1 for industry classification.

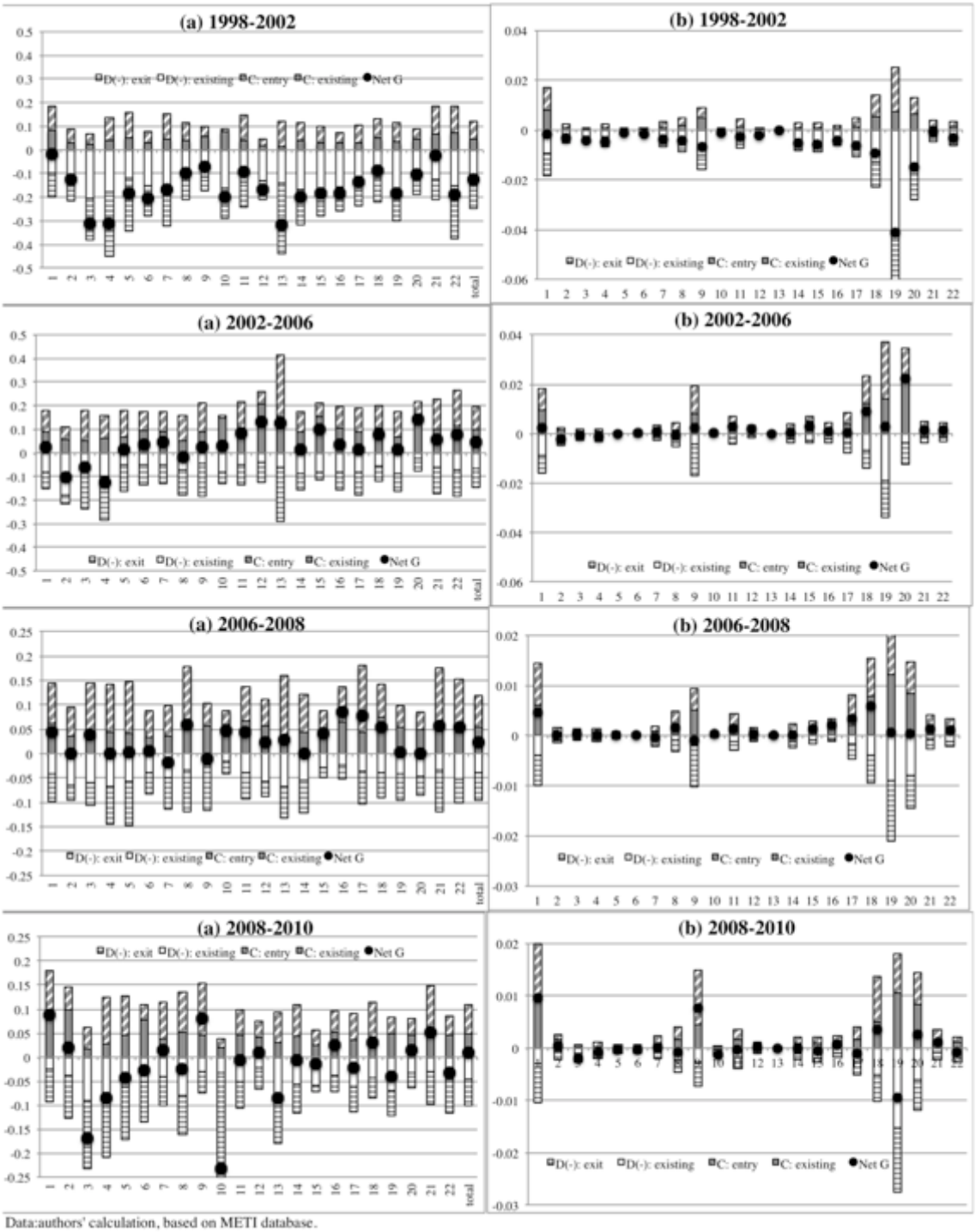
Table 5 Expanding MNEs in manufacturing sectors by firm size and region

	1998-2002				2002-2006				2006-2008				2008-2010			
	All	E. Asia	N.America	Europe	All	E. Asia	N.America	Europe	All	E. Asia	N.America	Europe	All	E. Asia	N.America	Europe
Number of firms: ratio to the total number of expanding MNEs (%)																
All size	100.0	89.0	27.1	19.9	100.0	95.3	25.9	20.7	100.0	82.1	24.1	21.1	100.0	91.0	23.7	17.8
SMEs	100.0	86.0	18.5	8.0	100.0	93.8	12.6	6.2	100.0	81.9	14.5	5.2	100.0	88.2	11.8	5.6
Large firms	100.0	91.4	33.9	29.2	100.0	96.3	34.9	30.5	100.0	82.2	29.7	30.5	100.0	92.9	32.0	26.3
Number of firms: SMEs' share for each region (%)																
	44.0	42.5	30.0	17.7	40.3	39.7	19.7	12.1	37.0	36.9	22.3	9.0	41.0	39.8	20.5	13.0

Data:authors' calculation, based on METI database.

Note: data are based on balanced panel data for each period.

