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Japanese and Asian Investment in Indonesian Manufacturing^{*}

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Abstract

This paper is intended to provide basic information related to the behavior and performance of Japanese multinational corporations (MNCs) in Indonesian manufacturing. Comparisons are also made for other Asian countries and other foreign countries using a plant-level dataset for Indonesian manufacturing and several firm-level data sets with related information. Results of analyses suggest that Japanese plants account for large shares of employment and value added in Indonesian manufacturing, especially in metal products and all machinery categories. In the early 1990s, MNCs from other Asian home economies were concentrated in different industries, but the industrial distributions of MNCs from Japan and other Asian economies have become similar in recent years. However, MNCs from other Asian economies still tend to be more labor-intensive and dependent on exports than Japanese MNCs. These differences suggest that MNCs from different home economies might have different effects on Indonesian manufacturing.

JEL classification: F23, O14

Keywords: Indonesia, MNCs, manufacturing

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1. Introduction

Foreign direct investment (FDI) has served an important role in the economic growth of eastern Asian developing countries in recent decades. As with other countries in the region, Indonesia has experienced large inflows of FDI. Indonesia has received FDI from many economies, including both developed countries and less-developed countries (LDCs). Through the mid-1980s, the main investors in Indonesia were Japanese, in addition to multinational corporations (MNCs) of North American and European developed countries. Thereafter, Indonesia received increased investment from newly industrializing economies such as Korea, Taiwan, Hong Kong, and Singapore (Thee 1991). The emergence of third-world MNCs has been studied since the 1980s, with emphasis on the differences between MNCs of developed countries and those of LDCs (Kumar and McLeod 1981, Wells 1983). More recently, FDI from LDCs has been a main topic of discussion in the *World Investment Report, 2006* (UNCTAD 2006).

The country of origin of FDI can be an important issue for policymakers who are concerned with FDI and external trade. Free trade areas and preferential trade agreements can change the nature of FDI and the activities of existing MNCs; such agreements are often established among countries in a region. For example, Indonesia is a member of ASEAN. The ASEAN Industrial Cooperation Scheme (AICO) scheme has enabled companies operating in two or more ASEAN countries to enjoy preferential tariff treatment. In addition, the Common Effective Preferential Tariff (CEPT) scheme is aimed at lowering tariffs to 0–5% within the region. Furthermore, China, Korea, and Japan have negotiated similar agreements with ASEAN countries. In 2006, Indonesia and Japan reached an agreement in principle on the major elements of the Economic Partnership Agreement, which is aimed at promotion not only of trade but also of direct investment. Although effects of reduction of tariffs within the region, and how they affect inward FDI in a country, remain unclear, such treatments would more or less change the nature of FDI from both member countries and other countries. Furthermore, concomitant with the movement toward regional integration, FDI is expected to increase within member countries. Therefore, if the characteristics of MNCs depend on the origins of investors, and if the effects of FDI differ according to the MNCs' host economy, it is important for policymakers to recognize those differences of MNCs by nationality. For example, if FDI promotion is designed for employment creation,

related policies should not hinder FDI by MNCs of countries that characteristically use labor-intensive technology.

The importance of MNCs would be increased if FDI barriers were reduced along with the movement toward regionalism. As described above, the origin of investors can be an important issue in cases where the volume of FDI from particular countries or regions is expected to increase or decrease. However, it is often difficult to know the situation of FDI and MNCs in a developing economy, mainly because of the dearth of data, especially data related to the origin of investors. This paper is intended to provide basic information related to the behavior and performance of MNCs in Indonesian manufacturing according to the group to which the source country belongs: Japan, other Asian countries, and other foreign countries. One contribution of this paper is the unique dataset examined here. The panel dataset was constructed from plant-level datasets used for Indonesia's manufacturing surveys (BPS, Statistik Industri), with additional information related to the nationality of foreign-owned plants. The original source contains only very limited information related to nationality. Therefore, to the author's knowledge, this analysis is the first attempt at characterizing FDI into Indonesian manufacturing. The following section describes some analytical principles. Section 3 explains the dataset in more detail. Using that unique dataset, Section 4 explains differences in location, industry, and ownership. Sections 5 and 6 describe differences in employment, value added, and trade propensity. Finally, Section 7 summarizes the results of analyses.

2. Some Analytical Principles

Characteristics of MNCs are expected to differ according to their investors' origin. Important differences might stem from their home countries' different stages of economic development. In particular, for Indonesia, most neighboring countries are classifiable as LDCs. In the literature describing MNCs, firms undertaking investment abroad are thought to have competitive advantages that compensate for the disadvantages related to operating abroad. The investment development paths (IDP) theory holds that, as an economy develops, firms accumulate firm-specific advantages. Firms subsequently initiate and increase investment abroad when those advantages reach a certain level (Dunning 1993). Therefore,

MNCs' comparative advantages are likely to depend on the home countries' stage of economic development. The theory also implies that, in the early stage of IDP, imports and inward FDI contribute to development of firm-specific advantages mainly in low/medium knowledge-intensive industries and resource-based sectors (UNCTAD 2006, p. 147). For that reason, FDI from LDCs might be characterized as low/medium knowledge-intensive and resource-intensive technology, whereas MNCs from developed countries exploit high knowledge-intensive technology in host countries.

Furthermore, the comparative advantages of firms in LDCs are developed in the LDC milieu. Consequently, those MNCs are more likely to be better adapted to exploit other LDCs' comparative advantages than MNCs from developed countries. Chen (1990) discussed the possibility that MNCs from LDCs do not necessarily use more appropriate products and technologies, but they tend to establish more appropriate industries and use more appropriate product technology than do MNCs from developed countries. Two-stage transfer of technology also implies that firms in LDCs modify technologies that have been introduced from developed countries to adapt them to local conditions; subsequently, they then transfer the technologies to other LDCs (Parry 1981, Chen 1990). These possible differences, which stem from different origins of investors, have important implications in terms of technology diffusion.

In addition to differences between characteristics of the respective MNCs of LDCs and developed countries, MNCs are expected to differ among developed countries. One important source of such differences is the conceptual distance from a home country to the host country. The conceptual distance includes cultural, social and legal differences, in addition to geographical distance. The theoretical model of Rodriguez-Clare (1996) predicts that linkage effects of MNCs on the host economy are greater when the cost of communication between MNC parents and affiliates, which tends to increase with 'distance', is high, for the reason that MNCs have a strong incentive to procure inputs in host countries.¹ Results of that model imply that the characteristics of MNCs differ according to the origin of its investors. In addition, it has often been argued that the management style of Japanese MNCs differs from those of other developed countries' MNCs.

¹ Javorcik, Saggi, and Spatareanu (2004) examined the hypothesis using data for firms in Romania.

3. Constructing a database with ownership information

3.1. Data

Indonesia's BPS-Statistics (former Central Bureau of Statistics) conducts industrial surveys annually. The surveys cover manufacturing plants with 20 or more workers (L&M manufacturing plants). For example, the survey for 2000 includes information related to 22,174 large and medium manufacturing plants. The aggregated results of the surveys are published as *Large and Medium Manufacturing Statistics*. Based on those results, BPS-Statistics has maintained two very detailed databases. One database consists of cross sections for each year containing information reported by surveyed plants; it is called the raw dataset (SI-dataset). The second database is called the backcast database by the statistical authorities; it consists of panel data for 1975–1999 (BC-dataset). It contains information for numerous plants that did not reply to surveys and which had therefore been omitted from the preceding dataset. Such information is collected from special surveys of non-respondents. Furthermore, it contains revisions of data entries, which originally violated accounting identities or which contain apparent typographical errors.

The datasets contain useful information related to both locally and foreign-owned plants. Moreover, the data are unobtainable from other data related to flows of direct investments, but include value added, employment, capital stock, and other variables that are necessary for economic analyses. However, the available datasets do not contain reliable information related to investors' nationalities. Although the SI-datasets contain information on main countries of investors for each foreign-owned plant in a few years, the information seems insufficient; many numbers are missing. Combining the two datasets, the author produced a dataset that is useful to analyze the characteristics of foreign-owned plants according to their investors' country of origin. The dataset construction method is explained below.

