Job Creation and Destruction at the Levels of Intra-firm Sections, Firms, and Industries in Globalization:
The case of Japanese manufacturing firms

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Abstract

This paper investigates globalizing activities of Japanese manufacturing firms and their domestic adjustments in terms of domestic employment since the 2000s. A unique feature of this paper is to apply the job creation (JC)/job destruction (JD) method to changes in domestic employment at three different stages, i.e., industry level, firm level, and intra-firm section level, with a distinction among three types of firms, namely, expanding multinational enterprises (MNEs), non-expanding MNEs, and local firms. The paper also examines domestic adjustments to import competition. Major findings include: (i) de-industrialization advances in the early 2000s, but the shrinkage of manufacturing industry is not observed after that, (ii) both gross job creation and gross job destruction at firm and intra-firm section levels are much larger than net changes in all periods, showing the restructuring dynamism, firm heterogeneity, and active adjustments within firms, (iii) gross changes are widely different among three periods at the industry level, (iv) small and medium enterprises (SMEs) actively contribute to net job creation (or less net job destruction), compared with large firms, (v) multinational SMEs that expand foreign operations enlarge domestic employment in total, intensify headquarters (HQ) services, and almost maintain or expand manufacturing activities, in all periods, unlike other types of SMEs, (vi) multinational large firms that expand foreign operations increase domestic employment in total as well as employment engaged in HQ services and manufacturing activities, compared with other types of large firms, except in the early 2000s when both the manufacturing industry as a whole and manufacturing activities significantly shrunk, and vii) negative effects of import competition on domestic employment seem to exist particularly in the early 2000s, but such a tendency is becoming weak, and rather globalizing corporate activities contribute to the expansion of domestic employment by extending complementary activities at home.

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. Introduction

Autor, et al. (2016) and Acemoglu, et al. (2016), unusually as academic papers, had huge impacts on the US politics at the emergence of the Trump Administration. It was unfortunate that the journalism placed too much emphasis on the impact of imports from China on the US employment. A key message of them, however, was the importance of industrial adjustments and the corresponding labor mobility. In the advancement of globalization and technological break-through, the industrial structure certainly has to change. To take advantage of changes in the competitive environment, quick and smooth transitions are essential, particularly in developed countries.

The international trade literature has evolved over time in order to respond to the globalization and its distributional consequences. The traditional theory of comparative advantage worked for the world of the first unbundling in the words of Baldwin (2016), which primarily dealt with industrial adjustments and inter-industry labor movements. The new-new international trade theory initiated by Melitz (2003) expanded the scope of the international trade theory by introducing firm heterogeneity and provided a pathway to intra-industry/inter-firm reshufflings and labor movements. Furthermore, the fragmentation theory (Jones and Kierzkowski, 1990), two-dimensional fragmentation (Ando and Kimura, 2005), and the concept of the second unbundling (Baldwin, 2016) introduced the idea of intra-firm adjustments and labor movements.

Indeed, in the globalizing world, labor movements required for industrial adjustments must be understood at levels of intra-firm, inter-firm or intra-industry, and inter-industry. The US economy seems to have relatively fast adjustments in intra-industry as well as inter-industry labor replacements. On the other hand, Japan and perhaps Germany may be exploiting the opportunities for intra-firm labor movements more effectively. Japanese firms seem to be relatively flexible in replacing workers within a firm in order to respond to changes in international competitive environment and its own globalizing activities. Which is better is a matter of further discussion. But in any case, we have to know what is going on in the induced labor movements.

Whether outward foreign direct investment (FDI) accelerates de-industrialization at home or rather generates domestic jobs and operations has been an important issue not only for academic purposes but also for the practical policy aspects. In general, international division of labor at the production process/task level can retain domestic employment and operations more elastically, rather than international division of labor at the industry level. However, whether

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de-industrialization at home can be avoided or delayed in practice must be empirically examined. 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 and may sometimes has positive effects on domestic employment. One of the recent strands in the literature focuses on causality from FDI to domestic employment.[1] Another strand in the literature studies MNEs only and estimates a labor demand function to quantify the effects of foreign operations on domestic employment.[2] As a part of research on this topic, Ando and Kimura (2015) 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. 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.

A unique contribution of the current paper to the literature is to apply the JC/JD method for three levels: the level of intra-firm sections, the firm level, and the industry level. This extension of the analytical framework provides useful insights on industrial adjustments and labor movements at different levels. We will find that the Japanese manufacturing industry has made substantial industrial adjustments and labor replacements not only across sub-sectors of manufacturing industries but also in labor reshuffling among firms and among intra-firm sections. Our dataset allows us to count the number of workers working for HQ services (HQ), manufacturing activities (MFG), and other activities (Other) within each firm; we call these three as "intra-firm sections."

The JC/JD method is also powerful in comparing different groups. The existing literature using JC/JD method is applied to various subsets of establishments or firms in terms of sectors/subsectors, regions, establishment/firm size, and others.[3] We will conduct a comparative study in two dimensions: SMEs versus large firms and expanding MNEs

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[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).

[2] Harrison and McMillan (2011) is a representative paper in this literature. The examples for the Japanese data are Yamashita and Fukao (2010), Kambayashi and Kiyota (2014), and Ito and Tanaka (2014).

[3] One of the important findings in the literature is that small firms present more dynamism with larger JC and JD than large firms. 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.

(increasing the number of foreign affiliates) vs. non-expanding MNEs vs. local firms (without foreign affiliates) to uncover distinct features of expanding MNEs. In addition, we investigate several sample periods, rather than a single specific period, to capture the evolving features of globalizing corporate activities and domestic adjustments.

In addition to the JC/JD analysis, this paper also investigates domestic adjustments in terms of domestic employment to import competition. Autor et al. (2016) and Acemoglu et al. (2016) analyze the impacts of imports from China on labor markets in the U.S in 1991-2011 for 392 manufacturing industries, using import penetration (IP) ratios, and demonstrate that rising import exposure lowers domestic employment at the industry level.[4][5] In the case of Japan, IP ratios in general tend to rapidly increase since the 1990s (Figure 1).[6] In particular, by-industry IP ratios drastically change since the 2000s in some manufacturing industries (Figure 2). To see whether the effects of import competition on domestic adjustments are observed or not in Japan, this paper examines the relationship between changes in domestic employment and IP ratios, with a distinction among the types of firms, in three periods since 2000.[7]

== Figure 1==

==Figure 2==

The paper is organized as follows: the next section introduces our data set for the Japanese manufacturing firms, and basic statistics is presented in Section 3. Section 4 applies the JC/JD method to investigate gross and net changes in domestic employment at industry, firm, and intra-firm section levels. A 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 investigates the analysis of domestic adjustments in terms of domestic employment to import competition. The conclusion is

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[4] See Utar et. al (2013) for the impacts of Chinese competition on Mexican maquiladoras, using the Chinese share of import penetration rate for the matched US industry.
[5] In the case of U.S., long-term industrial adjustments for manufacturing to services is observed in terms of manufacturing/all employees.
[6] IP ratios in real terms are calculated as follows: imports/(outputs+imports-exports).
[7] See Tomiura (2004) for the relationship between import competition and employment during and after the recent Bubble period in Japan. Tomiura (2009) provides analysis on import competition based on IP ratios and employment in Japan.

presented in the last section.

2. The strengths and limitations of our data

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 Japanese Business Structure and Activities (Kikatsu* hereafter*)*. This database provides detailed information on (parent) firms located in Japan as well as the number and industry of their foreign affiliates with no less than 20 percent Japanese ownership. The sample in the survey covers firms with more than 50 workers, capital of more than 30 million yen, and having establishments in mining, manufacturing, wholesale/retail trade, and restaurants.

Since the *Kikatsu* is firm-level statistics, rather than 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 intra-firm sections such as headquarters services and manufacturing activities as well as the number of foreign affiliates.[8] Another advantage of the *Kitatsu* data is that the coverage of the manufacturing sector is claimed to be at the "census" level, though the coverage of the services sector is incomplete.[9] [10] Therefore, this study concentrates on manufacturing firms in Japan and conducts the JC/JD analysis of both MNEs and local firms by investigating not only total domestic employment for each firm but also domestic employment engaged in HQ services (HQ), domestic employment involved in manufacturing activities (MFG), and domestic employment in other intra-firm sections (Other).

On the other hand, the *Kitatsu* data has limitations related to the "census" coverage, which is particularly serious for our study. One issue is the size truncation. As mentioned above, the survey covers firms with 50 or more workers. Thus, firms with less than 50 workers are not included 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, and a specialized survey for exit does not exist.[11] Furthermore, information on mergers

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[8] 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.
[9] The overall trend of the coverage for Japanese manufacturing firms by *Kikatsu* data is presented in Table A.1.
[10] The coverage of the services sector has been expanded over time.
[11] The establishment year of a firm is available.

and acquisitions (M&A) is not available. Thus, our empirical results based on the *Kitatsu* data must be carefully interpreted, considering these limitations. Our analysis, however, tries to provide valuable information, which has not been sufficiently studied yet, by utilizing 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 by-industry features of Japanese manufacturing firms, based on Tables 1 and 2. Table 1 shows by-industry shares of the number of firms and domestic employment (total employment and employment in 3 intra-firm sections) in 2012, and Table 2 presents shares of SMEs in each manufacturing industry.[12] In terms of the number of firms and domestic employment, major industries are food processing (industry 1), chemicals (industry 9), and machineries (industries 18-21), particularly general machinery, electric machinery, and transport equipment (18-20). The majority of manufacturing firms in Japan are SMEs in terms of the number; close to 80 percent are SMEs (Table 2). However, SMEs' portion becomes lower from the perspective of domestic employment; shares of SMEs are around a quarter for domestic employment.

== Table 1 ==

== Table 2 ==

To capture the overall pattern of Japanese manufacturing MNEs, let us look at the composition of Japanese manufacturing MNEs in 2012 (Table 3). Over 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 (53 percent of MNEs with affiliates in East Asia) while large firms are relatively active in North America and Europe (72 percent of MNEs with affiliates in North America and 82 percent of MNEs with affiliates in Europe). In terms of industry composition, around a half of manufacturing MNEs are machineries, respectively. Although these industries are one of the major industries of

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

Japanese manufacturing firms in general, by-industry shares among manufacturing MNEs are larger, compared with those in Table 1. It suggests that these industries are more than proportionally active abroad.

== Table 3 ==

In our sample based on the panel dataset for each period, the number of manufacturing MNEs (the shares of MNEs in all firms in the dataset) increases from 2,692 (26 percent) in 2000-2004, 3,012 (28 percent) in 2004-08, to 3,332 (30 percent) in 2008-12 (Table 4).[13,14] 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 SMEs are also aggressively expanding their operations abroad. The shares of MNE1 in total MNEs are 53 percent in 2000-2004, 42 percent in 2004-08, and 46 percent in 2008-12. In particular, machinery industries are vigorous in expanding operations abroad. Moreover, as Ando and Kimura (2015) emphasized, most of the expanding MNEs are expanding their operations at least in East Asia, suggesting active expansion of operations in East Asia.

==Table 4==

4. Gross and net changes in domestic employment

This section applies the JC/JD method to Japanese manufacturing firms and investigates gross and net changes in their domestic employment. There are three distinctive features of our JC/JD analysis. First, by utilizing the advantage of *Kikatsu* database, we calculate not only gross changes in domestic employment at the firm level but also gross changes at the industry level as well as the intra-firm section level; three intra-firm sections are

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[13] We define manufacturing firms in our panel data as those categorized into manufacturing sectors at the beginning of each period.
[14] MNEs are defined as those having at least one foreign affiliate at the beginning and/or the end of each period.

HQ (HQ services), MFG (manufacturing activities), and Other (other activities). As discussed in section 1, i) the traditional trade theory focuses on resource allocation at the industry level or industry adjustments, ii) the new-new trade theory sheds light on firm heterogeneity in the same industry and thus adjustments among firms with heterogeneous productivities within the same industry, and iii) the fragmentation theory emphasizes international division of labor at the production process/task level. To provide facts to think about what we can retain domestically in the era of international production networks or the 2nd unbundling, we extend the JC/JD method to apply to changes in domestic employment at the industry, firm, and intra-firm section levels. Second, our paper investigates changes in domestic employment with/without distinguishing three types of firms, i.e., MNE1, MNE2, and Local. In particular, we shed light on changes in domestic employment by MNE1, which expand globalizing activities in terms of the number of foreign affiliates, comparing with those by MNE2 and Local. Third, to capture the evolving features of globalizing corporate activities and domestic adjustments, three sample periods are examined, rather than focusing on only one period: the period 2000-04 (after the 1997-98 Asian Financial Crisis), 2004-08 (before the Global Financial Crisis (GFC), and 2008-12 (after the GFC).

4.1 The JC/JD method

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

Net change rate (*NetG*) = gross job creation rate (*JC*) – gross job destruction rate (*JD*).

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

$$g_{it} = \frac{(x_{it} - x_{it_0})}{(x_{it} + x_{it_0})/2}.$$ (1)

Since the rate of changes is calculated as being divided 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).[15]

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[15] 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.

The rate of gross job creation (JC_t) and the rate of gross job destruction (JD_t) in period t at the firm level are calculated by:

$$JC_t = \sum_{i \ (g_{it}>0)} w_{it} g_{it} \tag{2}$$

and

$$JD_t = \sum_{i \ (g_{it}<0)} w_{it} |g_{it}| \ , \tag{3}$$

where w_{it} is a weight for firm i in period t, which is calculated as below

$$w_{it} = \frac{x_{it}+x_{it_0}}{\sum_i (x_{it}+x_{it_0})}. \tag{4}$$

Thus, the rate of net/gross changes is the employment-weighted rate of changes. The equations (2) and (3) can be rewritten as follows:

$$JC_t = \sum_{i \ (x_{it}-x_{it_0}>0)} \frac{x_{it}-x_{it_0}}{\sum_i (x_{it}+x_{it_0})/2} \tag{2'}$$

and

$$JD_t = \sum_{i \ (x_{it}-x_{it_0}<0)} \frac{|x_{it}-x_{it_0}|}{\sum_i (x_{it}+x_{it_0})/2} \ . \tag{3'}$$

As mentioned above, our paper calculates JC/JD at the industry level (JC_t^J/JD_t^J), JC/JD at the firm level (JC_t^I/JD_t^I), and JC/JD at the intra-firm section level (JC_t^S/JD_t^S), using the firm level data. Thus, JC_t^J and JD_t^J are calculated as follows:

$$JC_t^J = \sum_{j \ (x_{jt}-x_{jt_0}>0)} \frac{x_{jt} - x_{jt_0}}{\sum_j (x_{jt} + x_{jt_0})/2}$$

and

$$JD_t^J = \sum_{j \ (x_{jt}-x_{jt_0}<0)} \frac{|x_{jt} - x_{jt_0}|}{\sum_j (x_{jt} + x_{jt_0})/2},$$

where $x_j \ (= \sum_{i \in j} x_i)$ is domestic employment in industry j.