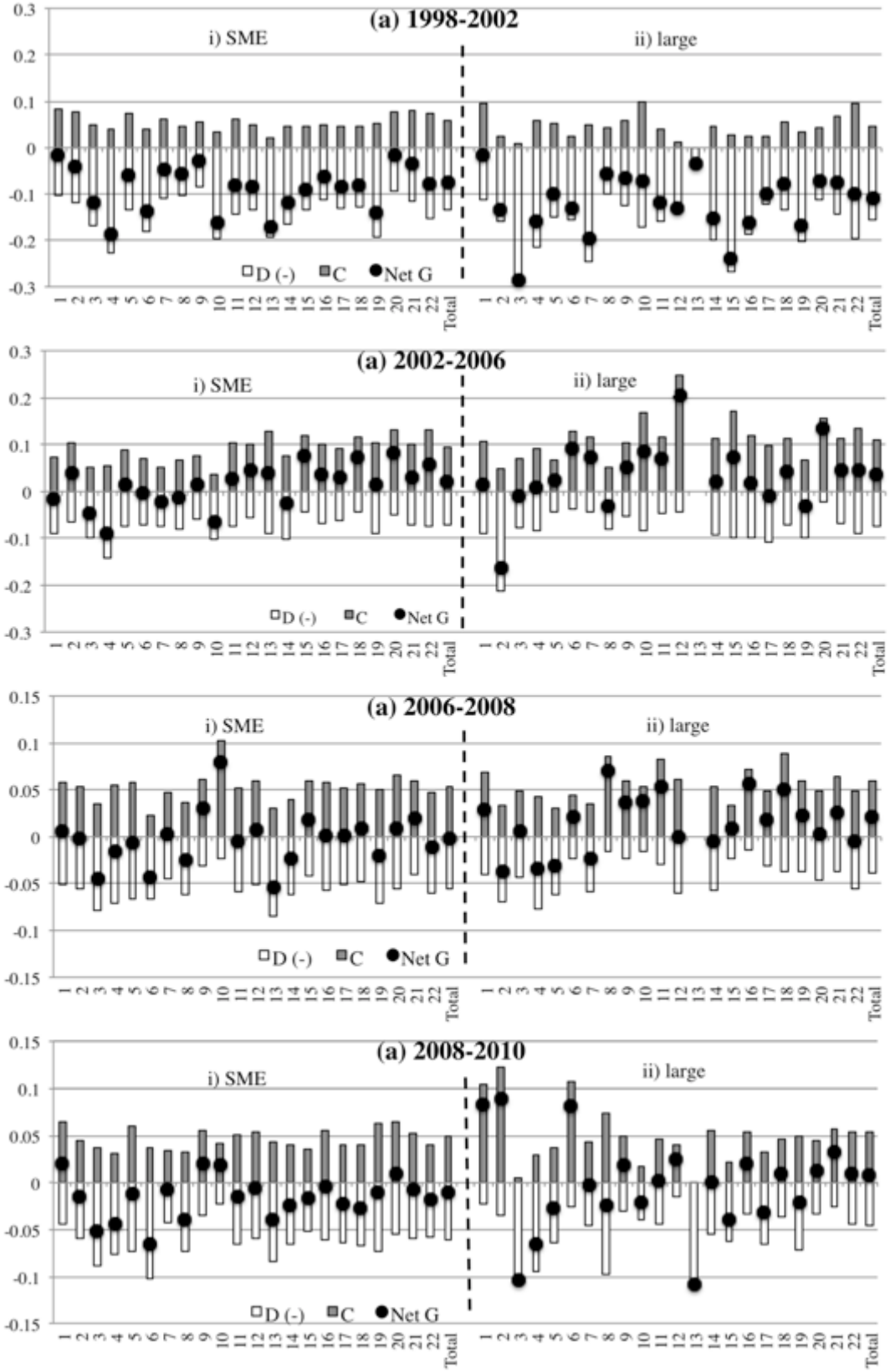
Figure 1 "Full" decomposition of changes in domestic employment by Japanese manufacturing firms



Data:authors' calculation, based on METI database.

Note: data are based on unbalanced panel data with some treatment. C, D (-), and Net G refer to gross (job) creation, gross (job) destruction, and net change.

Figure 2 "Panel" decomposition of changes in domestic employment by Japanese manufacturing SMEs and large firms



Data:authors' calculation, based on METI database.

Note: data are based on balanced panel data for each period. C/D (-) and Net G refer to gross (job) creation/destruction and net change.

Table 6 Changes in domestic operations and trade: dom employment

	MNE1			MNE2			Local		
	C	D (-)	Net G	C	D (-)	Net G	C	D (-)	Net G
(i) SMEs									
Dom employment									
1998-2002	0.072	-0.126	-0.054	0.046	-0.168	-0.123	0.058	-0.130	-0.061
2002-2006	0.129	-0.052	0.077	0.085	-0.084	0.001	0.092	-0.072	0.020
2006-2008	0.072	-0.046	0.026	0.049	-0.060	-0.010	0.054	-0.054	-0.001
2008-2010	0.051	-0.058	-0.007	0.046	-0.072	-0.026	0.051	-0.058	-0.007
HQ employment									
1998-2002	0.183	-0.269	-0.087	0.140	-0.293	-0.154	0.143	-0.295	-0.152
2002-2006	0.249	-0.137	0.112	0.180	-0.187	-0.007	0.188	-0.171	0.017
2006-2008	0.177	-0.124	0.053	0.138	-0.123	0.015	0.131	-0.130	0.001
2008-2010	0.140	-0.146	-0.006	0.095	-0.142	-0.047	0.123	-0.132	-0.009
mfg employment									
1998-2002	0.114	-0.183	-0.069	0.075	-0.231	-0.156	0.102	-0.165	-0.063
2002-2006	0.145	-0.147	-0.002	0.119	-0.152	-0.033	0.113	-0.150	-0.038
2006-2008	0.124	-0.126	-0.003	0.094	-0.120	-0.026	0.099	-0.110	-0.011
2008-2010	0.106	-0.129	-0.023	0.104	-0.104	0.000	0.104	-0.095	0.009
(ii) large firms									
Dom employment									
1998-2002	0.045	-0.164	-0.119	0.043	-0.166	-0.123	0.076	-0.126	-0.061
2002-2006	0.113	-0.064	0.049	0.077	-0.097	-0.020	0.135	-0.076	0.060
2006-2008	0.057	-0.030	0.027	0.050	-0.046	0.005	0.079	-0.041	0.037
2008-2010	0.051	-0.035	0.016	0.045	-0.051	-0.006	0.073	-0.054	0.019
HQ employment									
1998-2002	0.106	-0.332	-0.227	0.098	-0.294	-0.196	0.124	-0.286	-0.162
2002-2006	0.172	-0.124	0.048	0.143	-0.190	-0.048	0.190	-0.174	0.016
2006-2008	0.107	-0.060	0.047	0.131	-0.084	0.048	0.148	-0.116	0.032
2008-2010	0.115	-0.053	0.062	0.144	-0.088	0.057	0.136	-0.131	0.005
mfg employment									
1998-2002	0.050	-0.225	-0.175	0.035	-0.270	-0.235	0.107	-0.188	-0.082
2002-2006	0.100	-0.144	-0.043	0.098	-0.194	-0.097	0.168	-0.158	0.010
2006-2008	0.089	-0.069	0.020	0.090	-0.082	0.007	0.123	-0.107	0.016
2008-2010	0.067	-0.064	0.004	0.081	-0.082	0.000	0.127	-0.079	0.047