First, various sources with ownership information were accumulated to estimate the country of the ultimate beneficial owner. BPS-Statistics' *Manufacturing Directory* contains information related to location, sectors, and employment, which are generally consistent with the two datasets (BPS-Statistics various years b). In addition, CIC data (2003, 2005) were useful to gather information about firms' investors' countries. Toyo Keizai (various years) and JETRO (2005) data were used to identify Japanese-owned firms. Regarding plants that

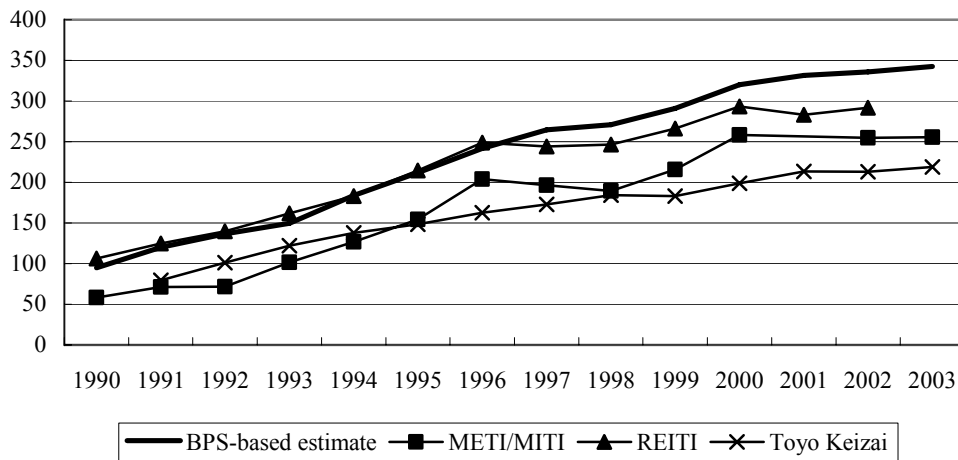
were not described in these sources, various other sources were used, including websites of companies, business organizations, and industrial estates.

Second, the two datasets were merged with information from alternative sources with ownership information, as described in the preceding paragraph. The resultant information is useful as a panel dataset. Discovered among SI-data for 2001–2003, however, were about 5,000 plants which cannot be merged with data for 1975–2000 because the plant identification codes for 1975–2000 and codes for 2001–2003 were not consistent. Of those plants, about 4,000 plants were inferred to have been newly established since 2000 because a high identification code number indicates that the plant was surveyed only recently. The 1,000 records for plants that could not be merged with data for earlier periods were treated as newly established plants.

The dataset was constructed with information on the country of the ultimate beneficial owner for foreign plants. For the purposes of this study, a foreign plant is defined as any plant with a foreign ownership share of 1% or greater when defining the country of the ultimate beneficial owner. If a Japanese firm ultimately controlled a plant and the Japanese holding was the largest of the known foreign holdings, the plant was defined as a Japanese plant. A similar methodology was applied to plants of other nationalities. The resulting estimates of a plant's ultimate beneficial owner were complicated because, for several plants, it was impossible to obtain information related to ownership. In such cases, an educated guess was made based on the available information.² In addition, because the starting years of foreign ownership were unknown for some foreign-owned plants (whether new investment or merger and acquisition), such plants were treated as foreign-owned plants from the first year that plants were reported in BC/SI-datasets.

² The task of identifying plants' owners was further complicated by the fact that most sources with ownership information (the BPS-statistics' directory is the only exception), contain firm-level data, but the BPS surveys contain plant-level information. There are a large number of multi-plant firms. For that reason, there might be an obvious gap between the firm-level ownership information and the plant-level data.

Figure 1 Comparison of employment by Japanese manufacturing plants (thousand persons)

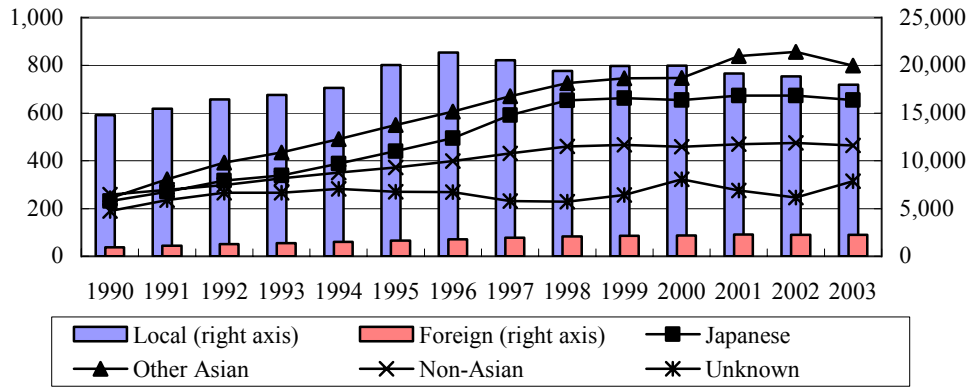


Sources) Author's estimates from BPS-Statistics (various years a); METI/MITI (various years); RIETI (2005); Toyo Keizai (various years).

Although similar comparisons are not possible for other nationalities, the resulting estimate of employment at plants identified as Japanese-owned resembled corresponding estimates by REITI in 1990–1996; the estimate was generally larger than those estimates by REITI and METI or Toyo Keizai in 1997–2003 (Fig. 1). Although exact comparisons are not possible because the coverage of these sources is inconsistent, these estimates suggest that the BPS-based estimates overestimate employment at Japanese plants, or that other estimates underestimate them.³ It is impossible to know which is more reliable from sources available when this analysis was conducted.

³ The Survey of Overseas Business Activities of Japanese Companies (METI/MITI) covers foreign affiliates of Japanese companies, including overseas subsidiaries (overseas companies in which a Japanese company(s) makes a 10 percent or greater investment) and sun-subidiaries (overseas companies with an overseas subsidiary, in which a Japanese company(s) has invested more than 50 percent, which then makes a greater than 50% investment). Based on the survey, RIETI compiled a new dataset interpolating missing values of non-respondents. Toyo Keizai covers foreign affiliates of Japanese companies (overseas companies in which a Japanese company(s) makes a 10 percent or greater investment either directly or indirectly).

Figure 2 Number of plants by group



Sources) Author's estimates from BPS-Statistics (various years a)

3.2. Nationality groups

In the following sections, the BPS-based dataset is used to compare characteristics of plants grouped by nationality of investors, as defined above. The first group includes plants identified as Japanese-owned; the group is called *Japanese plants* below. The second group is Other Asian plants, which are identified as plants owned by companies based in Asian countries other than Japan. The third group is Non-Asian plants, which are identified as plants owned by companies based in non-Asian countries. The group of Non-Asian plants mainly consists of plants owned by MNCs of technologically advanced countries other than Japan. The fourth group is Plants with unknown ownership. For these plants, the author could not gather sufficient information related to ownership to identify them. Therefore, the group might include numerous other Asian plants and Non-Asian plants; nevertheless, the number of Japanese plants is presumably small because sorting was performed with emphasis on Japanese plants. A large number of locally owned plants might also be included in this group because of reporting errors and other errors in the BPS-Statistics' surveys.⁴ The final group includes plants identified as locally owned.

Figure 2 presents the number of plants by group: the total number of the L&M manufacturing plants decreased from 23,907 in 1996 to 20,324 in 2003 after the rapid increase during 1990–1996. The number of foreign-owned plants continued to increase. In

⁴ In this group, numerous plants reported positive foreign ownership shares in the first year that the plants appeared in the BPS-Statistics' surveys; they reported 0 percent foreign ownership shares in subsequent years.