Similarly, JC/JD at the firm level (JC_t^I/JD_t^I) are calculated as follows:

$$JC_t^I = \sum_{i \ (x_{it}-x_{it_0}>0)} \frac{x_{it} - x_{it_0}}{\sum_i (x_{it} + x_{it_0})/2}$$

and

$$JD_t^I = \sum_{i\ (x_{it}-x_{it_0}<0)} \frac{|x_{it} - x_{it_0}|}{\Sigma_i\ (x_{it} + x_{it_0})/2} \quad ,$$

where x_{it} is domestic employment in firm i.

Since we use the firm-level data, not the establishment/plant-level data, we cannot directly capture the JC/JD in terms of establishments. However, we instead apply the JC/JD method to information on three intra-firm sections (HQ, MFG, and Other) in order to calculate JC/JD at the intra-firm section level. JC/JD at the intra-firm section level (JC_t^S / JD_t^S) can be calculated as follows:

$$JC_t^S = \sum_{s\ (x_{st}-x_{st_0}>0)} \frac{x_{st} - x_{st_0}}{\Sigma_s\ (x_{st} + x_{st_0})/2}$$

and

$$JD_t^S = \sum_{s\ (x_{st}-x_{st_0}<0)} \frac{|x_{st} - x_{st_0}|}{\Sigma_s\ (x_{st} + x_{st_0})/2} \quad ,$$

where s represents each intra-firm section of firm i, and x_{st} is domestic employment in the corresponding intra-firm section of firm i.[16]

Finally, the relationship among net and gross changes at three different stages can be expressed as below:

$$NetG = JC_t^J - JD_t^J = JC_t^I - JD_t^I = JC_t^S - JD_t^S.$$

As mentioned above, three sample periods are examined: the period 2000-04 (after the 1997-98 Asian financial crisis), 2004-08, and 2008-12 (after the GFC). Note that our empirical approach is the "panel" decomposition, using a panel database for each period, without taking entry/exit of firms into consideration.[17]

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[16] The number of employment in Other is calculated by subtracting the sum of employment in HQ and MFG from the total number of domestic employment.

[17] In using *Kikatsu* data, it is difficult to identify explicitly entries and exits of firms. Ando and Kimura (2015) attempted to incorporate entries and exits of firms by defining them 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. However, there should be problems for too big gross changes in this "full" decomposition. As mentioned before, we cannot perfectly identify the entry and exit of firms in the database. Although the returned ratios of the survey are relatively high in the case of *Kikatsu* data, some firms that

4.2 The results of the JC/JD analysis

Table 5 summarizes the results of changes in domestic employment at three stages: (a) industry level, (b) firm level, and (c) intra-firm section level. The sum of JC and JD (in minus) is equal to NetG for each level. Firms are also classified by the size (All (firms), SMEs, and Large) and the type (Local, MNE1, MNE2, All). Figure 3 shows JC/JD (in bars) and NetG (in lines) in domestic employment at the industry, firm level, and intra-firm section levels by the firm size. Figure 4, in turn, presents corresponding figures by three types of firms (Local, MNE1, and MNE2) at (a) the industry level, (b) the firm level, and (c) the intra-firm section level. Figure 5 displays the by-industry decomposition of changes in domestic employment at the industry level (JC_t^J/JD_t^J).

== Table 5 ==

== Figure 3==

== Figure 4==

==Figure 5==

Table 6 summarizes changes in domestic employment at the intra-firm section level and their decomposition among intra-firm sections. Figure 6 shows the decomposition of JC/JD at the intra-firm section level by three sections; the length of JC/JD in Figure 6 is equal to that in (c) of Table 5 (and JC/JD for Total in Table 6). Figure 7 shows contributing patterns of each intra-firm section to JC/JD among three intra-firm sections, that is, NetG for each intra-firm section (JC/JD of Net G (Total) in Table 6).

== Table 6 ==

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continue to exist may not return the questionnaires in some years. Although Ando and Kimura (2015) checked data for two years to identify entry firms and exiting firms, some of them may not actually be entry/exiting firms. The size cut-off point of *Kikatsu* data is another source of false entry and exit. Also, if M&A is active, it may induce exits of firms in the database.

== Figure 6==

==Figure 7==

4.2.1 General trends

Let us begin with checking the general trends of gross and net changes in domestic employment.[18] Our results provide several interesting insights. First, the NetG wildly changes over time, reflecting changes in internal and external economic conditions. The net changes for the whole manufacturing industry are net job destruction (-5.8 percent) for the period 2000-04 (after the 1997-98 Asian financial crisis), net job creation (4.1 percent) for 2004-08, and slightly net job creation (0.7 percent) for 2008-12 (after the GFC). This suggests that de-industrialization advanced particularly in the former half of the 2000s, but it is not relevant after the middle of the 2000s. 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.

Second, both JC and JD are large in all periods at the firm level and the intra-firm section level (Figure 3). For instance, JC/JD (-) at the firm level for all firms are 7.0 percent/-12.9 percent in 2000-04, 10.0 percent/-5.9 percent in 2004-08, and 7.7 percent/-7.1 percent in 2008-12. Such large JC and JD, which are much larger than the net changes, suggest that domestic employment is dynamic, and the heterogeneity across firms in the adjustment of domestic employment is huge.[19] In particular, gross changes at the intra-firm section level, which are even larger than those at the firm level, imply the existence of active adjustments within firms (Figures 3 and 6).

Third, gross changes are widely different among three periods at the industry level, unlike to the case of corresponding changes at firm/intra-firm section levels (Figure 3). JC at the industry level is close to zero and JD is huge, resulting in large net job destruction in the period 2000-04, while JC is huge and JD is almost zero, contributing to large net job creation in the period 2004-08. In the period 2008-12, both JC and JD are small, but JC larger than JD causes small net job creation.

Fourth, major industries that contribute to net job creation/destruction vary over time,

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[18] See Appendix for the brief discussion on trends of the corporate structure of Japanese manufacturing firms, based on the aggregated data of the *Kikatsu* and other database.
[19] Figure A.1 presents contribution of each manufacturing industry to JC/JD at the firm level in total for all firms.

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but machinery industries (18-21), in particular the electric machinery industry (19), tend to be major contributors to JC/JD at the industry level (Figure 5).[20] For instance, the electric machinery industry consists of a large portion of gross job destruction at the industry level in the period 2000-04, all machinery industries occupy a large share of the corresponding gross job creation (JC) in the period 2004-08, and the electric machinery/transport equipment industry is a major industry of JD/JC at the industry level in the period 2008-12, though the magnitude is small, compared with other periods. The textile and apparel industries (3 and 4) contribute to net job destruction in all periods.

Fifth, manufacturing activities significantly shrink in the period 2000-04, but they remain in the period 2004-08 and rather expand in the period 2008-12, though the magnitude of expansion is small. Both gross changes (JC and JD) at the intra-firm section level are large (much larger than the net changes) (Table 6 and Figure 6), and how each intra-firm section, particularly the MFG section, contributes to the net changes varies over time (Figure 7).[21] For instance, the NetG for the MFG section is -8.8 percent (net job destruction) in 2000-04, 0.1 percent (almost no change) in 2004-08, and 1.2 percent (net job creation) in 2008-12. The MFG contributes to a large part of JD in total in 2000-04 (-8.8 percent out of -9.7 percent) and a large part of JC in total in 2008-12 (1.2 percent our of 1.4 percent), while its contribution to JC is small in the period 2004-08 (0.1 percent out of 4.1 percent). On the other hand, the corresponding NetG for the HQ section is -0.9 percent, 1.1 percent, and 0.1 percent. It suggests that although the magnitude is quite small for a firm size in all periods, this section contributes to net job creation in periods 2004-08 and 2008-12, or HQ services tend to expand after the latter half of the 2000s.

Sixth, the general trend seems to differ to some extent between SMEs and large firms. In the period of 2000-2004, net changes are net job destruction for both SMEs and large firms, but net job destruction is much larger for large firms than SMEs; JC, JD (-) at the firm level, and NetG for SMEs/large firms are 8.2 percent/6.7 percent, -10.2 percent/-13.7 percent, and -2.0 percent/-7.0 percent (Figure 3). In the period of 2004-08/2008-12, net changes are net job creation for SMEs and large firms, but both gross and net job creation are much larger for SMEs than large firms (JC and NetG for SMEs/large firms are 11.3 percent/9.6 percent and 5.5 percent/3.7 percent in the period 2004-08 and 8.5 percent/7.5 percent and 1.2 percent/0.5

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[20] This is partly because the size of machinery industries is relatively large, occupying close to 40 percent of total employment in 2012.
[21] See Table A.3 for changes for each intra-firm section.

percent in the period 2008-12). These figures suggest that SMEs relatively and actively contribute to net job creation, compared with large firms. In addition, the MFG section of large firms in particular significantly causes net job destruction (-10.4 percent), while that of SMEs induces net job destruction by only -3.1 percent in the period 2000-04 (Figure 7). Considering such differences between SMEs and large firms, the following analysis focusing on the differences among the types of firm, that is, MNE1, MNE2, and Local, is basically discussed separately for SMEs and large firms.

4.2.2 Features by Local, MNE1, and MNE2

Here, we discuss the results of JC/JD analysis by three types of firms (Local, MNE1, and MNE2) to capture distinctive features of MNE1. The most interesting insight for MNE1/SME is that net changes for the whole manufacturing industry are net job creation and larger than MNE2/SME or Local/SME in all periods; net job creation is 3.4 percent in 2000-04, 10.3 percent in 2004-08, and 5.7 percent in 2008-2012 (Figure 4). In particular, even in the period 2000-04 when net changes are net job destruction for other types (-2.1 percent for Local/SME and -6.6 percent for MNE2/SME), net changes for MNE1/SME are net job creation (3.4 percent). Moreover, JC is larger and JD is smaller for MNE1/SME than for MNE2/SME or Local/SME in all periods at all three stages ((a) industry level, (b) firm level, and (c) intra-firm section level) as well, except a case, JD at the intra-firm section level. It suggests that compared with MNE2/SME or Local/SME, MNE1/SME tends to expand domestic employment in absolute and relative terms.

In addition, net change rates for employment engaged in HQ services are net job creation and are larger for MNE1/SMEs than MNE2/SMEs or Local/SMEs in all periods (Figure 7). Furthermore, net changes for employment engaged in manufacturing activities is almost zero (-0.3 percent) or net job creation for in all periods for MNE1/SMEs, though net changes are huge net job destruction for Local/SMEs (-3.1 percent) and MNE2/SMEs (-5.9 percent) in the period 2000-04 and net job destruction for Local/SMEs in the period 2004-08 (-0.7 percent), and net job destruction/net job creation is the smallest/largest in the period 2000-04/2008-12 among three types of firms. In sum, MNE1/SMEs tend to increase domestic employment in total absolutely and relatively, compared with MNE2/SMEs or Local/SMEs, intensify HQ services, and even maintain or expand manufacturing activities as well.

On the other hand, large firms present a different picture. Net changes are the largest for MNE1/large firms among three types of firms for large firms in all periods, similarly to the

feature for MNE1/SMEs (Figure 4).   However, net changes are net job destruction in 2000-04 (-6.0 percent), while net job creation in the other periods, 2004-08 (5.0 percent), and 2008-12 (2.9 percent) (Figure 4). In addition, JC/JD for MNE1/large firms is not necessarily the largest/smallest among three types of firms in all periods at all three stages (industry level, firm level, and intra-firm section level). More specifically, for MNE1/large firms, gross job creation (JC) is the largest at the industry level (except the case of JC in the period 2000-04) and gross job destruction (JD) is the smallest at the industry level and the firm level, but JC at the firm level and the intra-firm sector level is not the largest.

Moreover, net changes for employment engaged in HQ services are the largest for MNE1/large firms among three types of firms in all periods, but they are net job destruction in 2000-04, while net job creation in the other periods, 2004-08 and 2008-12 (Figure 7). Moreover, net job destruction for employment engaged in manufacturing activities for MNE1/large firms (-10.4 percent) is larger than Local/large firms (-6.9 percent) and smaller than MNE2/large firms (-13.3 percent) in the period 2000-04. Net changes for the MFG section are net job creation in both periods 2004-08 and 2008-12 and the largest for MNE1/large firms among three types of firms (1.1 percent and 2.3 percent); net changes are rather net job destruction for Local/SMEs (-2.6 percent) in the period 2004-08 and MNE/large firms in the period 2004-08 (-0.1 percent). These suggest that the period 2000-04 seems to be a restructuring period for MNE1/large firms in a sense that manufacturing activities in terms of employment significantly shrink in 2000-04, but manufacturing activities tend to expand in the later periods absolutely and relatively, compared with other types of firms, in addition to intensified HQ services.

Regarding major contributors to gross and net changes, MNE1/SMEs shows some different patterns from other types of firms or general trends for SMEs (Figure 5). For instance, in the period 2000-04, all machinery industries including the electric machinery industry contribute to gross job creation for MNE1/SMEs, though some machinery industries cause net job destruction in the case of SMEs in general, Local/SMEs, and MNE2/SMEs. In the period 2008-12, textile and apparel industries contribute to gross job creation for MNE1/SMEs, though this industry causes net job destruction in the case of SMEs in general, Local/SMEs, and MNE2/SMEs.

5. Domestic adjustments to import competition

As discussed in Section 1, manufacturing import penetration (IP) ratios in Japan have

significantly changed since the 1990s; IP ratios increased from 7 percent in 1970 to 9 percent in 1990, 13 percent in 2000, and reached 19 percent by 2012.   In particular, manufacturing IP ratios by industries have significantly changed since the 2000s in some industries. For instance, IP ratios for the textile and apparel industry significantly increased from 20 percent in 1998 to 29 percent in 2000, and close to 50 percent in 2012.   IP ratios for the electric machinery industry also increased from 17 percent in 2000 to 27 percent in 2007, though they rapidly dropped in 2009 to 15 percent and gradually started to increase again to reach 21 percent in 2012. These significant changes since the 1990s, particularly in the 2000s, may reflect industrial structure adjustments according to changes in the environment of international competition and accelerating globalizing activities within international production networks based on international fragmentation. High IP ratios do not necessarily require the shrinkage of domestic activities if firms can remain domestic activities that are complementary to their globalizing activities within the production networks such as HQ services and even manufacturing activities. Therefore, this section investigates the relationship between domestic adjustments in terms of domestic employment and IP ratios. Moreover, we decompose IP ratios into those for three types of firms to examine the possible differences in that relationship among three types of firms, particularly MNE1.[22] Note that Autor, et al. (2016) and Acemoglu, et al. (2016), for instance, focus on changes in IP ratios while Utar and Torres-Ruiz (2013) utilize the level of IP ratios.   Thus, this paper investigates the relationship between changes in domestic employment and IP ratios for both the level of IP ratios and the change (gap) in IP ratios.