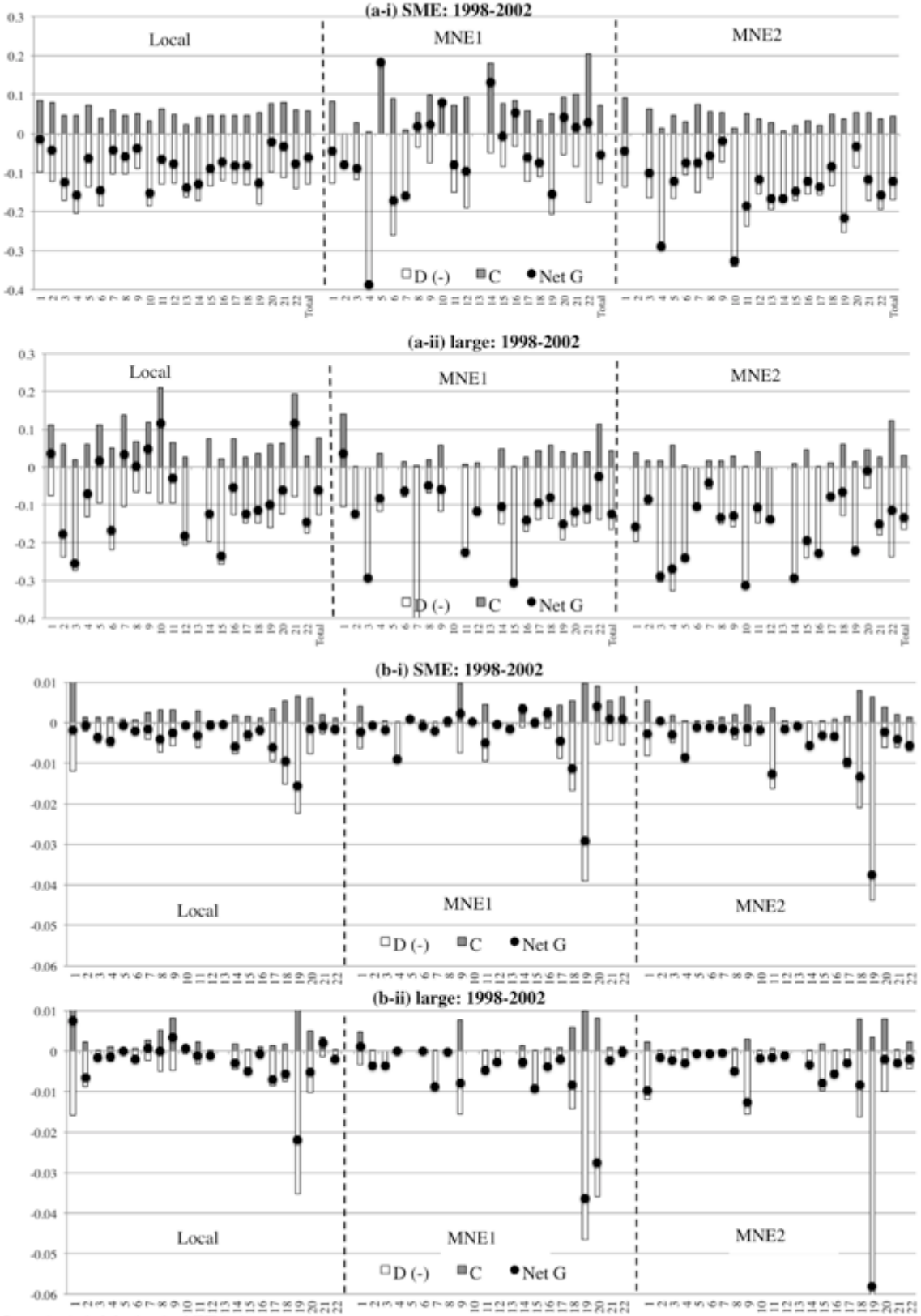
Data:authors' calculation, based on METI database.

Note: data are based on balanced panel data for each period.

C, D (-), and Net G refer to gross (job) creation, gross (job) destruction, and net change.

The largest figures among 3 types of firms for C/D (-)/Net G are highlighted .

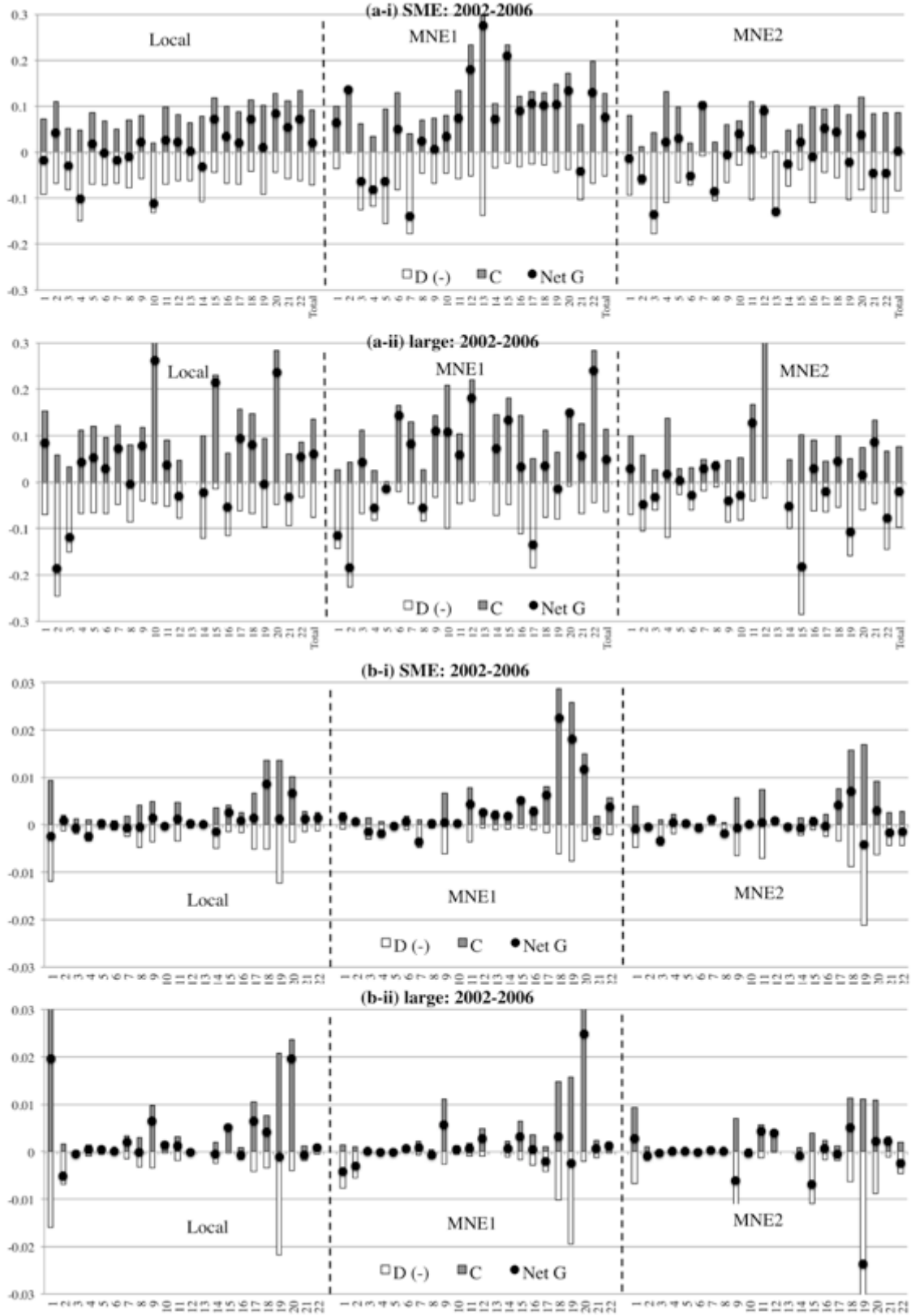
Figure 3 The decomposition of changes in domestic employment by the type of firms: 1998-2002



Data:authors' calculation, based on METI database.