Table 1 Locational distributions of plants by group (%)

| Group | Local | | | Japanese | | | Other Asian | | | Non-Asian | | |
|-------------------|-------|------|------|----------|------|------|-------------|------|------|-----------|------|------|
| | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 |
| Riau | 1 | 1 | 2 | 1 | 9 | 8 | 3 | 8 | 8 | 3 | 6 | 6 |
| Other Sumatra | 10 | 9 | 9 | 1 | 1 | 1 | 12 | 8 | 6 | 15 | 12 | 9 |
| DKI Jakarta | 14 | 12 | 9 | 27 | 14 | 10 | 16 | 11 | 10 | 20 | 15 | 13 |
| West Java | 24 | 25 | 29 | 49 | 55 | 64 | 45 | 49 | 55 | 41 | 41 | 47 |
| Central Java | 17 | 18 | 18 | 4 | 4 | 4 | 3 | 3 | 4 | 5 | 5 | 6 |
| Yogyakarta | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| East Java | 23 | 24 | 23 | 12 | 13 | 11 | 13 | 15 | 12 | 14 | 15 | 13 |
| Eastern Indonesia | 9 | 8 | 8 | 6 | 3 | 2 | 8 | 5 | 4 | 2 | 5 | 6 |
| Indonesia | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Sources) Author's estimates from BPS-Statistics (various years a).

2003, there were 2,232 foreign-owned plants in Indonesian L&M manufacturing, accounting for about 11% of all L&M manufacturing plants. The largest foreign ownership group in terms of number of plants is Other Asian plants, followed by Japanese plants and Non-Asian plants. About 30 percent of foreign-owned plants were Japanese-owned, indicating the great presence of that group in L&M manufacturing.

The analyses described in this paper emphasize the period of 1990–2003 because information related to foreign ownership is scarce for earlier periods. When the analyses were conducted, data related to employment and added value were used from the BC-dataset if they were available; otherwise the SI-datasets were used. Some plants were reported only in BC-datasets for some years without information describing their industrial classification. In this case, the industrial classification was estimated using available information related to industrial classification for closest preceding or subsequent years in the SI-datasets.⁵ To weaken the influences of outliers and apparently inappropriate data entries on the results,

⁵ The industrial classification is based on the Indonesian Standard Industrial Classification (ISIC, revision 2). Salient differences between the International SIC (rev. 2) and the Indonesian SIC (rev. 2) are in the three-digit detail of non-metallic mineral products, which contains five categories in the Indonesian SIC (361, pottery; 362, glass products; 363, cement; 364, clay products; 369, non-metal products) but only three categories in the international SIC (361, 362 and a combination of the other three categories). The classification was changed in 1999 (revision 3). The classification for 1999–2003 based on ISIC revision 3 was converted to ISIC revision 2 using information in Badan Pusat Statistik (2000) and information related to each plant's classification based on ISIC revision 2 in 1997 and 1998.

these values were also modified by interpolation to the greatest extent possible. Some shortcomings in the dataset remain, but the dataset is important because it contains useful information for analyses of foreign plants in Indonesian manufacturing. Such data are unavailable in official data related to the flow of FDI.

4. Location, Industry and Ownership

4.1. Locational choice

Table 1 shows spatial patterns of domestic and foreign investment in the Indonesian L&M manufacturing industry. Most locally owned plants are located on Java Island. The share in West Java was the highest, followed by East Java, Central Java, and DKI Jakarta. Only 1–2 percent of locally owned plants were located in Yogyakarta province. The combined shares of these provinces of Java Island increased slightly from 80 percent in 1990 to 82 percent in 2003. However, during that period, the share of DKI Jakarta decreased from 14 percent to 9 percent. In contrast, the share of a neighboring province, West Java, increased from 24 percent to 29 percent. This trend probably reflects the relative increase in land prices, deteriorating traffic conditions, and other difficulties with urbanization in Jakarta. Outside Java, 10–12 percent of the locally owned plants were located on Sumatra Island including Riau Province and 8–9 percent were located in Eastern Indonesia, including Kalimantan and Surawesi Islands during 1990–2003. The slight rise in Riau Province was caused by the increase in locally owned plants in Batam Islands and neighboring regions in the province.

Corresponding shares of Japanese plants show different patterns. A notable difference is the higher concentration of Japanese plants in DKI Jakarta and West Java. About three-fourths of the Japanese plants were located in the two provinces during 1990–2003. Similarly with locally owned plants, the share of Japanese plants in DKI Jakarta decreased, although the corresponding share increased from 49 percent in 1990 to 64 percent in 2003 in West Java. The concentration and increase of Japanese plants in West Java are partially attributable to the development of industrial estates and transport infrastructure in the province, as well as problems with urbanization in Jakarta. Since private companies were first allowed to develop industrial estates at the end of the 1980s, Japanese-affiliated companies have established several industrial estates along the tollway from Jakarta through Cikampek; in other cases,

Table 2 Plant ownership by region (%)

| Group | Local | | | Japanese | | | Other Asian | | | Non-Asian | | |
|-------------------|-------|------|------|----------|------|------|-------------|------|------|-----------|------|------|
| | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 |
| Riau | 94 | 66 | 61 | 1 | 12 | 12 | 2 | 13 | 15 | 2 | 6 | 6 |
| Other Sumatra | 95 | 95 | 93 | 0 | 0 | 0 | 1 | 2 | 3 | 2 | 2 | 3 |
| DKI Jakarta | 93 | 92 | 88 | 2 | 2 | 3 | 1 | 2 | 4 | 2 | 2 | 3 |
| West Java | 92 | 87 | 81 | 2 | 4 | 6 | 2 | 4 | 7 | 2 | 2 | 3 |
| Central Java | 99 | 98 | 97 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| Yogyakarta | 99 | 98 | 95 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| East Java | 98 | 96 | 94 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 |
| Eastern Indonesia | 97 | 96 | 94 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 1 | 2 |

Sources) See sources for Table 1.

Japanese companies have been sales agents for other industrial estates. In 2003, about one-third of Japanese plants were located in regions where these industrial estates were constructed (Cibitung, Cikarang, Lemahabang, Cikampek, Ciampel, Bungursari, Campaka). In contrast, only 11–12 percent of the Other Asian plants and Non-Asian plants were located in these regions. The development of industrial estates contributed to the increase of FDI because firms became attracted to the simplified investment procedures and lower infrastructure maintenance costs (Sato 1999). According to the BKPM website, 65 industrial estates have been developed by public and private companies (Investment Coordinating Board 2005). Most of the large estates are located in West Java, followed by DKI Jakarta, Central Java, and East Java. Japanese preferences for industrial estates are also apparent in the share of such enterprises in Riau province. About 8 percent of Japanese plants are located in Riau Province especially in export processing zones in the Batam Islands near Singapore.

Most of the Other Asian plants and Non-Asian plants were also located in DKI Jakarta and West Java. However, the combined shares of these provinces are smaller than that of Japanese plants, suggesting that Japanese MNCs show a strong tendency among foreign-owned plants to concentrate investment in the provinces. On the other hand, although the shares were decreasing, a large number of Other Asian plants and Non-Asian plants were located on Sumatra other than in Riau Province; only 1 percent of Japanese plants were located in that same area. Comparing Other Asian plants with Non-Asian plants, the former had a higher share in West Java; the latter had a higher share in DKI Jakarta.

The dominance by foreign-owned plants has been greatest in Riau Province in terms of the number of plants in recent years (Table 2). In 2003, 12 percent of the plants located in the province were Japanese plants; 15 percent and 6 percent were Other Asian plants and Non-

Asian plants, respectively. In most other regions, the numbers of plants owned by each foreign ownership group increased during 1990–2003. The share of Japanese plants among all L&M manufacturing plants in West Java increased from 2 percent in 1990 to 6 percent in 2003. The share in DKI Jakarta also increased. However, the increase of shares in the provinces was most rapid for Other Asian plants. In 2003, there were more Other Asian plants than Japanese plants in both DKI Jakarta and West Java, but the shares of Non-Asian plants have been smaller than corresponding shares of Japanese plants in recent years as a result of the slower increase of Non-Asian plants in the regions.