The basic estimation equation is as follows:

$$\Delta lnL_{it} = \alpha + \beta_1 lnSIZE_{it} + \beta_2 IP_{jt} + e,$$

where ΔlnL_{it} is 100 times the log change in domestic employment for firm i in period t, $lnSIZE_{it}$ is the firm size (log of total employment) for firm i in period t, and IP_{jt} is a variable of IP ratios for industry j in period t.[23] The firm size is included as a control variable

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[22] While we basically follow the idea of Autor, et al. (2016), we also conduct estimations by simply decomposing IP variables into three groups, using interaction term of IP variable with types of firms, to examine the possible differences among three types of firm. The endogeneity problems will be considered in a revised version.

[23] The number of industries is 21 as shown in Figure 2. This industry classification basically follows that in Section 3 and Section 4, except that the textile industry and the apparel industry are categorized as the same group since the JIP database that is used in calculating IP ratios treats them as one industry.

in estimations, considering different patterns between SMEs and large firms as discussed in the previous section. The variable of IP ratios for 21 industries is the level of IP ratios or the change (gap) in IP ratios. Ordinary Least Squares (OLS) estimations are conduced separately for each of three periods, 2000-04, 2004-08, and 2008-12.

Table 7 reports the results. Considering the differences in patterns of changes in domestic employment between SMEs and large firms as discussed in the previous section, we include the firm size as a control variable for estimations. The results of our estimations provide several interesting findings. First, the level of IP ratios tends to be negatively correlated with changes in domestic employment for all periods in general, but such a tendency is becoming weak. The coefficients for IP ratios are -0.23 for the period 2000-04, -0.08 for the period 2004-08, and -0.06 for the period 2008-2012 with statistical significance. Moreover, although the change in IP ratios is negatively associated with changes in domestic employment with statistical significance in the period 2000-04, the coefficient becomes insignificant in the period 2004-08 and turns to be positive with statistical significance in the period 2008-12.

== Table 7 ==

Regarding the results of decomposed IP variables, unlike the general trend or other firm types (MNE2 and Local), the level of IP ratios has no correlation (in the period 2000-04) or is rather positively associated with changes in domestic employment for MNE1 (expanding MNEs). The interaction term of IP ratios with MNE1 are insignificant in the period 2000-04, while the corresponding coefficients are 0.2 in the period 2004-08 and 0.13 in the period 2008-2012 with statistical significance. Similarly, unlike the general trend, the change in IP ratios has no relation (in the period 2000-04) or is rather positively associated with changes in domestic employment in other periods for MNE1. Although coefficients for interaction terms with Local and MNE2 become positive and statistically significant in the period 2008-12 (they are negative with statistical significance for Local and MNEs in other periods), the coefficient for the interaction term with MNE1 is the largest among three types of firms; 0.26 for Local, 0.74 for MNE1, and 0.09 for MNE2.

All of these findings suggest that the environment of international competition in terms of imports tend to require domestic adjustments but such a tendency is becoming weak. Rather, high IP ratios or changes in IP ratios reflect the expansion of globalizing corporate activities within international production networks, which contributes to the expansion of

domestic employment by extending complementary activities at home.

6. Conclusion

This paper investigated globalizing activities of Japanese manufacturing firms and their domestic adjustments in terms of domestic employment since the 2000s, 2000-04 (after the 1997-98 Asian Financial Crisis), 2004-08, and 2008-12 (after GFC). We first applied the JC/JD method to changes in domestic employment of Japanese manufacturing firms at three different stages, i.e., the industry level, the firm level, and the intra-firm section level. Moreover, our analysis was conduced not only for all firms as a whole but also for three types of firms, that is, expanding MNEs, non-expanding MNEs, and local firms, to capture features of expanding MNEs. Furthermore, the paper examined domestic adjustments to import competition by analyzing the relationship between changes in domestic employment and import penetration ratios, focusing on the features of expanding MNEs.

Major findings are the following: (i) de-industrialization advances in the early 2000s, but the shrinkage of manufacturing industry is not observed after that, (ii) both gross job creation and gross job destruction at firm and intra-firm section levels are much larger than net changes in all periods, showing the restructuring dynamism, firm heterogeneity, and active adjustments within firms, (iii) gross changes are widely different among three periods at the industry level, (iv) from the perspective of functions within a firm, manufacturing activities significantly shrink in the early 2000s, but they remain or expand after that, though the magnitude of expansion is small, v) although the magnitude is quite small for a firm size, HQ services contribute to net job creation in the latter half of the 2000s, (vi) SMEs actively contribute to net job creation (or less net job destruction), compared with large firms, (vii) multinational SMEs that expand foreign operations enlarge domestic employment in total, intensify HQ services, almost maintain or expand manufacturing activities, in all periods, unlike other types of SMEs, (viii) multinational large firms that expand foreign operations increase domestic employment in total as well as workers engaged in HQ services and manufacturing activities, compared with other types of large firms, except in the early 2000s when both the manufacturing industry as a whole and manufacturing activities significantly shrink as other types of firms, and ix) negative effects of import competition on domestic employment seem to exist particularly in the early 2000s, but such a tendency is becoming weak, and rather globalizing corporate activities contribute to the expansion of domestic employment by

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extending complementary activities at home within international production networks, x) major industries that contribute to net job creation/destruction vary over time, but machinery industries, in particular the electric machinery industry, tend to be major components of JC/JD, xi) the textile and apparel industries cause net job destruction in all periods, but even in this industry, multinational SMEs/large firms contributes to net job creation in the period 2008-12/2004-08, respectively.

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 because globalizing corporate activities are not necessarily destroying jobs but can instead expand domestic operations. To keep some activities at home, not only the adjustments among subsectors in manufacturing industry but also the reshuffling of workers among firms within a subsector as well as the replacements of human resources across different sections within a firm is important. Whether such labor movements at the micro level are good for the long run or not may be debatable. However, at least they can contribute to avoiding sudden de-industrialization. Government policies, particularly those on the labor market, may help such corporate efforts.

Second, the expansion of headquarters function and the retaining or slight expansion of manufacturing activities after the mid 2000s by expanding MNEs, which is not necessarily applicable to other types of firms, indicate a gradual shift in the nature of domestic activities. The accommodation of skill shift may become an important policy issue. Also, 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, recent policy debates after the GFC, the Great East Japan Earthquake, and formidable yen appreciation until 2012 raised great concern over 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 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 establishments presents quite a different picture; the employment peaked out in 2007, and a drastic decrease is observed up to 2011. We cannot tell exactly what happens, but

one possibility is a poor performance of small manufacturing firms with less than 50 workers after the GFC. Although this is out of the scope of our study, more investigation is needed beyond the *Kikatsu* data for an assessment of recent economic performance of manufacturing firms in Japan.

Appendix: Trend of corporate structure of Japanese manufacturing firms

Table A.1 presents 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. Employment also bottomed out around 2002-03, 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 have 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 1997-98 Asian financial crisis until 2002-03, but after that, the shrinking of the sector, including employment does not seem to continue.

==Table A.1==

Table A.2 instead shows the trend of basic information on Japanese affiliates abroad, using another firm-level statistics, that is, the *Kaiji* data (*Basic Survey on Overseas Business Activities of Japanese Companies*). The *Kaiji* is also conducted by the 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 *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==

References

Acemoglu, Daron; Autor, David; Dorn, David; Hanson, Gordon H.; and Price, Brendan. (2016) "Import Competition and the Great US Employment Sag of the 2000s." *Journal of Labor Economics*, 34, No. 1, Pt. 2: S141-S198.

Ando, Mitsuyo and Kimura, Fukunari. 2005. The Formation of International Production and Distribution Networks in East Asia. In *International Trade in East Asia (NBER-East Asia Seminar on Economics, Volume 14)*, Takatoshi Ito and Andrew K. Rose, editors, p. 177-213. Chicago: The University of Chicago Press.

Ando, Mitsuyo and Kimura, Fukunari. 2012. How Did the Japanese Exports Respond to Two Crises in the International Production Network?: The Global Financial Crisis and the Great East Japan Earthquake. *Asian Economic Journal* 26 (3): 259-285.

Ando, Mitsuyo and Fukunari Kimura (2015) "Globalization and Domestic Operations: Applying the JC/JD Method to the Japanese Manufacturing Firms." *Asian Economic Papers,* Vol. 14, No. 2: 1–35.

Arnold Jens M. and Hussinger, Katrin. 2010. Exports versus FDI in German Manufacturing: Firm Performance and Participation in International Markets. *Review of International Economics* 18 (4): 595-606, 09.

Autor, David H.; Dorn, David; and Hanson, Gordon H. 2016. "The China Shock: Learning from Labor Market Adjustment to Large Changes in Trade." NBER Working Paper 21906 (January). Forthcoming in Annual Review of Economics.

Baldwin, Richard. 2011. "21st Century Regionalism: Filling the Gap between 21st Century Trade and 20th Century Trade Rules." Centre for Economic Policy Research Policy Insight No. 56 (May).

Baldwin, Richard. 2016. *The Great Convergence: Information Technology and the New Globalization*. Cambridge, MA and London: The Belknap Press of Harvard University Press.

Davis, Steven J.; Haltiwanger, John C.; and Schuh, Scott. 1996. *Job Creation and Destruction*. Cambridge and London: The MIT Press.

Delgado, Miguel A., Fariňas, Jose C., and Ruano, Ruano. 2002. Firm Productivity and Export Markets: A Non-Parametric Approach. *Journal of International Economics* 57 (2): 397-422.

Edamura, Kazuma; Hering, Laura; Inui, Tomohiko; and Poncet, Sandra. 2011. The Overseas Subsidiary Activities and Their Impact on the Performance of Japanese Parent Firms.

RIETI Discussion Paper Series 11-E-069. Tokyo: RIETI.

Fuchs, Michaela and Weyh, Antje. 2010. The Determinants of Job Creation and Destruction: Plant-level Evidence for Eastern and Western Germany. *Empirica* 27: 425-444.

Harrison, A. and McMillan, M.S. 2011. Outsourcing Jobs? Multinationals and U.S. Manufacturing Employment. *The Review of Economics and Statistics* 93 (3): 857-875.

Hayakawa, Kazunobu; Matsuura, Toshiyuki; Motohashi, Kazuyuki; and Obashi, Ayako. 2013. Two-dimensional Analysis of the Impact of Outward FDI on Performance at Home: Evidence from Japanese Manufacturing Firms. *Japan and the World Economy* 27: 25-33.

Hijzen, Alexander; Inui, Tomohiko; and Todo, Yasuyuki. 2007. The Effects of Multinational Production on Domestic Performance: Evidence from Japanese Firms. RIETI Discussion Paper Series 07-E-006. Tokyo: RIETI.

Hijzen, Alexander; Jean, Sébastien; and Mayer, Thierry. 2011. The Effects at Home of Initiating Production Abroad: Evidence from Matched French Firms. *Review of World Economics* 147: 457-483.

Hijzen, Alexander; Upward, Richard; and Wright, Peter W. 2010. Job Creation, Job Destruction and the Role of Small Firms: Firm-Level Evidence for the UK. *Oxford Bulletin of Economics and Statistics* 72 (5): 621-647.

Ito, Keiko and Tanaka, Ayumu. 2014. The Impact of Multinationals' Overseas Expansion on Employment at Suppliers at Home: New Evidence from Firm-level Transaction Relationship Data for Japan. RIETI Discussion Paper Series 14-E-011. Tokyo: RIETI.

Jones, Ronald W. and Kierzkowski, Henryk. 1990. The Role of Services in Production and International Trade: A Theoretical Framework. In Ronald W. Jones and Anne O. Krueger, eds., *The Political Economy of International Trade: Essays in Honor of Robert E. Baldwin*, Oxford: Basil Blackwell: 31-48.

Kambayashi, Ryo and Kiyota, Kozo. 2014. Disemployment by Foreign Direct Investment? Multinationals and Japanese Employment. RIETI Discussion Paper Series 14-E-051. Tokyo: RIETI.

Matsuura, Toshiyuki. 2012. Why Did Manufacturing Firms Increase the Number of Non-regular Workers in the 2000s? Does International Trade Matter? RIETI Discussion Paper Series 13-E-036. Tokyo: RIETI.

Melitz, Marc J. 2003. The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. *Econometrica*, Vol.71, No.6, pp. 1695-1725.

Tanaka, Ayumu. 2012a. The Effects of FDI on Domestic Employment and Workforce

Composition. RIETI Discussion Paper Series 12-E-069. Tokyo: RIETI.

Tanaka, Ayumu. 2012b. Firm Productivity and the Number of FDI Destinations: Evidence from a Non-parametric Test. *Economic Letters* 117: 1-3.

Tomiura Eiichi. 2009.「輸入競争が日本の国内産業に与えた影響について」伊東元重 編『バブル／デフレ期の日本経済と経済政策　第 3 巻 国際環境の変化と日本経済』慶応義塾大学出版会，第 1 章，: 3-31.

Tomiura, Eiichi. 2004. Import Competition and Employment in Japan: Plant Startup, Shutdown and Product Changes. Japanese Economic Review 55 (2): 141-152.

Utar, Hale and Luis B. Torres-Ruiz. 2013. International competition and industrial evolution: Evidence from the impact of Chinese competition on Mexican maquiladoras. *Journal of Development Economics* 105: 267–287.

Wagner, Joachim. 2011. Offshoring and Firm Performance: Self-selection, Effects on Performance, or Both? *Review of World Economics* 147: 217-247.

Yamashita, Nobuaki and Fukao, Kyoji. 2010. Expansion Abroad and Jobs at Home: Evidence from Japanese Multinational Enterprises. *Japan and the World Economy* 22: 88-97.