Note: data are based on balanced panel data for each period. C/D (-) and Net G refer to gross (job) creation/destruction and net change.

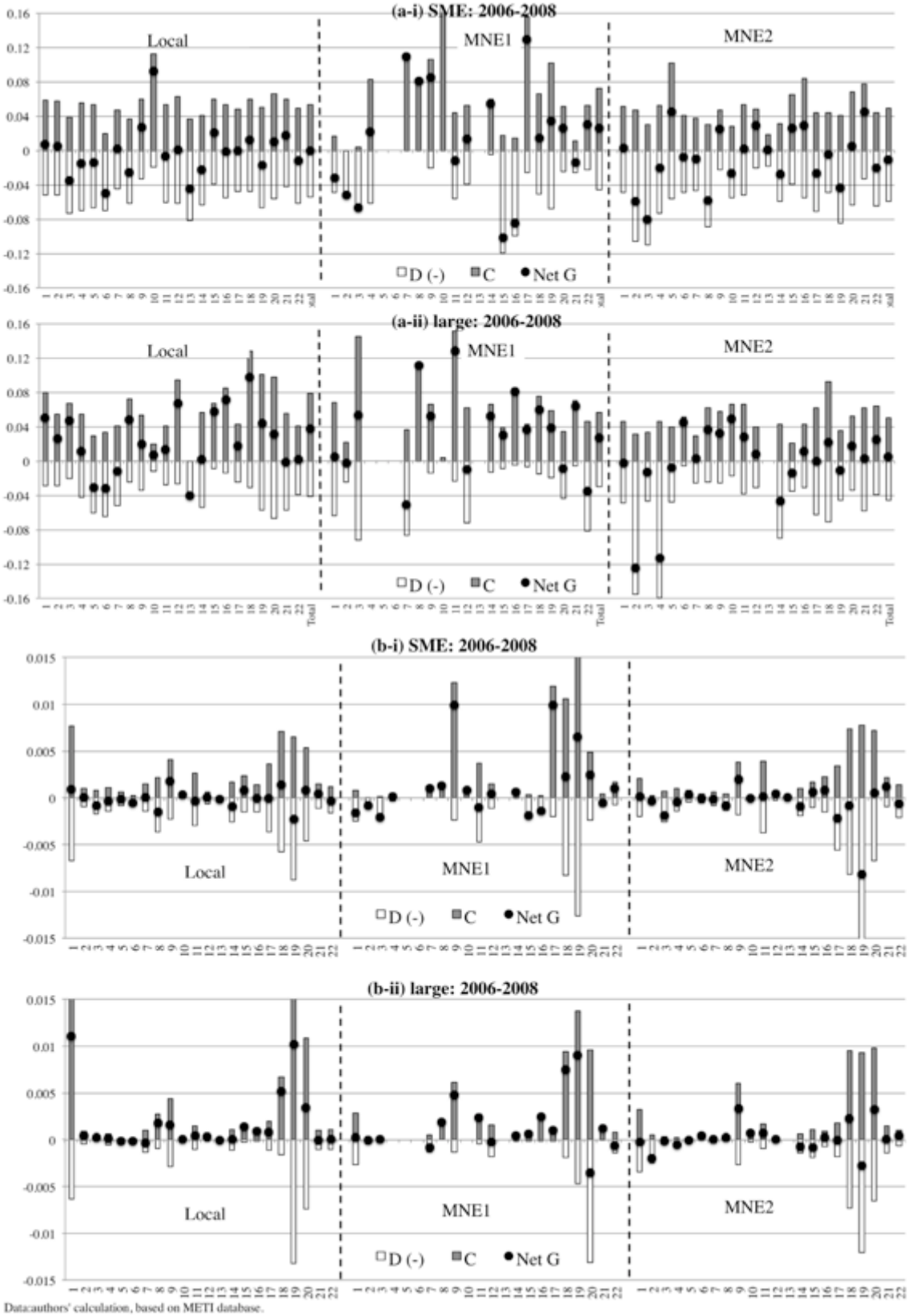
Figure 4 The decomposition of changes in domestic employment by the type of firms: 2002-2006



Datacauthors' calculation, based on METI database.

Note: data are based on balanced panel data for each period. C/D (-) and Net G refer to gross (job) creation/destruction and net change.

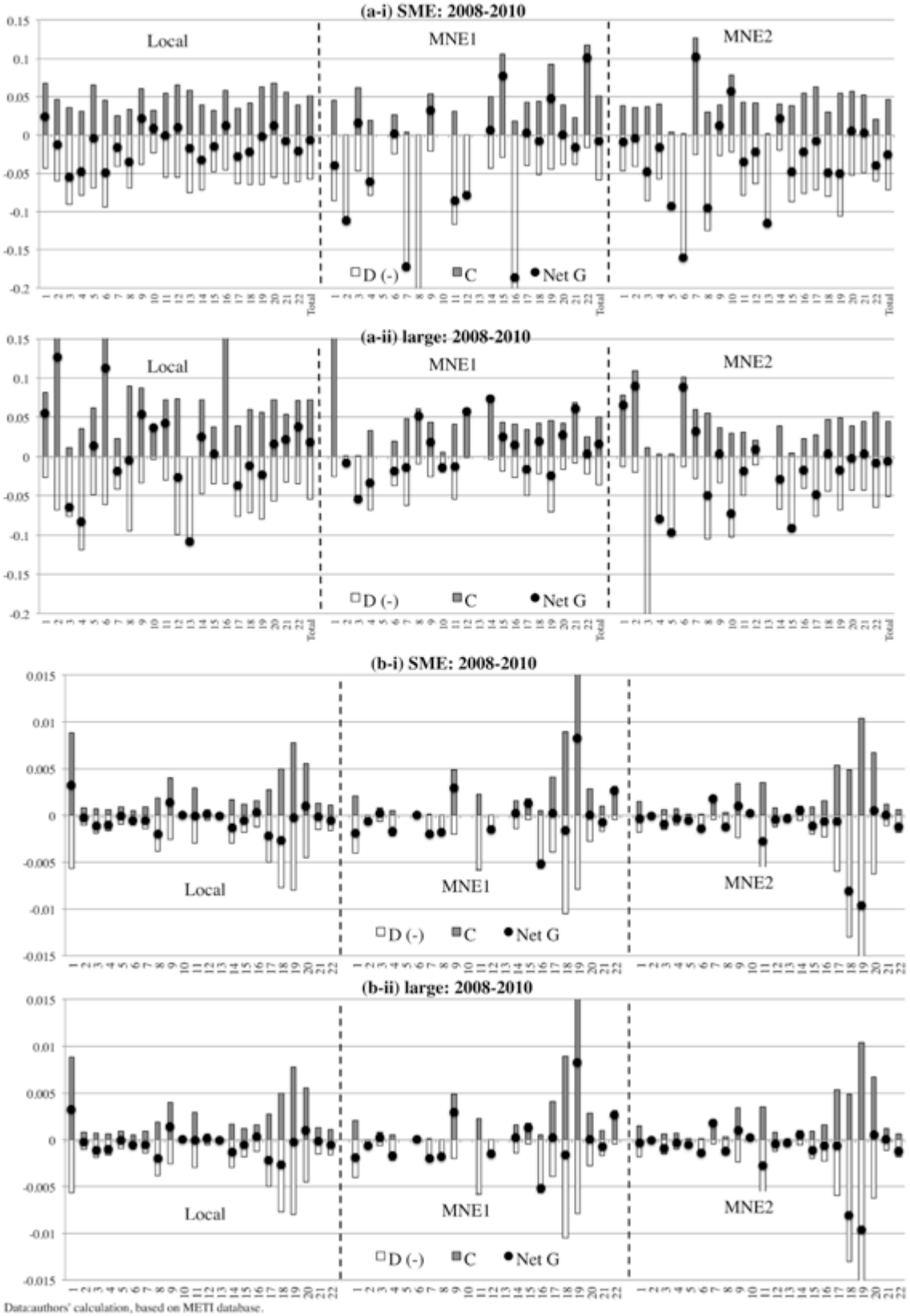
Figure 5 The decomposition of changes in domestic employment by the type of firms: 2006-2008