4.2. Industry

Regarding L&M manufacturing during 1990–2003, more than one-fourth of locally owned plants produced Food, Beverages and Tobacco (31, at a two-digit level of ISIC, Rev. 2; Table 3). The second largest sector in terms of the number of plants was Textiles, Garment and Leather (32), accounting for more than one-fifth of locally owned plants. However, the fraction of this traditional sector in the number of plants has declined from 24 percent in 1990 to 21 percent in 2003; the number of locally owned plants decreased gradually in the largest subsectors of this category, Textiles (321, at a three-digit level of ISIC, Rev. 2) and Garments (322). A resource-intensive sector, Wood products and Furniture (33), also accounts for a large fraction of locally owned plants. Locally owned plants in the downstream subsector, Furniture (332), were fewer in 2003 than those of the upstream subsector, Wood products (331), but the percentage of locally owned plants in the downstream subsector increased rapidly from 4 percent in 1990 to 7 percent in 2003. The remainder of locally owned plants in L&M manufacturing (about 10 percent for each sector) produced Chemicals (35), Non-metallic minerals (36), and Metal products and Machinery (38). Only 1 percent of locally owned plants produced Basic metals (37) during the period.

The industrial distribution of Japanese plants differed greatly from that of locally owned plants. About one-half of Japanese plants produced Metal products and Machinery (38) in 2003. That fraction increased from 41 percent in 1990 to 48 percent in 2003. The rise in the relative number of Japanese plants in this category resulted from the rapid increase in a subsector, Electric equipment (383), from 12 percent in 1990 to 21 percent in 2003. The number of Japanese plants producing Transport equipment (384) was also large. The second largest fraction of Japanese plants produced Chemicals (35) accounting for 18–22 percent

Table 3 Industrial distribution of plants by group (%)

| ISIC | Industry | Local | | | Japanese | | | Other Asian | | | Non-Asian | | |
|-------|----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-----------|-----------|-----------|-----------|-----------|
| | | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 |
| 31 | Food, Beverages, Tobacco | <u>29</u> | <u>25</u> | <u>27</u> | <u>6</u> | <u>7</u> | <u>5</u> | <u>18</u> | <u>11</u> | <u>9</u> | <u>22</u> | <u>22</u> | <u>23</u> |
| 32 | Textiles, Garments, Leath. | <u>24</u> | <u>23</u> | <u>21</u> | <u>14</u> | <u>15</u> | <u>12</u> | <u>34</u> | <u>31</u> | <u>30</u> | <u>7</u> | <u>8</u> | <u>9</u> |
| 321 | -Textiles | 11 | 10 | 9 | 11 | 10 | 7 | 11 | 11 | 9 | 4 | 3 | 4 |
| 322 | -Garments | 11 | 10 | 9 | 2 | 5 | 4 | 17 | 13 | 15 | 2 | 3 | 4 |
| 323 | -Leather products | 1 | 1 | 1 | - | - | 0 | - | 1 | 2 | 0 | 1 | 1 |
| 324 | -Footwear | 1 | 2 | 2 | 0 | 0 | 0 | 7 | 6 | 5 | 1 | 2 | 1 |
| 33 | Wood prod., Furniture | <u>13</u> | <u>14</u> | <u>14</u> | <u>3</u> | <u>5</u> | <u>4</u> | <u>11</u> | <u>10</u> | <u>8</u> | <u>3</u> | <u>5</u> | <u>7</u> |
| 331 | -Wood products | 8 | 8 | 7 | 2 | 3 | 2 | 10 | 6 | 5 | 1 | 1 | 1 |
| 332 | -Furniture | 4 | 6 | 7 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 4 | 5 |
| 34 | Paper, Printing & pub. | <u>4</u> | <u>5</u> | <u>5</u> | <u>2</u> | <u>2</u> | <u>2</u> | <u>4</u> | <u>4</u> | <u>4</u> | <u>2</u> | <u>2</u> | <u>2</u> |
| 35 | Chemicals | <u>11</u> | <u>10</u> | <u>11</u> | <u>22</u> | <u>18</u> | <u>20</u> | <u>16</u> | <u>15</u> | <u>17</u> | <u>36</u> | <u>32</u> | <u>29</u> |
| 351-2 | -Chemicals | 4 | 4 | 4 | 16 | 12 | 11 | 5 | 5 | 6 | 29 | 26 | 24 |
| 355-6 | -Rubber, Plastics | 7 | 6 | 7 | 6 | 6 | 9 | 11 | 10 | 11 | 7 | 6 | 5 |
| 36 | Non-metallic minerals | <u>9</u> | <u>10</u> | <u>8</u> | <u>4</u> | <u>3</u> | <u>3</u> | <u>1</u> | <u>2</u> | <u>2</u> | <u>8</u> | <u>5</u> | <u>5</u> |
| 37 | Basic metals | <u>0</u> | <u>1</u> | <u>1</u> | <u>6</u> | <u>5</u> | <u>5</u> | <u>2</u> | <u>3</u> | <u>3</u> | <u>2</u> | <u>2</u> | <u>2</u> |
| 38 | Metal prod., Machinery | <u>9</u> | <u>10</u> | <u>10</u> | <u>41</u> | <u>43</u> | <u>48</u> | <u>11</u> | <u>19</u> | <u>21</u> | <u>19</u> | <u>20</u> | <u>20</u> |
| 381 | -Metal products | 4 | 4 | 4 | 10 | 7 | 7 | 4 | 6 | 6 | 8 | 7 | 8 |
| 382 | -Non-electric machinery | 1 | 1 | 1 | 6 | 6 | 7 | 2 | 2 | 2 | 3 | 3 | 3 |
| 383 | -Electrical equipment | 1 | 1 | 2 | 12 | 19 | 21 | 4 | 8 | 11 | 5 | 8 | 7 |
| 384 | -Transport equipment | 3 | 3 | 3 | 13 | 10 | 12 | 1 | 2 | 2 | 3 | 2 | 2 |
| 385 | -Professional equipment | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| 39 | Miscellaneous | <u>2</u> | <u>2</u> | <u>2</u> | <u>2</u> | <u>2</u> | <u>2</u> | <u>4</u> | <u>6</u> | <u>6</u> | <u>2</u> | <u>3</u> | <u>3</u> |
| 3 | L&M manufacturing | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Sources) See sources for Table 1.

during 1990–2003. The figures suggest that about two-thirds of Japanese plants produced these capital-intensive products, which only about one-fifth of locally owned plants produced. Numerous Japanese plants produced products in a labor-intensive sector, Textiles, Garment and Leather (32). However, this category's fraction of Japanese plants decreased from 15 percent 1996 to 12 percent in 2003 as the Textiles' fraction decreased. Only 5–7 percent of Japanese plants produced Food, Beverages and Tobacco (31).