Figure 1 Manufacturing import penetration ratios in Japan (%)
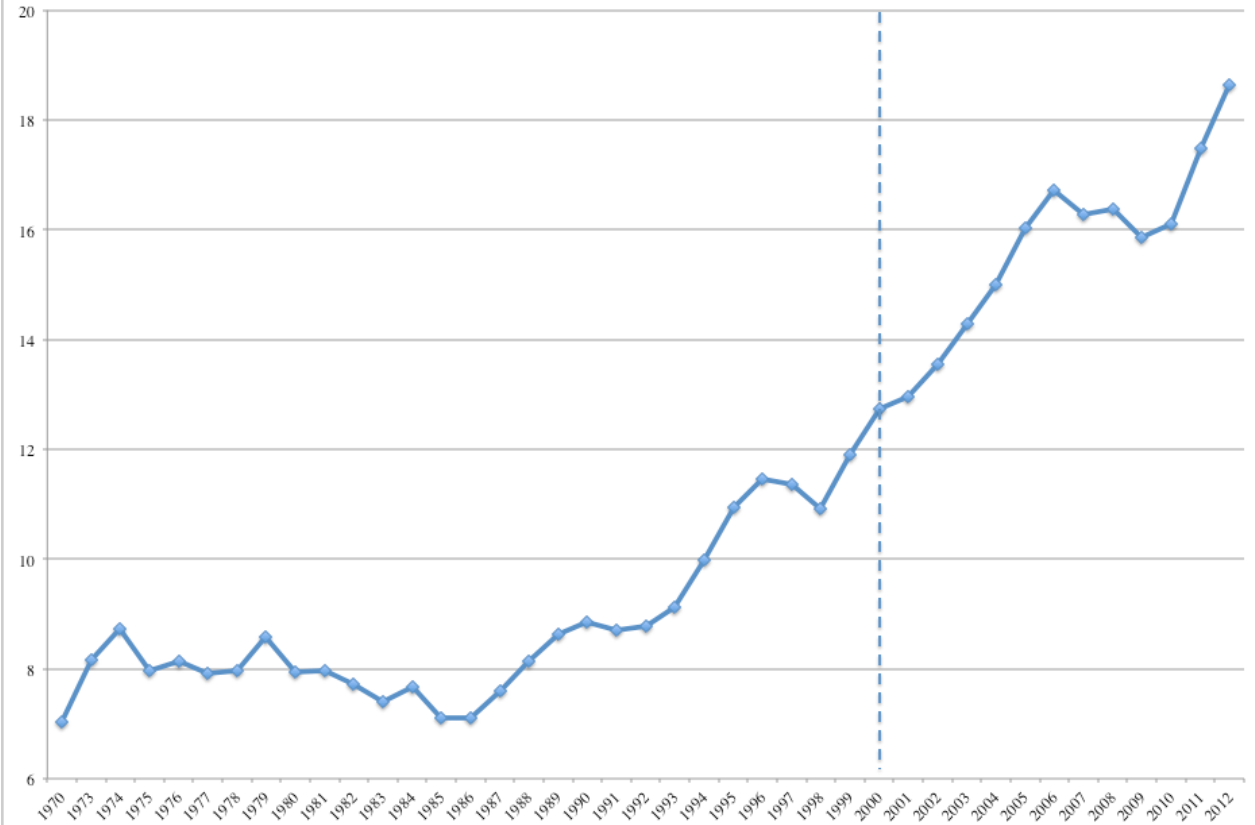
Data source: authors' calculation, based on JIP database 2015.

Figure 2 By-industry manufacturing import penetration ratios in Japan (%)
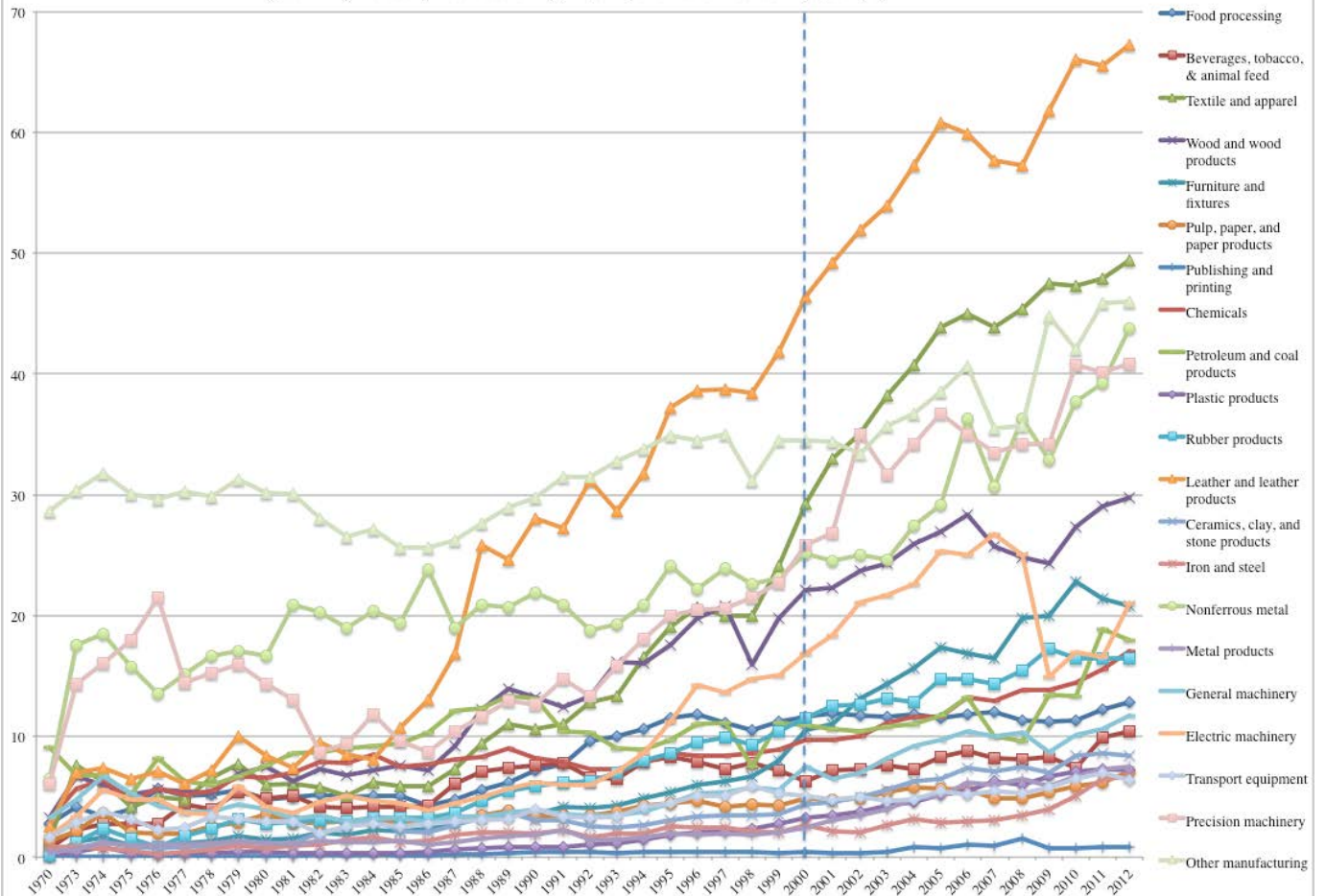
Data source: authors' calculation, based on JIP database 2015.

Table 1 By-industry composition of basic data for manufacturing firms: 2012

| | | | | Sectoral share (%) | | | |
| | | Ave firm size | # of firms | Dom. employment | | | |
Industry classification				Total	HQ	Mfg	Other
1	Food processing	385	11.4	11.0	6.7	12.3	10.0
2	Beverages, tobacco, & animal feed	407	1.5	1.6	1.6	1.0	2.9
3	Textiles	227	1.7	1.0	0.6	0.9	1.3
4	Apparel	169	2.0	0.9	0.5	0.9	0.9
5	Wood and wood products	192	1.1	0.5	0.4	0.6	0.4
6	Furniture and fixtures	249	0.9	0.6	0.6	0.5	0.8
7	Pulp, paper, and paper products	254	3.0	1.9	1.2	2.3	1.4
8	Publishing and printing	248	4.4	2.7	2.0	2.6	3.4
9	Chemicals	527	7.2	9.4	11.0	6.8	14.7
10	Petroleum and coal products	417	0.4	0.4	0.5	0.4	0.5
11	Plastic products	240	6.0	3.6	2.9	4.0	3.2
12	Rubber products	469	1.2	1.4	1.1	1.6	0.9
13	Leather and leather products	132	0.2	0.1	0.0	0.1	0.0
14	Ceramics, clay, and stone products	224	3.4	1.9	1.6	2.0	1.8
15	Iron and steel	387	3.4	3.3	2.0	4.0	2.2
16	Nonferrous metal	355	2.8	2.5	1.8	2.8	2.3
17	Metal products	232	8.2	4.7	4.4	4.8	4.8
18	General machinery	326	12.7	10.4	12.0	9.9	10.6
19	Electric machinery	580	13.4	19.3	19.2	18.7	20.9
20	Transport equipment	771	9.6	18.4	23.5	20.4	11.3
21	Precision machinery	390	2.6	2.5	3.5	2.0	3.0
22	Other manufacturing	279	2.8	2.0	2.8	1.5	2.5
	All manufacturing	401	100.0	100.0	100.0	100.0	100.0

Data:authors' calculation, based on METI database.
Note: data are only for 2012. Average firm size is the average of the total employment.

Table 2 The share of SMEs for each manufacturing industry (%): 2012

| Industry | # of firms | Dom. employment | | | |
		Total	HQ	Mfg	Other
1	72.1	25.5	34.6	25.9	21.6
2	72.8	23.1	25.8	36.7	12.2
3	89.8	49.5	62.7	65.4	22.0
4	91.0	60.7	71.2	66.7	45.0
5	86.7	54.7	57.6	56.3	48.5
6	83.9	39.1	43.2	49.4	24.8
7	83.2	38.4	53.9	38.0	33.5
8	85.6	42.1	47.1	43.3	38.5
9	67.3	17.7	20.8	23.2	10.8
10	67.9	19.1	21.3	19.2	17.8
11	81.5	41.8	45.8	44.4	32.6
12	76.3	21.7	27.2	22.0	16.8
13	90.5	71.8	81.4	85.9	30.5
14	85.6	46.4	55.2	47.1	41.0
15	79.1	24.7	36.2	24.5	20.8
16	75.5	26.5	32.4	31.0	12.6
17	86.4	43.4	45.3	50.1	27.6
18	79.8	30.3	33.9	32.9	22.7
19	70.6	16.3	20.8	18.3	10.1
20	65.5	11.8	9.3	13.2	8.8
21	72.6	23.5	25.6	25.9	18.7
22	77.6	36.3	29.4	42.8	30.8
	76.5	24.3	25.8	26.8	18.0

Data:authors' calculation, based on METI database.
Note: data are only for 2012. See Table 1 for industry classification.

Table 3 Composition of manufacturing MNEs: 2012

	All firms				SMEs				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	93.3	35.6	21.0	100.0	91.8	18.4	7.0	100.0	95.1	55.6	37.2
By-size share of firms with affiliates in each region (%)												
	100.0	100.0	100.0	100.0	53.7	52.8	27.7	18.0	46.3	47.2	72.3	82.0
By-industry share of firms with affiliates in each region (%)												
1	4.3	4.1	4.1	2.0	3.0	2.8	3.1	1.5	5.9	5.6	4.5	2.1
2	0.8	0.7	1.3	0.9	0.5	0.3	0.6	0.7	1.2	1.1	1.5	1.0
3	1.5	1.5	0.8	0.5	1.8	1.9	0.6	0.0	1.1	1.1	0.9	0.7
4	1.6	1.7	0.2	0.3	2.5	2.7	0.3	0.7	0.7	0.7	0.2	0.2
5	0.6	0.5	0.2	0.0	0.7	0.7	0.6	0.0	0.4	0.4	0.1	0.0
6	0.8	0.8	0.1	0.1	0.7	0.8	0.0	0.0	0.8	0.8	0.1	0.2
7	1.6	1.5	1.1	0.8	1.3	1.2	0.9	0.0	2.0	1.8	1.2	1.0
8	1.1	1.1	0.6	0.7	1.2	1.2	0.6	0.7	1.0	1.1	0.5	0.7
9	9.2	8.9	11.5	13.9	6.7	6.6	8.0	11.1	12.0	11.5	12.8	14.5
10	0.5	0.4	0.6	0.7	0.3	0.3	0.0	0.0	0.7	0.6	0.9	0.8
11	7.1	7.3	4.1	3.9	8.7	8.9	3.7	4.4	5.3	5.4	4.2	3.7
12	1.4	1.5	1.3	1.6	1.6	1.7	0.6	0.7	1.3	1.3	1.6	1.8
13	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
14	2.3	2.3	1.8	2.3	2.5	2.4	1.4	3.0	2.1	2.2	2.0	2.1
15	2.6	2.7	1.7	1.1	2.1	2.1	1.4	0.7	3.3	3.3	1.7	1.1
16	3.3	3.4	2.8	3.3	3.0	3.1	2.8	5.2	3.7	3.7	2.8	2.9
17	7.9	8.0	5.7	3.1	10.3	10.5	8.8	5.2	5.2	5.3	4.6	2.6
18	17.1	17.0	18.9	20.4	19.1	18.9	27.0	25.9	14.8	14.9	15.8	19.2
19	15.6	15.9	16.4	19.1	16.1	16.3	19.3	20.0	15.2	15.6	15.3	18.9
20	13.8	13.8	18.1	14.9	11.1	11.0	9.9	5.9	17.0	17.0	21.2	16.9
21	3.1	3.0	5.1	6.0	2.7	2.3	6.5	8.1	3.6	3.8	4.6	5.5
22	3.6	3.7	3.5	4.5	4.3	4.4	4.0	5.9	2.8	2.9	3.4	4.2

Data:authors' calculation, based on METI database.
Note: data are only for 2012. See Table 1 for industry classification.