Data:authors' calculation, based on METI database.

Note: data are based on balanced panel data for each period. C/D (-) and Net G refer to gross (job) creation/destruction and net change.

Figure 6 The decomposition of changes in domestic employment by the type of firms: 2008-2010



Datacauthors' calculation, based on METI database.
Note: data are based on balanced panel data for each period. C/D (-) and Net G refer to gross (job) creation/destruction and net change.

Table 7 Changes in domestic operations and trade: dom establishement, affiliates, and trade

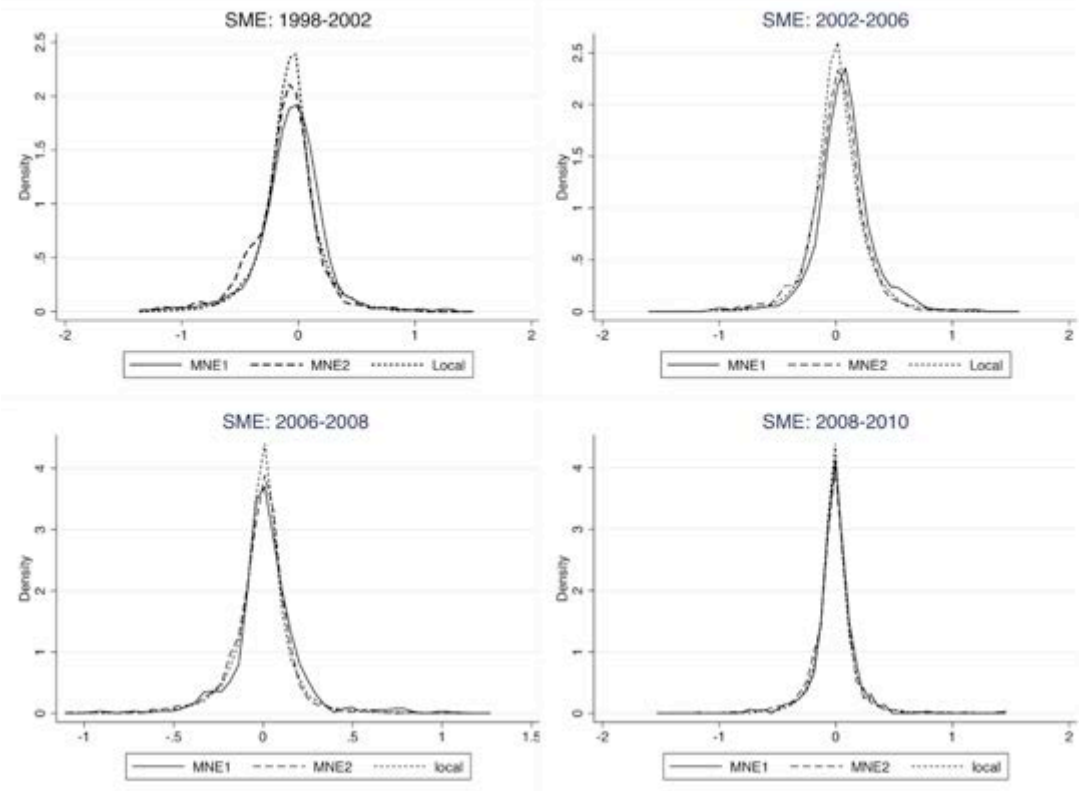
	MNE1			MNE2			Local		
	C	D (-)	Net G	C	D (-)	Net G	C	D (-)	Net G
(i) SMEs									
Dom establishments									
1998-2002	0.140	-0.126	0.014	0.103	-0.141	-0.038	0.110	-0.125	-0.015
2002-2006	0.124	-0.099	0.025	0.092	-0.120	-0.028	0.106	-0.096	0.011
2006-2008	0.103	-0.062	0.041	0.058	-0.061	-0.003	0.070	-0.066	0.004
2008-2010	0.080	-0.062	0.019	0.041	-0.080	-0.039	0.049	-0.060	-0.011
Dom affiliates									
1998-2002	0.291	-0.225	0.066	0.190	-0.265	-0.074	0.212	-0.353	-0.141
2002-2006	0.304	-0.232	0.072	0.140	-0.301	-0.161	0.215	-0.272	-0.057
2006-2008	0.886	-0.098	0.788	0.089	-0.131	-0.042	0.119	-0.168	-0.049
2008-2010	0.218	-0.139	0.079	0.082	-0.235	-0.152	0.132	-0.111	0.021
Exports									
1998-2002	0.465	-0.245	0.220	0.312	-0.362	-0.050	0.468	-0.399	0.069
2002-2006	0.605	-0.089	0.516	0.520	-0.179	0.341	0.687	-0.156	0.530
2006-2008	0.323	-0.161	0.162	0.165	-0.194	-0.029	0.582	-0.188	0.394
2008-2010	0.376	-0.234	0.142	0.267	-0.199	0.067	0.404	-0.258	0.146
Imports									
1998-2002	0.577	-0.190	0.387	0.335	-0.281	0.054	0.485	-0.335	0.150
2002-2006	0.747	-0.180	0.567	0.561	-0.176	0.385	0.786	-0.091	0.694
2006-2008	0.264	-0.224	0.040	0.137	-0.330	-0.194	0.213	-0.244	-0.031
2008-2010	0.374	-0.141	0.233	0.291	-0.255	0.036	0.238	-0.259	-0.021
(ii) large firms									
Dom establishments									
1998-2002	0.120	-0.174	-0.054	0.127	-0.151	-0.024	0.153	-0.123	0.030
2002-2006	0.121	-0.126	-0.005	-0.009	-0.178	-0.187	0.128	-0.114	0.014
2006-2008	0.066	-0.072	-0.006	0.071	-0.109	-0.038	0.071	-0.052	0.019
2008-2010	0.062	-0.081	-0.018	0.064	-0.080	-0.016	0.115	-0.066	0.049
Dom affiliates									
1998-2002	0.129	-0.162	-0.033	0.041	-0.246	-0.205	0.147	-0.165	-0.018
2002-2006	0.206	-0.082	0.125	0.072	-0.242	-0.170	0.187	-0.202	-0.015
2006-2008	0.125	-0.072	0.052	0.040	-0.188	-0.148	0.085	-0.107	-0.022
2008-2010	0.115	-0.090	0.025	0.027	-0.151	-0.124	0.094	-0.096	-0.001
Exports									
1998-2002	0.207	-0.073	0.133	0.151	-0.111	0.040	0.399	-0.372	0.027
2002-2006	0.457	-0.069	0.388	0.365	-0.115	0.251	0.514	-0.165	0.349
2006-2008	0.062	-0.152	-0.089	0.109	-0.199	-0.089	0.200	-0.423	-0.223
2008-2010	0.158	-0.182	-0.024	0.164	-0.162	0.002	0.397	-0.217	0.181
Imports									
1998-2002	0.705	-0.119	0.586	0.469	-0.219	0.250	0.852	-0.068	0.784
2002-2006	0.602	-0.344	0.258	0.605	-0.150	0.455	0.579	-0.162	0.417
2006-2008	0.145	-0.263	-0.118	0.235	-0.242	-0.006	0.192	-0.128	0.064
2008-2010	0.255	-0.306	-0.051	0.289	-0.255	0.034	0.131	-0.324	-0.192