The industrial distribution of Other Asian plants more closely resembled that of locally owned plants than that of Japanese plants in early 1990. The largest fraction of Other Asian plants produced Textiles, Garments and Leather (32) reflecting comparative advantages in Indonesia, followed by Food, Beverages and Tobacco (31). The combined fractions of these categories were almost equal to those of locally owned plants in 1990. There were also many Other Asian plants producing Chemicals (35) and Wood products and Furniture (33) in 1990. The drastic changes in industrial distribution of Other Asian plants are apparent in the

Table 4 Average foreign ownership shares of plants by group (%)

| ISIC | Industry | Japanese | | | Other Asian | | | Non-Asian | | |
|-------|-----------------------------|-----------|-----------|-----------|-------------|-----------|-----------|-----------|-----------|-----------|
| | | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 |
| 31 | Food, Beverages, Tobacco | <u>49</u> | <u>58</u> | <u>66</u> | <u>65</u> | <u>66</u> | <u>77</u> | <u>64</u> | <u>71</u> | <u>81</u> |
| 32 | Textiles, Garments, Leather | <u>68</u> | <u>67</u> | <u>70</u> | <u>74</u> | <u>79</u> | <u>89</u> | <u>75</u> | <u>76</u> | <u>83</u> |
| 321 | -Textiles | 68 | 64 | 69 | 76 | 79 | 87 | 77 | 77 | 74 |
| 322 | -Garments | - | 72 | 71 | 80 | 82 | 93 | - | 73 | 93 |
| 323 | -Leather products | - | - | - | - | 81 | 94 | - | - | - |
| 324 | -Footwear | - | - | - | 56 | 70 | 79 | - | 85 | 83 |
| 33 | Wood prod., Furniture | <u>54</u> | <u>70</u> | <u>81</u> | <u>60</u> | <u>71</u> | <u>83</u> | <u>56</u> | <u>81</u> | <u>88</u> |
| 331 | -Wood products | - | 63 | 76 | 59 | 68 | 82 | - | - | 81 |
| 332 | -Furniture | - | 78 | 87 | - | 79 | 86 | - | 82 | 90 |
| 34 | Paper, Printing & pub. | - | <u>56</u> | <u>70</u> | - | <u>67</u> | <u>67</u> | - | <u>65</u> | <u>85</u> |
| 35 | Chemicals | <u>58</u> | <u>66</u> | <u>79</u> | <u>78</u> | <u>74</u> | <u>78</u> | <u>69</u> | <u>69</u> | <u>80</u> |
| 351-2 | -Chemicals | 59 | 67 | 81 | 51 | 64 | 71 | 68 | 70 | 82 |
| 355-6 | -Rubber, Plastics | 54 | 63 | 76 | 88 | 81 | 82 | 76 | 69 | 73 |
| 36 | Non-metallic minerals | - | <u>54</u> | <u>64</u> | - | <u>67</u> | <u>79</u> | <u>58</u> | <u>48</u> | <u>71</u> |
| 37 | Basic metals | <u>61</u> | <u>57</u> | <u>76</u> | - | <u>90</u> | <u>88</u> | - | - | <u>90</u> |
| 38 | Metal prod., Machinery | <u>54</u> | <u>72</u> | <u>81</u> | <u>55</u> | <u>77</u> | <u>84</u> | <u>58</u> | <u>67</u> | <u>83</u> |
| 381 | -Metal products | 60 | 71 | 86 | - | 73 | 81 | 61 | 62 | 77 |
| 382 | -Non-electric machinery | 46 | 59 | 75 | - | 87 | 85 | 65 | 72 | 76 |
| 383 | -Electrical equipment | 51 | 79 | 88 | 53 | 79 | 87 | 55 | 76 | 92 |
| 384 | -Transport equipment | 58 | 59 | 69 | - | 68 | 73 | - | 52 | 77 |
| 385 | -Professional equipment | - | - | - | - | - | - | - | - | - |
| 39 | Miscellaneous | - | <u>73</u> | <u>87</u> | - | <u>79</u> | <u>92</u> | - | <u>70</u> | <u>70</u> |
| 3 | L&M manufacturing | 58 | 67 | 78 | 69 | 76 | 84 | 64 | 69 | 81 |

Sources) Author's estimates from BPS-Statistics (various years a). Plants with unknown ownership are not shown. "-" refers to categories where there are less than 5 plants.

fractions of Food, Beverages and Tobacco (31) and Metal products and Machinery (38). The fraction of the former decreased 9 percentage points, whereas the corresponding fraction of the latter increased 11 percentage points during 1990–2003. Consequently, the pattern of industrial distribution of Other Asian plants has come to resemble that of Japanese plants in recent years.

Resembling the industrial distribution of Japanese plants, 55 percent of Non-Asian plants, which were mainly owned by investors from developed countries outside Asia, produced Chemicals (35) or Metal products and Machinery (38) in 1990. However, as the relative number of plants producing Chemicals decreased, the fractions of these two categories declined to one-half in 2003. Another important difference between the two groups of developed countries is the low fraction of Metal products produced at Non-Asian plants. Furthermore, the fraction of Non-Asian plants had been almost constant in the sector during

1990–2003, although corresponding fractions of Japanese and Other Asian plants increased rapidly. Another salient characteristic of Non-Asian plants is that a small fraction of plants produce products for the traditional labor-intensive sector: Textiles, Garment and Leather (32).

4.3. Ownership

Waves of deregulation of FDI that have changed Indonesia since the mid-1980s have altered the ownership structure of foreign-owned plants. Average foreign ownership shares increased drastically during 1990–2003 in each group of foreign-owned plants. For example, the average share of foreign ownership in Japanese plants increased from 58 percent in 1990 to 78 percent in 2003 in L&M manufacturing. An important cause of this rise in foreign ownership shares, aside from deregulation of FDI, is related to financial conditions of local partners after the economic crisis in the late 1990s. Some local companies, experiencing financial troubles during and after the economic crisis, asked foreign partners for financial help, thereby increasing the foreign ownership share. Another important cause is the restructuring of production systems in the regions, partially resulting from trade-regime liberalization. Some foreign companies increased their foreign ownership share to smooth the decision-making related to procurement in the liberalized trade regime, avoiding time-intensive negotiation with local partners.

Average foreign ownership shares in Japanese plants were lowest, whereas Other Asian plants had the highest foreign ownership shares among the three foreign groups. In particular, the difference in average foreign ownership shares was large in 1990, indicating that Japanese plants tended to have low foreign ownership shares in the 1980s and the early 1990s compared to those of other foreign-owned plants. A possible explanation is that Japanese plants had invested in an earlier period, when rules related to foreign ownership were strict and lower ownership shares were more acceptable politically. Another is that Japanese plants had insufficient information related to local markets, business practices, and other information about business in Indonesia; they consequently preferred to invest with local partners. On the other hand, Other Asian investment increased after deregulation of FDI in the mid-1980s because Asian owners might have had more information about local markets and technology and skills that were appropriate for the developing country. Therefore, they might have preferred to invest independently, minimizing the participation of local partners.

Other Asian plants had high foreign ownership shares in plants with labor-intensive and resource-intensive sectors—Textiles, Garments and Leather (32) and Rubber and Plastics (355–6)—especially in the early 1990s. These data are not consistent with the results of either Lecraw (1981) or Chen (1990), who suggest that MNCs from LDCs have lower foreign ownership shares because they are usually producing mature products using standardized technology. For those reasons, they have weaker bargaining power because there is little fear of losing control over standardized technology.

5. Employment and Value Added

5.1. Employment and value added

The distributions of employment and added value in locally owned plants reflect the patterns suggested by the number of plants by sector. Food, Beverages and Tobacco (31) and Textiles, Garments and Leather (32) accounted for about one-half of all employment and value added in locally owned L&M manufacturing plants (Table 5). Comparing shares of employment and value added in locally owned plants, the labor-intensive sector production of Textiles, Garments and Leather (32) accounts for a higher share of employment than the corresponding share in value added, reflecting the low productivity of locally owned plants in this category. On the other hand, the value added share in Metal products and Machinery (38) increased greatly from 9 percent in 1990 to 15 percent in 2000, even as employment shares remained constant. The value-added shares of Wood products and Furniture (33) and Basic metals (37) declined during 1990–2000, suggesting that the structure of added value changed in locally owned plants, but that of employment did not change much during 1990–2000.