Table 4 The number of manufacturing firms by the type and by the industry

	2000-2004				2004-2008				2008-2012			
	Local	MNE1	MNE2	All	Local	MNE1	MNE2	All	Local	MNE1	MNE2	All
Number of firms												
	7825	1425	1267	10517	7922	1278	1734	10934	7789	1527	1805	11121
(% in all)	(74.4)	(13.5)	(12.0)	(100.0)	(72.5)	(11.7)	(15.9)	(100.0)	(70.0)	(13.7)	(16.2)	(100.0)
(SME %)	(83.6)	(42.4)	(50.5)	(74.1)	(85.7)	(43.2)	(58.4)	(76.4)	(84.5)	(47.0)	(58.3)	(75.1)
By-industry shares (%): all size												
1	13.2	4.0	5.1	10.9	13.3	4.1	5.4	11.0	14.0	4.3	4.8	11.2
2	1.8	1.3	1.1	1.7	1.7	0.8	1.4	1.6	1.8	0.8	0.9	1.5
3	2.5	2.2	2.1	2.5	2.2	2.0	2.3	2.2	2.0	1.6	1.5	1.8
4	2.3	1.2	2.8	2.2	2.0	1.4	1.8	1.9	2.1	1.0	2.2	1.9
5	1.2	0.3	0.9	1.0	1.1	0.5	0.7	1.0	1.2	0.2	0.7	1.0
6	1.3	0.4	1.3	1.1	1.2	0.8	0.9	1.1	1.0	0.9	0.8	1.0
7	3.8	1.7	1.8	3.3	3.6	1.8	1.9	3.1	3.5	1.4	1.8	3.0
8	5.6	1.5	1.8	4.6	5.7	1.5	1.6	4.6	5.7	0.9	1.5	4.4
9	6.3	11.3	9.5	7.4	6.3	10.4	9.9	7.3	6.5	10.9	8.2	7.4
10	0.3	0.6	0.9	0.4	0.4	0.3	0.6	0.4	0.4	0.5	0.6	0.4
11	5.0	6.0	5.5	5.2	5.0	6.7	5.6	5.3	5.4	5.8	6.7	5.7
12	1.0	1.5	1.4	1.1	1.1	2.0	1.3	1.2	1.0	1.6	1.4	1.1
13	0.2	0.1	0.3	0.2	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.2
14	4.4	2.4	2.6	3.9	4.0	2.5	2.6	3.6	4.0	1.8	2.7	3.5
15	3.5	2.2	2.7	3.2	3.7	1.9	2.9	3.4	3.8	3.3	2.2	3.5
16	2.4	2.9	3.2	2.6	2.1	3.3	2.6	2.3	2.5	3.3	3.3	2.8
17	7.9	5.8	6.6	7.5	8.0	5.7	7.4	7.7	7.8	7.2	8.0	7.7
18	11.4	16.0	14.9	12.5	11.3	17.0	14.4	12.5	11.5	16.6	16.5	13.0
19	14.0	17.0	19.9	15.1	14.2	16.7	17.9	15.0	12.9	15.5	17.4	14.0
20	7.7	15.1	9.4	8.9	7.7	13.4	12.1	9.1	8.0	15.5	12.5	9.7
21	2.3	4.2	3.6	2.7	2.9	4.3	3.3	3.1	2.2	4.0	2.7	2.5
22	1.8	2.4	2.7	2.0	2.1	2.9	3.1	2.3	2.5	2.8	3.4	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.
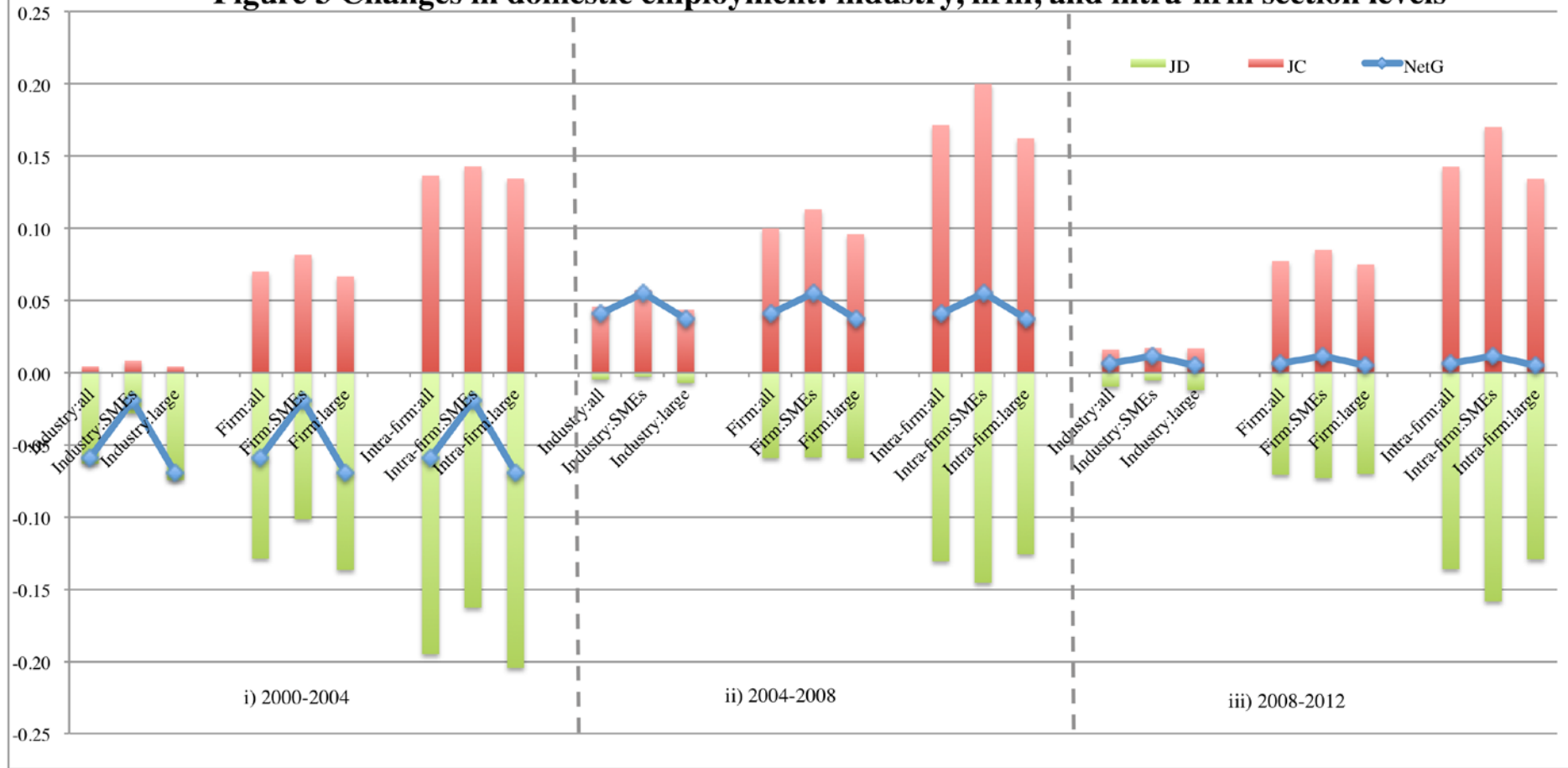
Table 5 Changes in domestic employment

Firm type		NetG	JC (a) Industry level (inter-industry)	JC ((a)/(b): share (%))	JC (b) Firm level (intra-and-inter-industry)	JC ((b)/(c): share (%))	JC (c) Intra-firm section level	JD (a) Industry level (inter-industry)	JD ((a)/(b): share (%))	JD (b) Firm level (intra-and-inter-industry)	JD ((b)/(c): share (%))	JD (c) Intra-firm section level
i) 2000-2004												
All firms	Local	-0.043	0.007	(8.7)	0.077	(58.5)	0.131	-0.050	(41.5)	-0.120	(68.7)	-0.174
	MNE1	-0.055	0.004	(6.9)	0.064	(47.2)	0.136	-0.059	(49.8)	-0.119	(62.3)	-0.191
	MNE2	-0.086	0.016	(23.3)	0.070	(48.3)	0.144	-0.102	(65.6)	-0.156	(67.6)	-0.230
	All	-0.058	0.005	(6.4)	0.070	(51.4)	0.137	-0.063	(49.0)	-0.129	(66.0)	-0.195
SMEs	Local	-0.021	0.008	(10.0)	0.081	(57.4)	0.140	-0.029	(28.6)	-0.102	(63.0)	-0.161
	MNE1	0.034	0.044	(37.7)	0.117	(61.9)	0.189	-0.010	(12.5)	-0.083	(53.7)	-0.155
	MNE2	-0.066	0.005	(8.2)	0.055	(46.9)	0.118	-0.071	(58.3)	-0.122	(66.0)	-0.184
	All	-0.020	0.008	(10.1)	0.082	(57.2)	0.143	-0.028	(27.6)	-0.102	(62.4)	-0.163
Large	Local	-0.066	0.007	(9.7)	0.073	(59.7)	0.122	-0.073	(52.7)	-0.139	(73.9)	-0.188
	MNE1	-0.060	0.004	(6.4)	0.061	(45.9)	0.133	-0.064	(53.0)	-0.122	(62.8)	-0.194
	MNE2	-0.088	0.018	(25.9)	0.071	(48.4)	0.147	-0.106	(66.8)	-0.159	(67.7)	-0.234
	All	-0.070	0.004	(6.6)	0.067	(49.6)	0.135	-0.074	(54.4)	-0.137	(66.8)	-0.205
ii) 2004-2008												
All firms	Local	0.037	0.041	(38.7)	0.107	(55.5)	0.193	-0.005	(6.9)	-0.071	(45.1)	-0.156
	MNE1	0.052	0.057	(56.9)	0.100	(61.5)	0.163	-0.005	(10.3)	-0.048	(43.4)	-0.111
	MNE2	0.026	0.041	(46.0)	0.089	(57.6)	0.154	-0.014	(23.2)	-0.062	(48.9)	-0.128
	All	0.041	0.046	(45.6)	0.100	(58.4)	0.172	-0.005	(7.8)	-0.059	(45.3)	-0.131
SMEs	Local	0.049	0.052	(47.7)	0.108	(55.3)	0.196	-0.003	(4.9)	-0.060	(40.4)	-0.147
	MNE1	0.103	0.104	(70.8)	0.147	(60.2)	0.245	-0.001	(2.8)	-0.044	(31.2)	-0.142
	MNE2	0.058	0.064	(53.8)	0.119	(60.6)	0.196	-0.006	(9.7)	-0.061	(44.1)	-0.138
	All	0.055	0.057	(50.6)	0.113	(56.5)	0.200	-0.003	(4.6)	-0.059	(40.2)	-0.146
Large	Local	0.022	0.032	(30.2)	0.105	(55.8)	0.189	-0.009	(11.3)	-0.083	(49.8)	-0.167
	MNE1	0.050	0.055	(56.5)	0.098	(61.6)	0.159	-0.006	(12.0)	-0.048	(44.2)	-0.109
	MNE2	0.020	0.038	(45.7)	0.083	(56.8)	0.146	-0.018	(28.2)	-0.063	(49.9)	-0.126
	All	0.037	0.044	(45.6)	0.096	(59.1)	0.162	-0.007	(11.8)	-0.059	(47.2)	-0.126
iii) 2008-2012												
All firms	Local	0.004	0.022	(25.3)	0.087	(50.7)	0.171	-0.017	(21.2)	-0.082	(49.3)	-0.167
	MNE1	0.031	0.037	(47.0)	0.078	(65.3)	0.120	-0.006	(13.2)	-0.048	(53.5)	-0.089
	MNE2	-0.029	0.004	(6.0)	0.063	(44.8)	0.140	-0.033	(35.9)	-0.092	(54.3)	-0.169
	All	0.007	0.016	(20.9)	0.077	(54.2)	0.143	-0.010	(13.4)	-0.071	(52.0)	-0.136
SMEs	Local	0.010	0.017	(20.9)	0.082	(48.6)	0.169	-0.007	(10.1)	-0.072	(45.4)	-0.159
	MNE1	0.057	0.059	(49.2)	0.120	(58.4)	0.205	-0.002	(2.9)	-0.063	(42.3)	-0.148
	MNE2	-0.010	0.015	(20.3)	0.076	(49.0)	0.154	-0.026	(29.9)	-0.086	(52.2)	-0.165
	All	0.012	0.017	(20.2)	0.085	(49.9)	0.170	-0.005	(7.1)	-0.073	(46.1)	-0.158
Large	Local	-0.001	0.029	(31.1)	0.092	(52.7)	0.174	-0.030	(31.9)	-0.093	(52.9)	-0.175
	MNE1	0.029	0.037	(48.6)	0.076	(66.1)	0.114	-0.008	(16.9)	-0.047	(54.7)	-0.085
	MNE2	-0.032	0.006	(9.8)	0.061	(44.0)	0.138	-0.038	(41.1)	-0.093	(54.7)	-0.170
	All	0.005	0.017	(22.5)	0.075	(55.9)	0.134	-0.012	(17.0)	-0.070	(54.1)	-0.129

Data:authors' calculation, based on METI database.

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

The largest figures among 3 types of firms for JC/JD (-)/NetG are highlighted.

Figure 3 Changes in domestic employment: industry, firm, and intra-firm section levels

i) 2000-2004

ii) 2004-2008

iii) 2008-2012

Data:authors' calculation, based on METI database.