Data:authors' calculation, based on METI database.

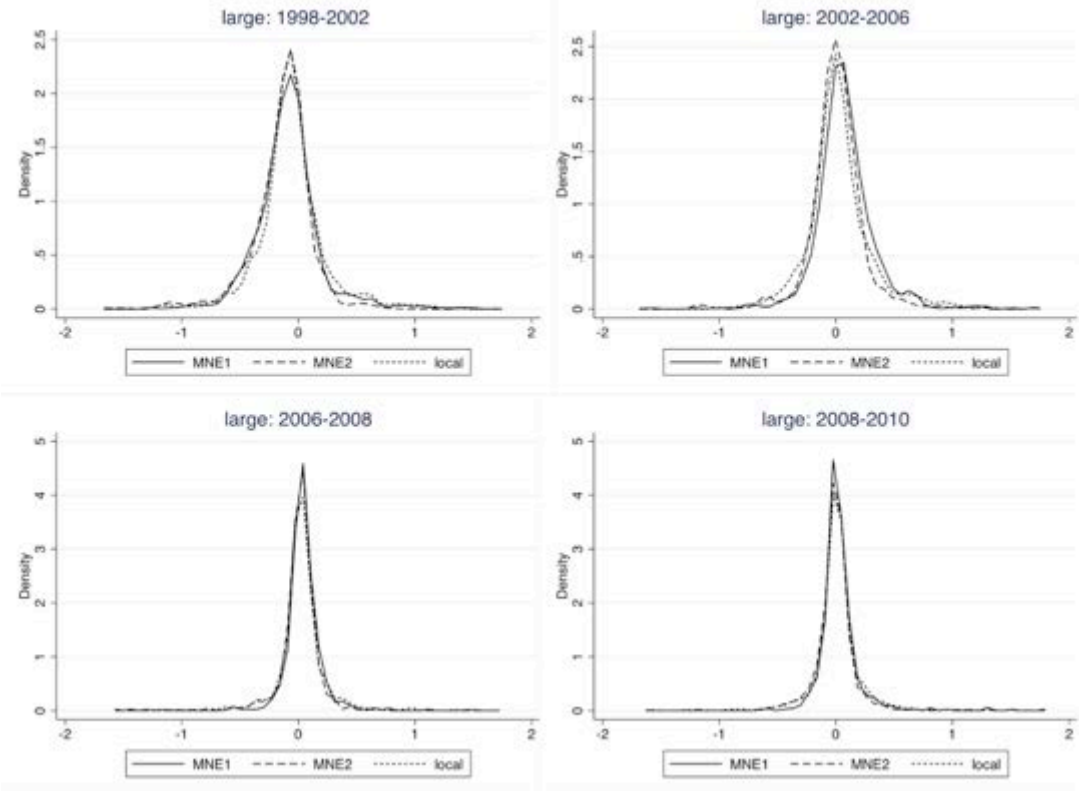
Note: see for Table 6.

Figure 7 Kernel density estimates of changes in domestic employment

i) SMEs



ii) large firms



Data:authors' calculation, based on METI database.

Table 8 KS test for expanding MNEs: dom employment

	MNE1 v.s. MNE2				MNE1 v.s. Local			
	Two-sided		One-sided		Two-sided		One-sided	
	Coef.	P value	Coef.	P value	Coef.	P value	Coef.	P value
(i) SMEs								
Dom employment								
1998-2002	0.117	0.001	0.001	1.000	0.090	0.001	0.020	0.684
2002-2006	0.127	0.000	0.002	0.998	0.157	0.000	0.006	0.962
2006-2008	0.081	0.066	0.007	0.975	0.080	0.038	0.018	0.827
2008-2010	0.059	0.256	0.010	0.947	0.038	0.698	0.017	0.816
HQ employment								
1998-2002	0.083	0.030	0.013	0.909	0.067	0.024	0.015	0.812
2002-2006	0.121	0.000	0.006	0.980	0.113	0.000	0.005	0.969
2006-2008	0.076	0.100	0.013	0.919	0.098	0.005	0.013	0.910
2008-2010	0.085	0.030	0.028	0.638	0.062	0.136	0.035	0.433
Mfg employment								
1998-2002	0.104	0.003	0.007	0.976	0.057	0.089	0.043	0.181
2002-2006	0.083	0.017	0.000	1.000	0.106	0.000	0.034	0.304
2006-2008	0.062	0.300	0.044	0.410	0.058	0.274	0.057	0.163
2008-2010	0.053	0.423	0.039	0.459	0.051	0.346	0.051	0.188
(ii) large firms								
Dom employment								
1998-2002	0.080	0.019	0.000	1.000	0.073	0.015	0.073	0.009
2002-2006	0.144	0.000	0.003	0.993	0.145	0.000	0.016	0.769
2006-2008	0.098	0.002	0.007	0.971	0.091	0.003	0.023	0.665
2008-2010	0.087	0.009	0.000	1.000	0.060	0.127	0.027	0.575
HQ employment								
1998-2002	0.041	0.580	0.016	0.831	0.027	0.883	0.020	0.692
2002-2006	0.113	0.000	0.008	0.956	0.086	0.001	0.017	0.753
2006-2008	0.087	0.010	0.018	0.798	0.091	0.003	0.027	0.571
2008-2010	0.094	0.004	0.013	0.890	0.118	0.000	0.020	0.735
Mfg employment								
1998-2002	0.093	0.004	0.000	1.000	0.093	0.001	0.093	0.001
2002-2006	0.081	0.017	0.012	0.898	0.054	0.106	0.018	0.720
2006-2008	0.057	0.218	0.005	0.983	0.056	0.192	0.021	0.734
2008-2010	0.045	0.490	0.008	0.962	0.053	0.252	0.053	0.138

Data:authors' calculation, based on METI database.