The employment structure at Japanese plants changed greatly during 1990–2003. The share of Textiles, Garments and Leather (32) declined, but that of Metal products and Machinery (38) increased. Most total employment and value added in Japanese plants was accounted for by plants producing Metal products and Machinery (38), especially by two subsectors: Electric equipment (383) and Transport equipment (384). The structure of employment and added value in Other Asian plants also changed during the period. The shares of resource-intensive subsectors, Wood products (331) and Rubber and Plastics (355–6) decreased in both employment and value added of Other Asian plants, but corresponding

Table 5 Industrial distribution of employment and added value by group (%)

| | Employment | | | | | | | | Value added | | | | | | | |
|-------|------------|-----------|-----------|-----------|-------------|-----------|-----------|-----------|-------------|-----------|-----------|-----------|-------------|-----------|-----------|-----------|
| | Local | | Japanese | | Other Asian | | Non-Asian | | Local | | Japanese | | Other Asian | | Non-Asian | |
| ISIC | 1990 | 2003 | 1990 | 2003 | 1990 | 2003 | 1990 | 2003 | 1990 | 2000 | 1990 | 2000 | 1990 | 2000 | 1990 | 2000 |
| 31 | <u>24</u> | <u>26</u> | <u>4</u> | <u>3</u> | <u>13</u> | <u>6</u> | <u>20</u> | <u>17</u> | <u>27</u> | <u>31</u> | <u>2</u> | <u>1</u> | <u>16</u> | <u>13</u> | <u>23</u> | <u>22</u> |
| 32 | <u>28</u> | <u>27</u> | <u>24</u> | <u>13</u> | <u>44</u> | <u>53</u> | <u>19</u> | <u>23</u> | <u>22</u> | <u>16</u> | <u>9</u> | <u>8</u> | <u>20</u> | <u>37</u> | <u>12</u> | <u>9</u> |
| 321 | 15 | 15 | 22 | 8 | 15 | 8 | 12 | 10 | 10 | 10 | 9 | 7 | 9 | 16 | 9 | 5 |
| 322 | 10 | 9 | 1 | 4 | 17 | 22 | 3 | 6 | 10 | 3 | 0 | 1 | 6 | 9 | 1 | 2 |
| 323 | 1 | 0 | - | 0 | - | 1 | 1 | 1 | 0 | 0 | - | - | - | 0 | 0 | - |
| 324 | 2 | 3 | 0 | 0 | 12 | 21 | 3 | 7 | 1 | 2 | 0 | 0 | 5 | 11 | 2 | 2 |
| 33 | <u>16</u> | <u>15</u> | <u>3</u> | <u>3</u> | <u>14</u> | <u>8</u> | <u>3</u> | <u>4</u> | <u>14</u> | <u>10</u> | <u>1</u> | <u>1</u> | <u>23</u> | <u>7</u> | <u>1</u> | <u>2</u> |
| 331 | 13 | 10 | 2 | 2 | 14 | 6 | 1 | 1 | 13 | 8 | 1 | 0 | 23 | 7 | 1 | 1 |
| 332 | 4 | 5 | 1 | 1 | 1 | 2 | 1 | 3 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 1 |
| 34 | <u>3</u> | <u>5</u> | <u>2</u> | <u>2</u> | <u>4</u> | <u>4</u> | <u>3</u> | <u>1</u> | <u>4</u> | <u>8</u> | <u>1</u> | <u>2</u> | <u>18</u> | <u>11</u> | <u>2</u> | <u>1</u> |
| 35 | <u>13</u> | <u>13</u> | <u>15</u> | <u>17</u> | <u>14</u> | <u>8</u> | <u>27</u> | <u>26</u> | <u>12</u> | <u>13</u> | <u>12</u> | <u>14</u> | <u>11</u> | <u>9</u> | <u>35</u> | <u>32</u> |
| 351-2 | 4 | 4 | 10 | 7 | 1 | 1 | 18 | 17 | 6 | 8 | 10 | 10 | 6 | 4 | 30 | 30 |
| 355-6 | 9 | 8 | 6 | 10 | 12 | 7 | 9 | 9 | 5 | 5 | 2 | 4 | 5 | 4 | 5 | 2 |
| 36 | <u>5</u> | <u>4</u> | <u>6</u> | <u>4</u> | <u>2</u> | <u>2</u> | <u>9</u> | <u>5</u> | <u>4</u> | <u>3</u> | <u>3</u> | <u>3</u> | <u>2</u> | <u>4</u> | <u>10</u> | <u>5</u> |
| 37 | <u>1</u> | <u>1</u> | <u>5</u> | <u>2</u> | <u>1</u> | <u>1</u> | <u>2</u> | <u>1</u> | <u>9</u> | <u>3</u> | <u>11</u> | <u>6</u> | <u>3</u> | <u>2</u> | <u>2</u> | <u>2</u> |
| 38 | <u>8</u> | <u>8</u> | <u>39</u> | <u>52</u> | <u>6</u> | <u>12</u> | <u>17</u> | <u>17</u> | <u>9</u> | <u>15</u> | <u>61</u> | <u>65</u> | <u>6</u> | <u>15</u> | <u>15</u> | <u>27</u> |
| 381 | 3 | 3 | 5 | 4 | 3 | 3 | 7 | 5 | 3 | 3 | 3 | 4 | 3 | 4 | 7 | 9 |
| 382 | 1 | 1 | 4 | 3 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 0 | 2 | 2 |
| 383 | 2 | 2 | 13 | 29 | 3 | 8 | 4 | 8 | 2 | 2 | 8 | 27 | 3 | 9 | 2 | 10 |
| 384 | 3 | 2 | 16 | 15 | 0 | 1 | 4 | 2 | 3 | 9 | 49 | 31 | 0 | 2 | 3 | 6 |
| 385 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 39 | <u>1</u> | <u>1</u> | <u>3</u> | <u>2</u> | <u>2</u> | <u>6</u> | <u>2</u> | <u>6</u> | <u>1</u> | <u>1</u> | <u>1</u> | <u>0</u> | <u>0</u> | <u>2</u> | <u>0</u> | <u>1</u> |
| 3 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Sources) Author's estimates from BPS-Statistics (various years a). Plants with unknown ownership are not shown. "--" refers to the categories where no plant exists. There seems to be unreliable estimates of value added for non-

respondents in the datasets for 2001–2003, so 1990 and 2000 were compared.

shares of Textiles, Garments and Leather (32) and Electric equipment (383) increased during 1990–2003 and 1990–2000. No large changes are apparent in the employment structure in Non-Asian plants, but the share of Electric equipment (383) of all value added in the group increased. These changes of patterns suggest that Japanese and Other Asian plants respond more quickly to the change of environment surrounding the Indonesian economy compared to locally owned plants and Non-Asian plants.

Foreign-owned plants have accounted for a large fraction of total employment and value added in L&M manufacturing. Table 6 shows the share of each owner nationality group in a sector in terms of employment and added value. In L&M manufacturing, foreign-owned plants, including Plants with unknown ownership, accounted for 11 percent of total employment in 1990. That share increased drastically to 26 percent in 2003. The corresponding share of all value added of foreign-owned plants was higher than the

Table 6 Employment and added value by group (%)