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

Figure 4(a) Changes in domestic employment by firm-type: industry level

Figure 4(b) Changes in domestic employment by firm-type: firm level

i) 2000-2004

ii) 2004-2008

iii) 2008-2012
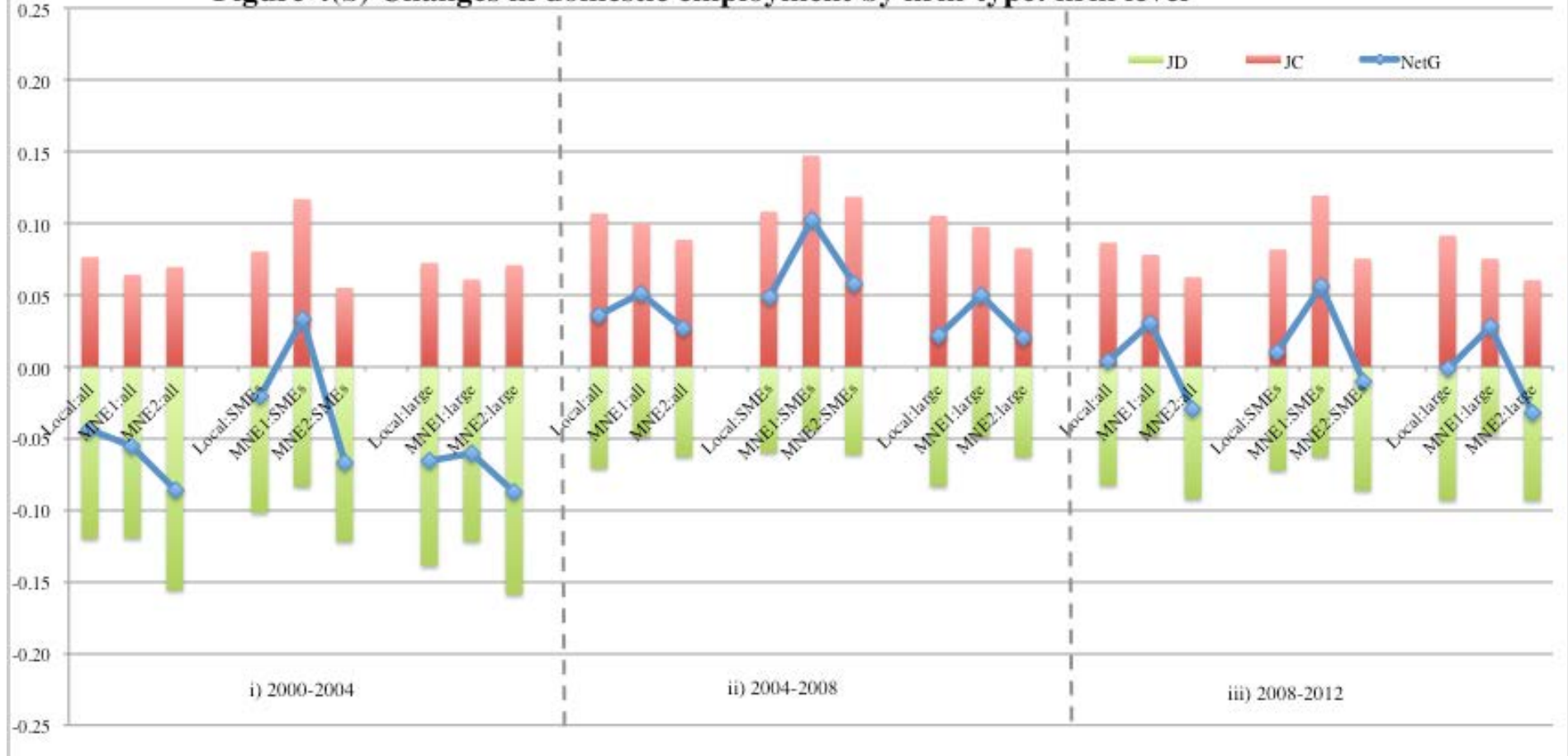
Figure 4(c) Changes in domestic employment by firm-type: intra-firm section level
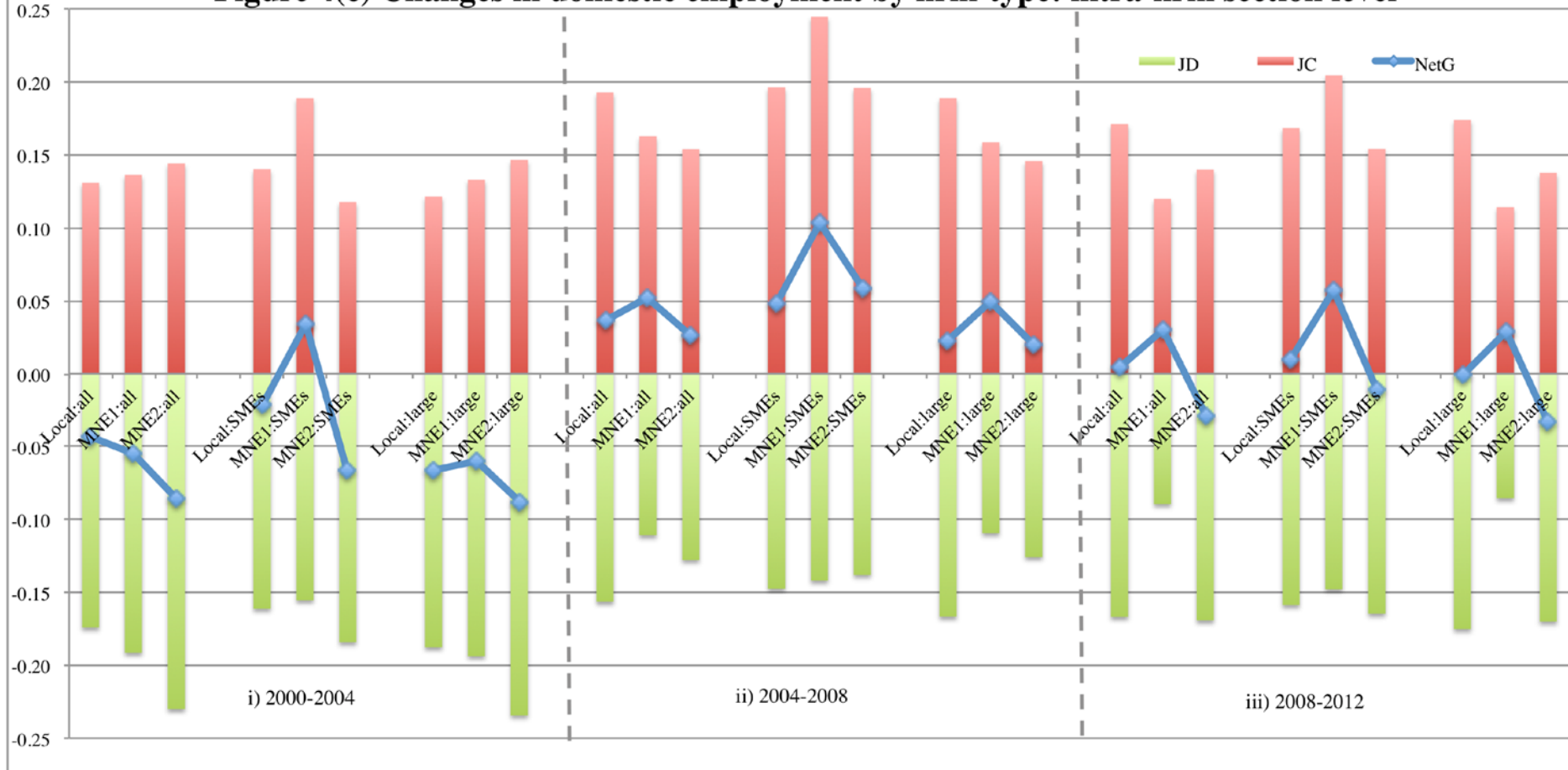
Data:authors' calculation, based on METI database.

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

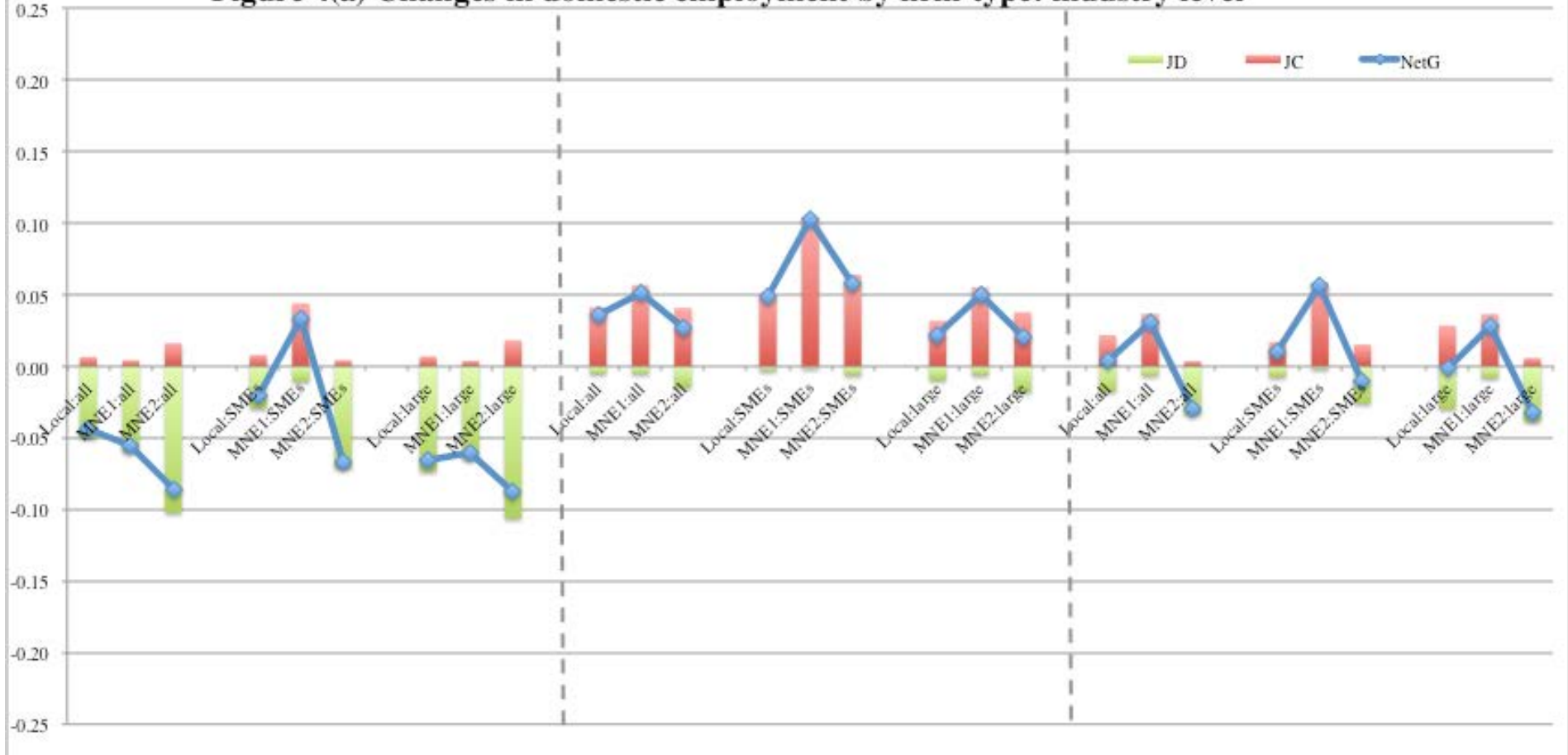Figure 5 Decomposition of changes in domestic employment at the industry level by industry
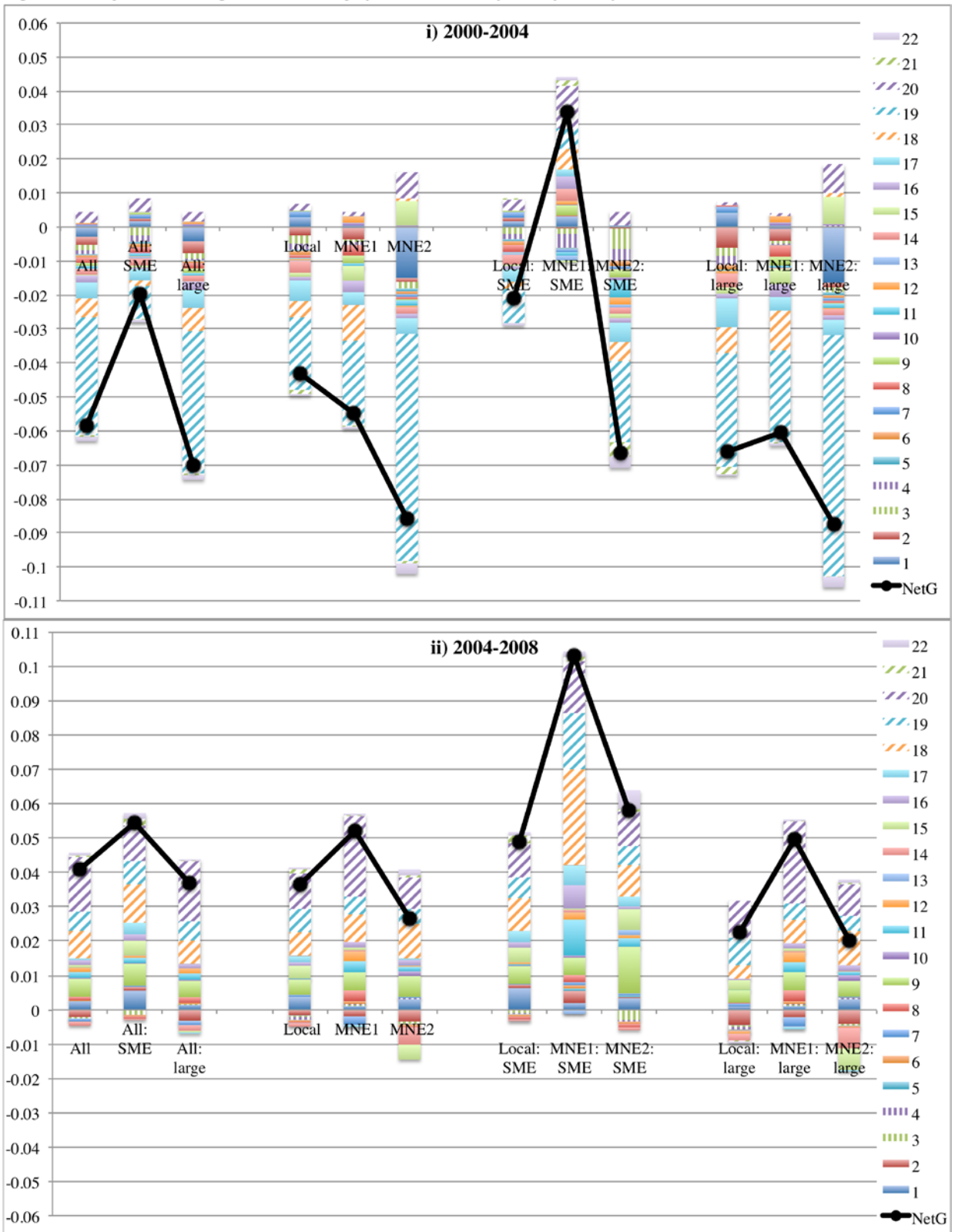
iii) 2008-2012

Data: authors' calculation, based on METI database.