Note: data are based on balanced panel data for each period.

The cases are highlighed if the results suggest stochastic dominance.

Table 9 KS test for expanding MNEs: dom establishement, affiliates, and trade

	MNE1 v.s. MNE2				MNE1 v.s. Local			
	Two-sided		One-sided		Two-sided		One-sided	
	Coef.	P value	Coef.	P value	Coef.	P value	Coef.	P value
(i) SMEs								
Dom establishments								
1998-2002	0.052	0.371	0.002	0.998	0.079	0.004	0.053	0.067
2002-2006	0.053	0.270	0.013	0.892	0.076	0.004	0.076	0.002
2006-2008	0.080	0.077	0.002	0.997	0.098	0.005	0.023	0.735
2008-2010	0.050	0.470	0.002	0.998	0.060	0.152	0.048	0.209
Dom affiliates								
1998-2002	0.177	0.000	0.000	1.000	0.114	0.001	0.000	1.000
2002-2006	0.131	0.001	0.000	1.000	0.123	0.000	0.000	1.000
2006-2008	0.135	0.010	0.064	0.327	0.133	0.005	0.052	0.415
2008-2010	0.165	0.000	0.003	0.997	0.120	0.011	0.063	0.254
Exports								
1998-2002	0.225	0.000	0.000	1.000	0.181	0.000	0.000	1.000
2002-2006	0.179	0.000	0.000	1.000	0.124	0.000	0.012	0.906
2006-2008	0.131	0.003	0.000	1.000	0.115	0.009	0.005	0.992
2008-2010	0.112	0.011	0.006	0.984	0.070	0.211	0.052	0.315
Imports								
1998-2002	0.231	0.000	0.000	1.000	0.155	0.000	0.000	1.000
2002-2006	0.209	0.000	0.000	1.000	0.152	0.000	0.000	1.000
2006-2008	0.062	0.539	0.038	0.625	0.053	0.691	0.026	0.796
2008-2010	0.106	0.029	0.028	0.757	0.065	0.338	0.011	0.952
(ii) large firms								
Dom establishments								
1998-2002	0.048	0.376	0.048	0.203	0.170	0.000	0.170	0.000
2002-2006	0.077	0.026	0.009	0.940	0.085	0.001	0.085	0.001
2006-2008	0.067	0.082	0.023	0.690	0.086	0.006	0.083	0.006
2008-2010	0.032	0.864	0.008	0.958	0.103	0.001	0.103	0.000
Dom affiliates								
1998-2002	0.125	0.000	0.000	1.000	0.076	0.032	0.076	0.019
2002-2006	0.177	0.000	0.000	1.000	0.133	0.000	0.037	0.386
2006-2008	0.184	0.000	0.002	0.996	0.177	0.000	0.098	0.005
2008-2010	0.130	0.000	0.000	1.000	0.189	0.000	0.189	0.000
Exports								
1998-2002	0.161	0.000	0.000	1.000	0.165	0.000	0.134	0.000
2002-2006	0.173	0.000	0.000	1.000	0.193	0.000	0.152	0.000
2006-2008	0.091	0.014	0.000	1.000	0.163	0.000	0.100	0.017
2008-2010	0.111	0.001	0.000	1.000	0.168	0.000	0.101	0.017
Imports								
1998-2002	0.138	0.000	0.000	1.000	0.105	0.016	0.094	0.024
2002-2006	0.095	0.012	0.000	1.000	0.149	0.000	0.083	0.050
2006-2008	0.049	0.546	0.021	0.806	0.105	0.028	0.061	0.255
2008-2010	0.085	0.049	0.000	1.000	0.118	0.011	0.072	0.154

Data:authors' calculation, based on METI database.

Note: data are based on balanced panel data for each period.

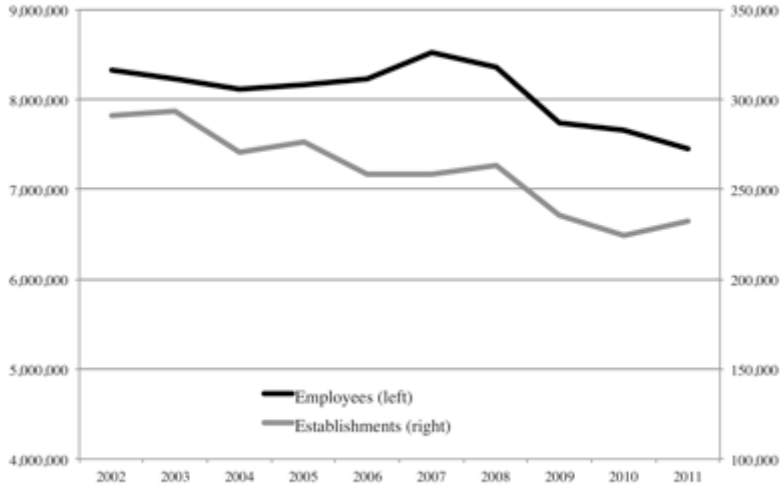
The cases are highlighed if the results suggest stochastic dominance.

Table A.1 Trend of corporate structure of Japanese manufacturing firms (based on *Kikatsu* data)

	No. of firms	No. of establishments	No. of employees		No. of affiliates		
				Regular employees	Total	Domestic	Foreign
1991	13,688	80,224	6,161,482	6,033,863	39,125	31,954	7,171
1994	13,731	80,910	6,008,534	5,934,049	41,680	33,203	8,477
1995	14,383	84,368	6,042,617	5,971,077	43,498	33,845	9,653
1996	14,251	86,357	5,996,283	5,913,947	43,892	33,567	10,325
1997	14,104	83,231	5,793,449	5,723,008	42,389	31,881	10,508
1998	14,075	82,981	5,627,161	5,579,050	42,484	31,494	10,790
1999	13,629	80,276	5,457,326	5,401,494	41,334	30,307	11,027
2000	13,265	78,116	5,295,679	5,238,724	40,700	29,583	11,117
2001	13,247	77,499	5,094,091	5,037,918	40,440	28,793	11,647
2002	12,946	76,149	4,875,238	4,823,057	38,953	26,839	12,114
2003	12,450	74,455	4,891,054	4,846,593	42,902	27,216	15,686
2004	13,235	78,997	5,129,647	5,086,312	46,262	28,308	17,954
2005	12,990	77,781	5,027,600	4,987,700	45,842	27,205	18,637
2006	12,777	76,169	5,092,717	5,050,065	46,599	26,698	19,901
2007	13,354	79,579	5,338,843	5,292,956	48,315	27,239	21,076
2008	13,394	79,556	5,360,175	5,326,038	50,208	27,441	22,767
2009	13,105	77,168	5,230,416	5,195,144	49,469	26,542	22,927
2010	13,104	77,079	5,293,161	5,243,457	49,061	25,495	23,566
2011	13,345	78,239	5,301,182	5,260,999	50,017	24,814	25,203
2012	13,203	77,660	5,335,937	5,295,291	51,394	24,623	26,771

Data: The *Kikatsu* data, available from the METI website:
http://www.meti.go.jp/statistics/tyo/kikatu/result-2.html

Figure A.1 Number of manufacturing establishments and employees (based on Economic Census)



Data: 2012 Economic Census (Overview of the results) (available from Statistics Bureau's website
http://www.stat.go.jp/data/e-census/2012/pdf/gaiyos.pdf
Note: Targeted establishments in this figure are those with no less than 4 employees.