| | Employment | | | | | | | | Value added | | | | | | | |
|-------|------------|------|----------|------|-------------|------|-----------|------|-------------|------|----------|------|-------------|------|-----------|------|
| | Local | | Japanese | | Other Asian | | Non-Asian | | Local | | Japanese | | Other Asian | | Non-Asian | |
| ISIC | 1990 | 2003 | 1990 | 2003 | 1990 | 2003 | 1990 | 2003 | 1990 | 2000 | 1990 | 2000 | 1990 | 2000 | 1990 | 2000 |
| 31 | 94 | 91 | 1 | 1 | 3 | 4 | 3 | 4 | 89 | 81 | 1 | 1 | 4 | 7 | 6 | 11 |
| 32 | 88 | 70 | 3 | 4 | 7 | 22 | 2 | 4 | 85 | 56 | 5 | 10 | 6 | 28 | 4 | 6 |
| 321 | 88 | 83 | 5 | 5 | 4 | 7 | 3 | 4 | 78 | 60 | 10 | 14 | 6 | 20 | 6 | 6 |
| 322 | 91 | 67 | 0 | 4 | 8 | 26 | 1 | 3 | 95 | 55 | 1 | 6 | 4 | 32 | 0 | 7 |
| 323 | 96 | 65 | - | 1 | - | 28 | 4 | 6 | 99 | 69 | - | - | - | 31 | 1 | - |
| 324 | 74 | 42 | 0 | 0 | 21 | 50 | 4 | 7 | 68 | 36 | 0 | 1 | 21 | 55 | 11 | 8 |
| 33 | 94 | 89 | 1 | 2 | 4 | 7 | 1 | 2 | 87 | 81 | 1 | 2 | 12 | 13 | 1 | 3 |
| 331 | 94 | 89 | 1 | 2 | 5 | 8 | 0 | 1 | 86 | 81 | 1 | 1 | 12 | 15 | 0 | 3 |
| 332 | 96 | 89 | 1 | 2 | 1 | 5 | 1 | 4 | 95 | 82 | 2 | 6 | 1 | 6 | 2 | 6 |
| 34 | 91 | 81 | 1 | 5 | 5 | 13 | 3 | 1 | 73 | 72 | 1 | 6 | 23 | 20 | 2 | 1 |
| 35 | 79 | 67 | 7 | 11 | 1 | 3 | 13 | 19 | 58 | 42 | 13 | 20 | 5 | 5 | 24 | 32 |
| 351-2 | 79 | 67 | 7 | 11 | 1 | 3 | 13 | 19 | 58 | 42 | 13 | 20 | 5 | 5 | 24 | 32 |
| 355-6 | 89 | 74 | 2 | 11 | 6 | 10 | 3 | 6 | 83 | 65 | 5 | 18 | 6 | 11 | 6 | 5 |
| 36 | 89 | 79 | 4 | 8 | 2 | 6 | 6 | 6 | 71 | 56 | 9 | 16 | 4 | 13 | 17 | 15 |
| 37 | 76 | 68 | 15 | 17 | 4 | 9 | 5 | 6 | 81 | 48 | 15 | 36 | 2 | 8 | 2 | 8 |
| 38 | 78 | 48 | 13 | 34 | 3 | 11 | 6 | 7 | 45 | 32 | 45 | 50 | 2 | 7 | 7 | 11 |
| 381 | 82 | 69 | 6 | 11 | 4 | 12 | 8 | 8 | 71 | 39 | 9 | 24 | 5 | 12 | 15 | 25 |
| 382 | 82 | 62 | 12 | 27 | 2 | 5 | 4 | 6 | 67 | 40 | 19 | 39 | 1 | 2 | 12 | 19 |
| 383 | 69 | 32 | 19 | 44 | 5 | 16 | 6 | 8 | 57 | 15 | 32 | 61 | 6 | 13 | 5 | 12 |
| 384 | 79 | 54 | 17 | 39 | - | 3 | 4 | 4 | 27 | 41 | 70 | 51 | - | 2 | 3 | 6 |
| 385 | 93 | 41 | - | 39 | - | 8 | 3 | 12 | 81 | 38 | - | 57 | - | 3 | 15 | 2 |
| 39 | 82 | 48 | 6 | 8 | 7 | 30 | 4 | 14 | 80 | 48 | 14 | 7 | 3 | 30 | 3 | 16 |
| 3 | 89 | 74 | 3 | 8 | 4 | 12 | 3 | 5 | 77 | 56 | 11 | 21 | 6 | 12 | 6 | 11 |

Sources) See sources for Table 5.

employment share; it increased from 23 percent in 1990 to 44 percent in 2000. The shares of all foreign ownership groups in both employment and value added increased during 1990–2003 and 1990–2000. In particular, the increases in shares of Other Asian plants were greater than those of the other two foreign ownership groups. Non-Asian plants increased overall employment slightly.

Reflecting the different patterns of industrial distribution of nationality groups, the degree of presence in each sector is also different. In Metal products and Machinery (38), where foreign-owned plants accounted for the largest shares of employment and value added among sectors, Japanese plants had the largest shares: one-third of employment in 2003 and about one-half of value added in 2000. Non-Asian plants were next, followed by Other Asian plants. The shares of Other Asian plants increased most among the foreign ownership groups. However, the value-added share of Other Asian plants was less than their employment shares, whereas Japanese and Non-Asian plants' value-added shares were greater than those of

employment were. That fact indicates that Other Asian plants engaged in lower-value-added and labor-intensive activities in this category than did Japanese or Non-Asian plants, which were owned mainly by MNCs of developed countries.

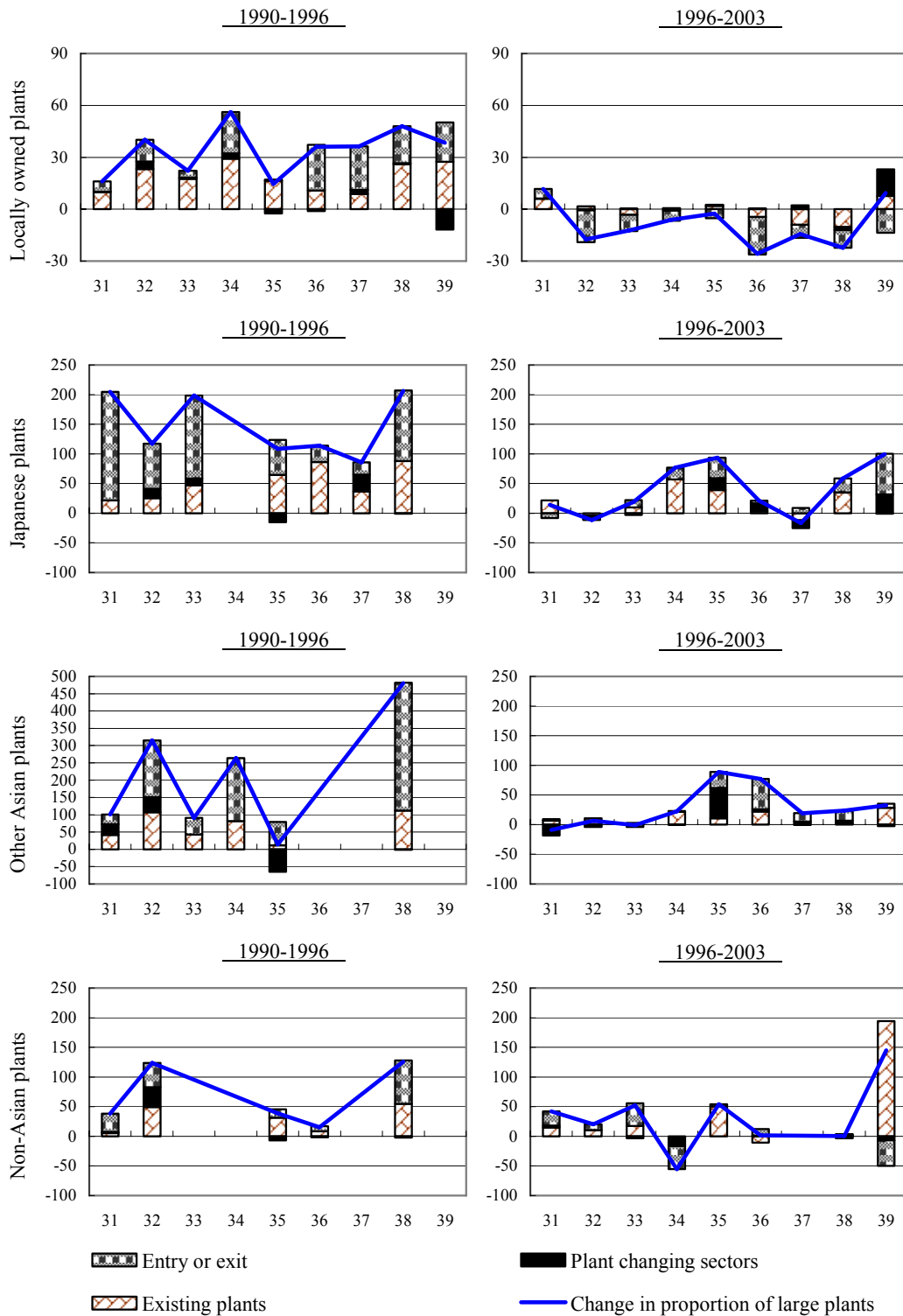
Japanese plants accounted for large shares of the plants producing Basic metals (38) and Chemicals (35) compared to other sectors. Non-Asian plants accounted for larger shares in Chemicals (35). In Textiles, Garment, Leather (32), the employment share of Other Asian plants increased from 7 percent in 1990 to 22 percent in 2003 and their share of added value increased from 6 percent in 1990 to 28 percent in 2000. Outside the labor-intensive sector, Other Asian plants also accounted for large shares in resource-intensive (sub)sectors: Paper, Printing and publishing (34), Rubber and Plastics (355, 356), and Wood products (331).