Note: data are based on balanced panel data for each period.
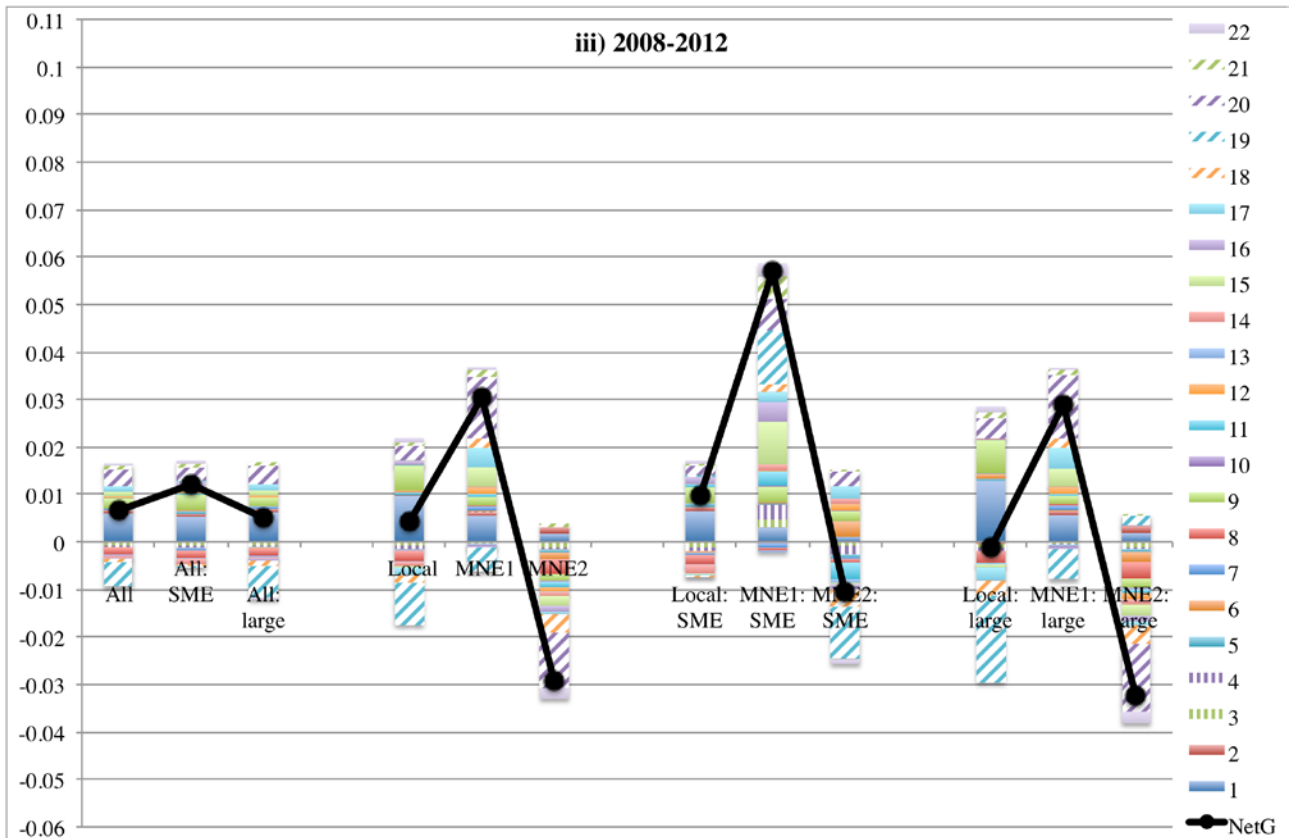
The length of JC/JD in total is equal to JC/JD in (a) of Table 5.

Table 6 Changes in domestic employment at the intra-firm section level

		NetG Total (=HQ+MFG+Other)	HQ	MFG	Other	NetG (Total) JC	JD	JC Total (=HQ+MFG+Other)	HQ	MFG	Other	JD Total (=HQ+MFG+Other)	HQ	MFG	Other
i) 2000-2004															
All firms	Local	-0.043	-0.008	-0.049	0.014	0.014	-0.057	0.131	0.018	0.062	0.051	-0.174	-0.026	-0.112	-0.036
	MNE1	-0.055	-0.007	-0.098	0.050	0.050	-0.105	0.136	0.020	0.034	0.083	-0.191	-0.027	-0.131	-0.033
	MNE2	-0.086	-0.014	-0.127	0.055	0.055	-0.140	0.144	0.014	0.031	0.099	-0.230	-0.028	-0.157	-0.045
	All	-0.058	-0.009	-0.088	0.038	0.038	-0.097	0.137	0.018	0.043	0.076	-0.195	-0.027	-0.131	-0.037
SME	Local	-0.021	-0.006	-0.031	0.016	0.016	-0.037	0.140	0.021	0.070	0.049	-0.161	-0.028	-0.101	-0.033
	MNE1	0.034	0.006	-0.003	0.030	0.036	-0.003	0.189	0.034	0.091	0.065	-0.155	-0.027	-0.093	-0.035
	MNE2	-0.066	-0.013	-0.059	0.006	0.006	-0.073	0.118	0.024	0.049	0.045	-0.184	-0.037	-0.108	-0.039
	All	-0.020	-0.006	-0.031	0.017	0.017	-0.036	0.143	0.023	0.070	0.050	-0.163	-0.029	-0.101	-0.033
Large	Local	-0.066	-0.010	-0.069	0.013	0.013	-0.079	0.122	0.015	0.054	0.052	-0.188	-0.025	-0.123	-0.040
	MNE1	-0.060	-0.008	-0.104	0.051	0.051	-0.112	0.133	0.019	0.030	0.084	-0.194	-0.027	-0.133	-0.033
	MNE2	-0.088	-0.014	-0.133	0.059	0.059	-0.147	0.147	0.013	0.029	0.104	-0.234	-0.027	-0.162	-0.045
	All	-0.070	-0.010	-0.104	0.045	0.045	-0.115	0.135	0.016	0.035	0.083	-0.205	-0.026	-0.140	-0.038
i) 2004-2008															
All firms	Local	0.037	0.004	-0.016	0.048	0.053	-0.016	0.193	0.024	0.088	0.081	-0.156	-0.020	-0.104	-0.033
	MNE1	0.052	0.018	0.011	0.023	0.052	0.000	0.163	0.027	0.069	0.067	-0.111	-0.009	-0.058	-0.044
	MNE2	0.026	0.007	0.007	0.012	0.026	0.000	0.154	0.026	0.072	0.056	-0.128	-0.019	-0.065	-0.044
	All	0.041	0.011	0.001	0.030	0.041	0.000	0.172	0.026	0.076	0.070	-0.131	-0.015	-0.076	-0.040
SME	Local	0.049	0.006	-0.007	0.050	0.056	-0.007	0.196	0.026	0.090	0.080	-0.147	-0.020	-0.097	-0.030
	MNE1	0.103	0.021	0.007	0.075	0.103	0.000	0.245	0.046	0.098	0.101	-0.142	-0.025	-0.091	-0.026
	MNE2	0.058	0.007	0.014	0.038	0.058	0.000	0.196	0.030	0.092	0.073	-0.138	-0.024	-0.078	-0.036
	All	0.055	0.007	-0.003	0.050	0.058	-0.003	0.200	0.029	0.091	0.081	-0.146	-0.021	-0.094	-0.030
Large	Local	0.022	0.002	-0.026	0.047	0.048	-0.026	0.189	0.021	0.085	0.083	-0.167	-0.019	-0.111	-0.036
	MNE1	0.050	0.018	0.011	0.020	0.050	0.000	0.159	0.026	0.068	0.065	-0.109	-0.008	-0.056	-0.045
	MNE2	0.020	0.008	0.006	0.007	0.020	0.000	0.146	0.025	0.068	0.053	-0.126	-0.018	-0.062	-0.046
	All	0.037	0.012	0.002	0.023	0.037	0.000	0.162	0.025	0.072	0.066	-0.126	-0.013	-0.070	-0.043
i) 2008-2012															
All firms	Local	0.004	-0.002	0.014	-0.008	0.014	-0.010	0.171	0.020	0.100	0.052	-0.167	-0.022	-0.086	-0.059
	MNE1	0.031	0.009	0.024	-0.003	0.033	-0.003	0.120	0.021	0.066	0.033	-0.089	-0.011	-0.042	-0.036
	MNE2	-0.029	-0.008	-0.009	-0.013	0.000	-0.029	0.140	0.025	0.067	0.048	-0.169	-0.033	-0.076	-0.060
	All	0.007	0.001	0.012	-0.007	0.014	-0.007	0.143	0.021	0.078	0.043	-0.136	-0.020	-0.066	-0.050
SME	Local	0.010	-0.001	0.019	-0.008	0.019	-0.009	0.169	0.021	0.097	0.050	-0.159	-0.022	-0.079	-0.058
	MNE1	0.057	0.007	0.033	0.018	0.057	0.000	0.205	0.032	0.108	0.064	-0.148	-0.026	-0.075	-0.047
	MNE2	-0.010	-0.006	0.000	-0.005	0.000	-0.011	0.154	0.022	0.083	0.049	-0.165	-0.028	-0.083	-0.054
	All	0.012	-0.001	0.017	-0.005	0.017	-0.006	0.170	0.022	0.096	0.052	-0.158	-0.023	-0.079	-0.056
Large	Local	-0.001	-0.002	0.010	-0.008	0.010	-0.011	0.174	0.019	0.103	0.053	-0.175	-0.021	-0.093	-0.061
	MNE1	0.029	0.010	0.023	-0.004	0.033	-0.004	0.114	0.020	0.063	0.031	-0.085	-0.010	-0.040	-0.035
	MNE2	-0.032	-0.008	-0.010	-0.014	0.000	-0.032	0.138	0.025	0.065	0.047	-0.170	-0.034	-0.075	-0.061
	All	0.005	0.002	0.011	-0.008	0.013	-0.008	0.134	0.021	0.073	0.040	-0.129	-0.019	-0.062	-0.048

Data:authors' calculation, based on METI database.

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

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

Total of JC/JD is equal to JC/JD in (c) of Table 5.

Figure 6 Decomposition of changes in domestic employment at the intra-firm section level

Note: data are based on balanced panel data for each period.
    The length of JC/JD in total is equal to JC/JD in (c) of Table 5.

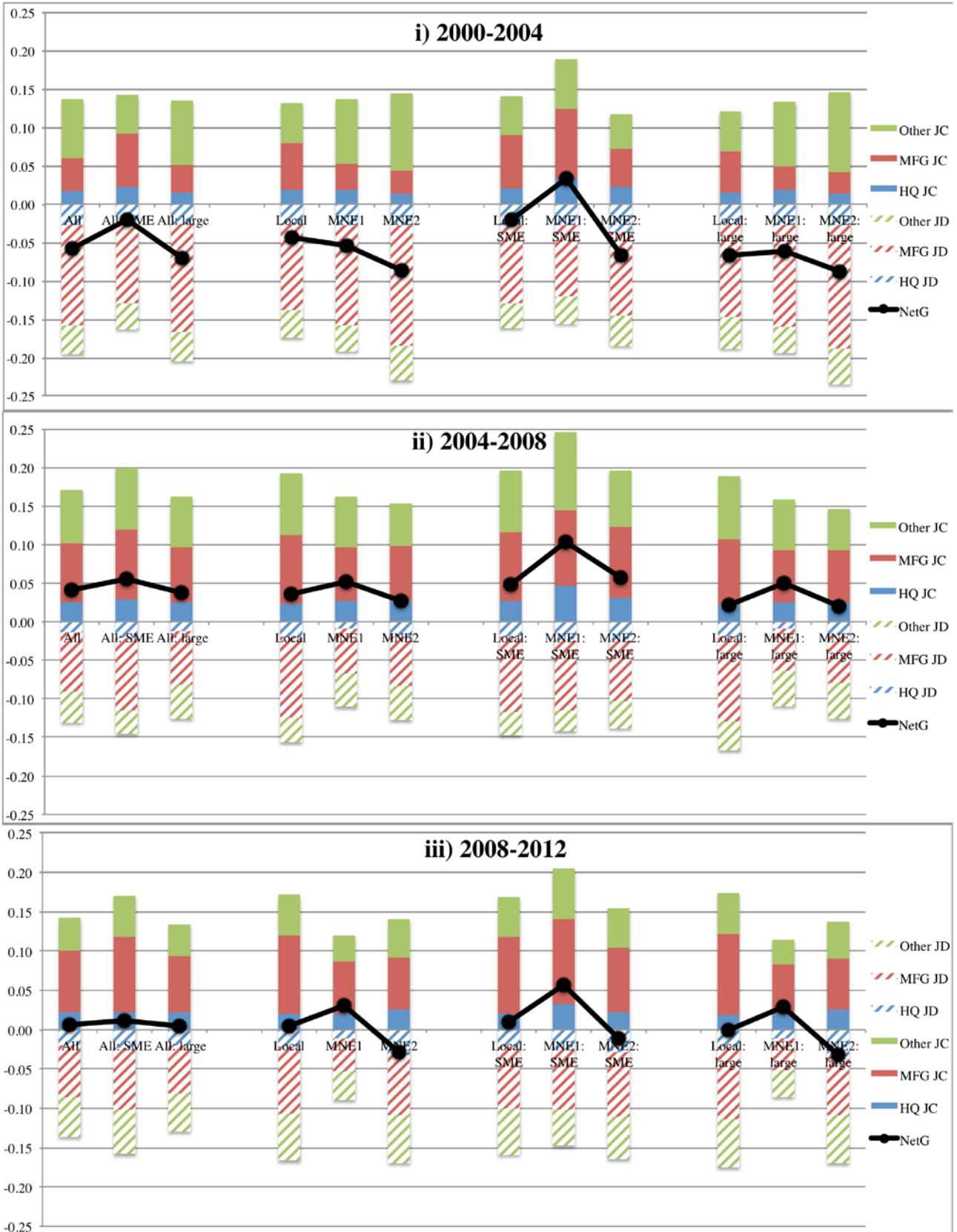Figure 7 Decomposition of changes in domestic employment among 3 intra-firm sections (JC/JD, based on NetG for each intra-firm section)
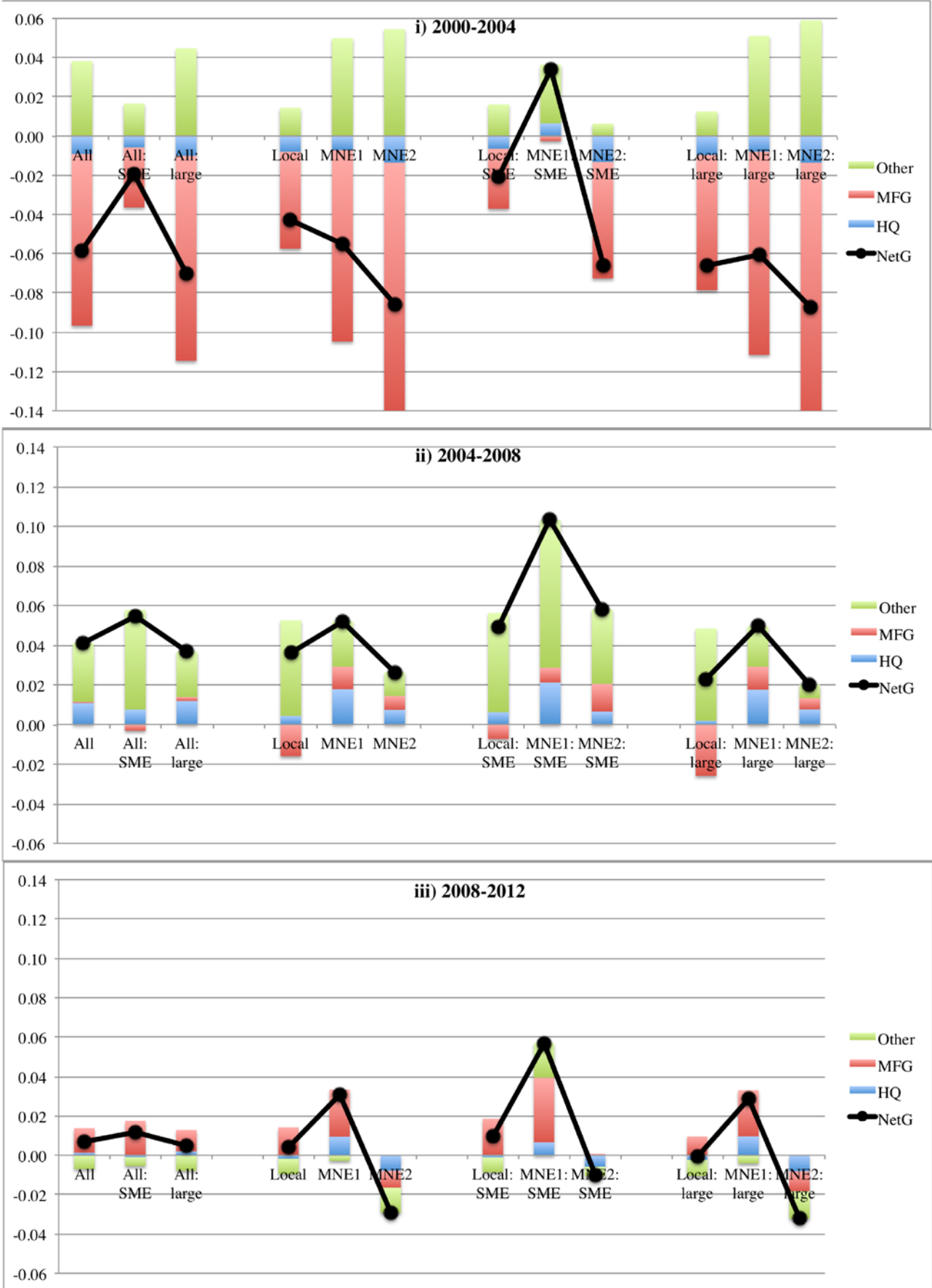
Data:authors' calculation, based on METI database.