Table A.2 Number of Japanese affiiates abroad (based on the *Kaiji* data)

	Total	Manufacturing affiliates	Affiliates in Asia	Affiliates in North America	Affiliates in Europe
	Number of Japanese affiliates abroad				
2003	13,875	7,127	7,496	2,630	2,332
2004	14,996	7,786	8,464	2,743	2,368
2005	15,850	8,048	9,174	2,825	2,384
2006	16,370	8,287	9,671	2,830	2,405
2007	16,732	8,318	9,967	2,826	2,423
2008	17,658	8,147	10,712	2,865	2,513
2009	18,201	8,399	11,217	2,872	2,522
2010	18,599	8,412	11,497	2,860	2,536
2011	19,250	8,684	12,089	2,860	2,614
2012	23,351	10,425	15,234	3,216	2,834
	Regular employees of Japanese affiliates abroad				
2003	3,766,179	3,113,894	2,466,483	673,122	410,083
2004	4,138,595	3,404,335	2,773,222	654,920	444,063
2005	4,360,523	3,621,736	3,054,796	629,645	438,882
2006	4,557,072	3,791,010	3,174,972	646,984	486,841
2007	4,746,145	3,952,310	3,371,786	667,195	448,016
2008	4,517,158	3,565,555	3,211,417	629,321	419,640
2009	4,701,317	3,680,327	3,281,709	611,377	471,314
2010	4,993,669	3,972,659	3,555,919	577,918	498,095
2011	5,227,164	4,109,466	3,733,718	603,586	465,178
2012	5,583,852	4,363,643	3,942,500	659,522	532,180
	Sales by Japanese affiliates abroad				(millions JPYen)
2003	145,175,402	71,038,238	43,683,381	58,042,861	32,168,853
2004	162,794,062	79,307,913	52,736,795	59,747,832	37,224,381
2005	184,950,495	87,418,663	65,373,711	66,195,534	38,258,011
2006	214,196,127	99,679,316	75,838,165	74,192,823	46,317,329
2007	236,208,099	111,040,510	85,717,082	79,052,849	50,713,285
2008	201,679,131	91,180,733	78,064,587	61,856,675	42,304,504
2009	164,466,063	78,305,761	67,324,664	51,988,711	31,089,359
2010	183,194,818	89,327,934	79,711,164	52,802,083	32,577,960
2011	182,242,114	88,289,996	79,809,247	50,764,229	31,326,308
2012	199,034,419	98,384,657	89,270,902	57,947,077	31,123,892

Data: The *Kaiji* data, available from the METI website:
http://www.meti.go.jp/statistics/tyo/kaigaizi/result/result_43.html

Table A.3 Part-time and temporary workers: ratio to the total number of employments

	2002			2006			2008			2010		
	Type1	Type2	Type3	Type1	Type2	Type3	Type1	Type2	Type3	Type1	Type2	Type3
1	34.5	4.3	3.1	39.7	2.5	6.5	40.9	2.3	5.7	42.6	2.3	3.3
2	8.1	1.7	2.1	8.7	0.5	5.4	9.5	0.4	5.5	12.0	0.7	3.2
3	6.7	0.3	2.5	9.0	1.2	4.8	7.0	0.7	3.6	8.7	1.2	2.3
4	14.6	1.0	1.3	17.8	0.6	1.3	18.6	0.5	2.3	17.4	19.2	1.8
5	5.9	0.5	2.8	5.1	0.7	6.3	5.4	0.8	5.8	6.6	0.7	3.3
6	6.6	1.9	3.8	7.4	0.4	9.2	7.1	0.6	4.6	8.7	0.3	3.5
7	7.5	0.4	1.8	8.1	0.5	2.8	8.6	0.3	2.7	9.7	0.6	1.9
8	7.1	1.0	2.1	8.2	1.3	4.3	11.2	1.5	3.4	9.8	1.0	2.3
9	3.5	0.4	2.7	4.6	0.3	5.0	4.8	0.3	5.5	7.1	0.2	4.1
10	0.7	0.0	1.2	0.8	0.0	3.9	2.7	0.0	2.7	1.3	0.0	3.6
11	10.4	0.7	7.5	11.6	0.7	10.7	11.4	0.4	6.6	10.4	0.7	5.9
12	5.4	4.7	8.2	10.4	0.3	6.8	8.3	0.4	4.8	7.6	0.8	3.5
13	13.2	1.2	3.4	19.4	2.0	0.4	22.7	1.0	1.2	20.0	1.1	0.9
14	4.1	0.6	4.9	5.5	0.5	9.7	5.6	0.7	7.4	5.6	0.5	9.4
15	1.2	0.3	1.9	1.7	0.3	3.9	2.0	0.3	3.1	2.2	0.3	2.9
16	4.6	0.9	3.4	6.2	0.7	9.1	5.6	0.8	5.5	5.8	0.4	4.9
17	6.6	0.6	4.3	7.7	0.4	9.6	8.6	0.4	5.7	8.4	0.3	4.5
18	3.5	0.3	3.4	5.5	0.8	10.2	5.8	0.3	8.2	6.0	0.4	6.4
19	4.3	0.5	4.6	5.0	0.6	13.1	4.3	0.5	7.7	4.8	0.6	6.5
20	2.3	1.3	6.7	3.4	0.9	14.0	2.7	0.4	6.4	3.1	1.0	5.3
21	8.5	0.1	5.2	9.7	0.4	10.8	7.9	0.2	9.7	7.2	0.3	5.3
22	11.1	0.6	3.3	9.6	0.3	6.7	9.5	0.5	6.0	9.9	0.4	4.7
All	7.7	1.1	4.2	9.1	0.8	9.7	9.1	0.6	6.3	10.0	0.9	5.0

Data:authors' calculation, based on METI database.

Note: data are for each year. Type 1, 2, and 3 indicate part-time employments, day labors, and temporary labors. Part-time workers are included in the total number of employments, but temporary workers are not. See Table 1 for industry classification.