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

The length of JC/JD in total is equal to JC/JD of NetG (Total) of Table 6.

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Table 7 Domestic adjustments and import penetration

	Dependent variable: changes in domestic employment (%)					
	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables	2000-2004	2000-2004	2004-2008	2004-2008	2008-2012	2008-2012
a) Import penetration: level						
Firm size (log)	-3.65 ***	-3.97 ***	-0.77 ***	-1.31 ***	-1.10 ***	-1.28 ***
	-13.88	*-14.29*	*-3.21*	*-5.16*	*-4.72*	*-5.23*
Import penetration	-0.23 ***		-0.08 ***		-0.06 ***	
	-7.6		*-3.91*		*-2.83*	
Import peneration*Local		-0.26 ***		-0.13 ***		-0.06 ***
		-7.79		*-5.53*		*-2.61*
Import peneration*MNE1		0.09		0.20 ***		0.13 ***
		1.6		*4.69*		*3.54*
Import peneration*MNE2		-0.40 ***		-0.11 ***		-0.20 ***
		-7.24		*-2.9*		*-5.91*
Constant	16.02 ***	17.68 ***	7.69 ***	10.49 ***	5.05 ***	5.97 ***
	11.15	*11.68*	*5.91*	*7.67*	*3.98*	*4.49*
Adj R2	0.024	0.028	0.002	0.007	0.003	0.007
Number of observations	10517	10517	10934	10934	11121	11121
b) Import penetration: change (gap)						
Firm size (log)	-3.72 ***	-3.94 ***	-0.79 ***	-1.26 ***	-1.05 ***	-1.13 ***
	-14.25	*-14.53*	*-3.28*	*-5.06*	*-4.53*	*-4.77*
Import penetration	-1.10 ***		-0.11		0.30 ***	
	-12.59		*-0.79*		*4.04*	
Import peneration*Local		-1.17 ***		-0.47 ***		0.26 ***
		-12.11		*-3.09*		*2.86*
Import peneration*MNE1		-0.16		2.26 ***		0.74 ***
		-0.84		*7.43*		*4.21*
Import peneration*MNE2		-1.61 ***		-0.51 *		0.09 ***
		-8.77		*-1.91*		*0.54*
Constant	16.81 ***	17.91 ***	6.78 ***	9.25 ***	3.58 ***	3.98 ***
	11.85	*12.21*	*5.27*	*6.95*	*2.87*	*3.14*
Adj R2	0.033	0.028	0.001	0.008	0.003	0.004
Number of observations	10517	10517	10934	10934	11121	11121

Data source: Authors' calculation, based on METI database.

Note: figures in italic are t statistics.

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

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

Table A.2 Number of Japanese affiiates abroad (based on the *Kaij*i 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: authors' calculation, based on the *Kaiji* data.

Figure A.1 By-industry contribution to changes in domestic employment at the firm level: all firms
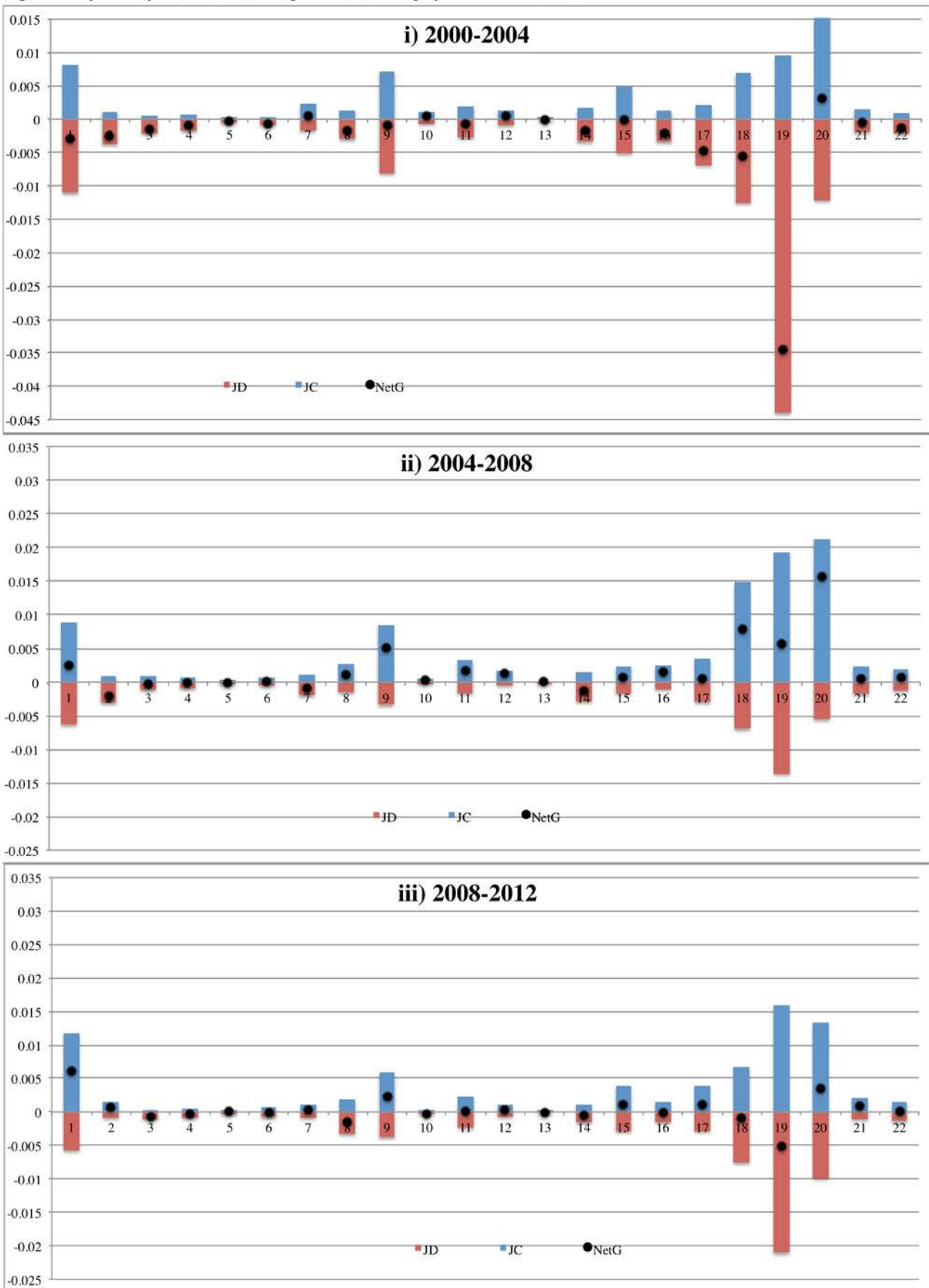
i) 2000-2004

ii) 2004-2008

iii) 2008-2012

Data:authors' calculation, based on METI database.
Note: data are based on balanced panel data for each period.

Table A.3 Changes in domestic employment for each intra-firm section

		2000-2004			2004-2008			2008-2012		
		JC	JD	NetG	JC	JD	NetG	JC	JD	NetG
All firms										
Total	Local	0.077	-0.120	-0.043	0.107	-0.071	0.037	0.087	-0.082	0.004
(= all	MNE1	0.064	-0.119	-0.055	0.100	-0.048	0.052	0.078	-0.048	0.031
intra-firm	MNE2	0.070	-0.156	-0.086	0.089	-0.062	0.026	0.063	-0.092	-0.029
sectors)	All	0.070	-0.129	-0.058	0.100	-0.059	0.041	0.077	-0.071	0.007
HQ	Local	0.151	-0.218	-0.066	0.203	-0.167	0.035	0.170	-0.184	-0.015
	MNE1	0.155	-0.211	-0.056	0.207	-0.069	0.138	0.154	-0.084	0.070
	MNE2	0.110	-0.214	-0.105	0.198	-0.142	0.056	0.183	-0.240	-0.057
	All	0.142	-0.214	-0.073	0.204	-0.118	0.086	0.166	-0.156	0.010
MFG	Local	0.092	-0.166	-0.073	0.131	-0.155	-0.024	0.152	-0.131	0.022
	MNE1	0.055	-0.216	-0.161	0.125	-0.105	0.020	0.120	-0.077	0.043
	MNE2	0.053	-0.271	-0.218	0.121	-0.109	0.012	0.119	-0.134	-0.015
	All	0.069	-0.209	-0.140	0.127	-0.126	0.001	0.132	-0.111	0.021
Other	Local	0.245	-0.175	0.070	0.380	-0.154	0.226	0.228	-0.263	-0.035
	MNE1	0.314	-0.126	0.188	0.209	-0.138	0.072	0.105	-0.114	-0.009
	MNE2	0.344	-0.155	0.189	0.204	-0.161	0.044	0.160	-0.203	-0.043
	All	0.302	-0.149	0.153	0.256	-0.147	0.108	0.154	-0.179	-0.025
SMEs										
Total	Local	0.081	-0.102	-0.021	0.108	-0.060	0.049	0.082	-0.072	0.010
(= all	MNE1	0.117	-0.083	0.034	0.147	-0.044	0.103	0.120	-0.063	0.057
intra-firm	MNE2	0.055	-0.122	-0.066	0.119	-0.061	0.058	0.076	-0.086	-0.010
sectors)	All	0.082	-0.102	-0.020	0.113	-0.059	0.055	0.085	-0.073	0.012
HQ	Local	0.163	-0.212	-0.049	0.207	-0.158	0.049	0.163	-0.172	-0.009
	MNE1	0.219	-0.177	0.042	0.271	-0.146	0.125	0.193	-0.154	0.039
	MNE2	0.150	-0.235	-0.085	0.185	-0.145	0.040	0.139	-0.176	-0.037
	All	0.168	-0.211	-0.043	0.210	-0.155	0.055	0.163	-0.171	-0.007
MFG	Local	0.099	-0.142	-0.043	0.131	-0.141	-0.011	0.145	-0.117	0.028
	MNE1	0.140	-0.144	-0.004	0.166	-0.153	0.012	0.181	-0.126	0.055
	MNE2	0.075	-0.166	-0.091	0.149	-0.127	0.022	0.136	-0.135	0.001
	All	0.100	-0.144	-0.044	0.136	-0.140	-0.005	0.147	-0.121	0.027
Other	Local	0.306	-0.205	0.101	0.434	-0.163	0.272	0.250	-0.287	-0.038
	MNE1	0.325	-0.175	0.150	0.424	-0.110	0.313	0.274	-0.199	0.075
	MNE2	0.238	-0.205	0.033	0.337	-0.164	0.173	0.214	-0.235	-0.021
	All	0.301	-0.201	0.100	0.418	-0.158	0.260	0.247	-0.268	-0.022
Large firms										
Total	Local	0.073	-0.139	-0.066	0.105	-0.083	0.022	0.092	-0.093	-0.001
(= all	MNE1	0.061	-0.122	-0.060	0.098	-0.048	0.050	0.076	-0.047	0.029
intra-firm	MNE2	0.071	-0.159	-0.088	0.083	-0.063	0.020	0.061	-0.093	-0.032
sectors)	All	0.067	-0.137	-0.070	0.096	-0.059	0.037	0.075	-0.070	0.005
HQ	Local	0.137	-0.225	-0.088	0.197	-0.179	0.018	0.177	-0.199	-0.022
	MNE1	0.150	-0.214	-0.064	0.203	-0.064	0.139	0.150	-0.078	0.073
	MNE2	0.105	-0.212	-0.107	0.201	-0.141	0.060	0.191	-0.252	-0.061
	All	0.133	-0.216	-0.082	0.202	-0.105	0.096	0.167	-0.152	0.015
MFG	Local	0.085	-0.194	-0.109	0.132	-0.173	-0.040	0.160	-0.145	0.015
	MNE1	0.049	-0.221	-0.171	0.123	-0.102	0.021	0.116	-0.073	0.043
	MNE2	0.050	-0.282	-0.231	0.115	-0.106	0.010	0.116	-0.134	-0.018
	All	0.058	-0.232	-0.173	0.124	-0.120	0.003	0.127	-0.108	0.019
Other	Local	0.205	-0.156	0.049	0.333	-0.146	0.187	0.210	-0.242	-0.032
	MNE1	0.314	-0.124	0.190	0.202	-0.139	0.063	0.096	-0.109	-0.013
	MNE2	0.350	-0.152	0.198	0.184	-0.160	0.024	0.154	-0.199	-0.046
	All	0.302	-0.140	0.162	0.222	-0.145	0.077	0.134	-0.160	-0.026

Data:authors' calculation, based on METI database.

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

JC, JD (-), and NetG refer to gross job creation, gross job destruction, and net change for each intra-firm section.

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

Figures in JC/JD for Total are equal to those in JC/JD in (b) of Table 5 for all firms.