These patterns partially reflect comparative advantages (during the earlier period) and developmental stages of home countries. In addition, the patterns are more or less related to investment by large MNCs from home countries in the earlier period. For example, a Japanese automaker started local operations in the mid-1970s with importation of completely built vehicles (Takii, 2004). Since that time, numerous Japanese parts and components manufacturers followed as the production of car and the number of other Japanese auto and motor vehicle manufacturers increased. Japanese assemblers account for a very large fraction of total production of automobiles in Indonesia. Similarly, for the Transport equipment sector, Japanese companies account for a large share of final production or assembly in the Electrical equipment sector. The existence of these key companies is an important reason for the dominance of Japanese plants in the Metal products and Machinery sector.

5.2. Employment growth and plant size

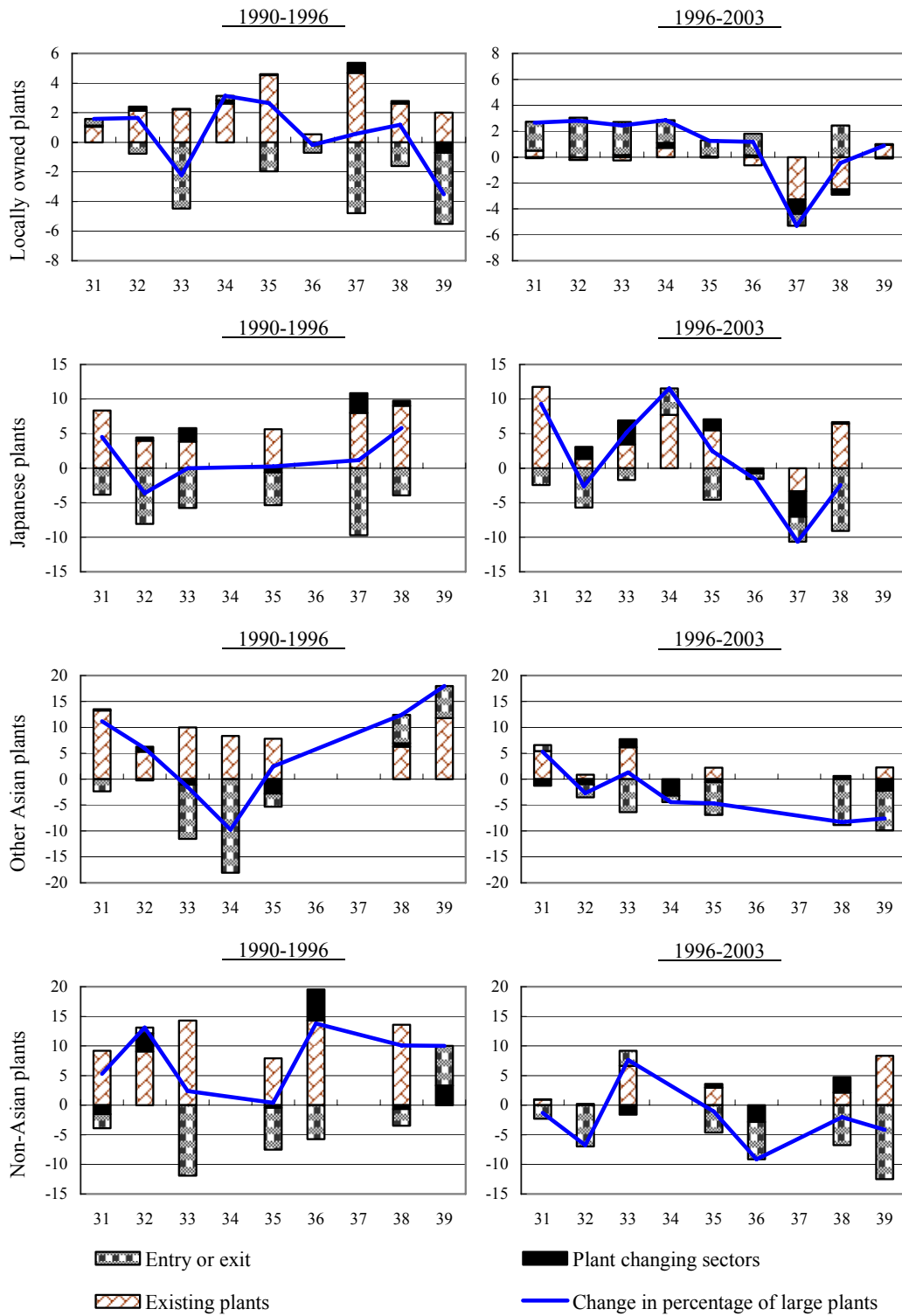
Employment in L&M manufacturing increased from 3.0 million in 1990 to 4.4 million in 1996 before decreasing slightly to 4.3 million in 2003. However, trends of employment growth differ by nationality group, sector, and period. Changes in employment in a sector are attributable to three factors: (1) changes of employment in existing plants in a sector, (2) changes of employment resulting from plants changing sectors, and (3) changes of employment resulting from plants' entry and exit.

Figure 3 Factor composition of employment growth (%p)



Sources) See sources for Table 5. Sectors with employment of less than 3,000 in the initial year (1990/1996) are not shown.

Figure 4 Factor composition of increased fractions of large plants (%p)



Sources) See Table 5. Sectors with less than five plants in the first year (1990/1996) are not shown.

Figure 3 shows the respective factor contributions to employment growth in sectors by nationality group and period. For example, the figures suggest that employment in locally owned plants processing Paper, Printing and publishing (34) increased about 60 percent during 1990–1996, and that the change of employment in existing plants (plants existing in the sector in 1990) contributed about 30 percentage points to that growth. According to that figure, employment growth in locally owned plants during 1990–1996 was mainly attributable to increased employment in both existing plants (factor 1) and new plants (factor 3). During 1996–2003, however, employment growth became negative, except in production of Food, Beverages and Tobacco (31), and Miscellaneous (39). These were mainly caused by decreased employment resulting from plants' exit from production, which exceeded the increase of employment resulting from plants' entry. Partially because of low employment in 1990, the initial year of the period, employment growth for each group of foreign-owned plants was higher than that for locally owned plants during 1990–1996. In that figure, for foreign ownership groups, sectors for which employment was less than 3,000 persons in the initial year of each period are not shown in the figure because growth rates for some sectors thereby come to be shown as extremely high. In particular, employment growth at Other Asian plants was very high: more than 450 percent in Metal products and Machinery (38) followed by Textiles, Garments and Leather (32). The growth in Metal products and Machinery was mainly attributable to employment changes resulting from new plant entry. Employment growth at Japanese plants was also high at plants producing Metal products and Machinery. However, employment growth attributable to new plant entry was slight in Japanese plants compared to Other Asian plants. Employment growth was also high at Japanese plants producing Food, Beverages and Tobacco (31) and Wood products and Furniture (33) partially because of low employment in the initial year. Although employment growth was negative in locally owned plants, that of foreign-owned plants was positive in most sectors during 1996–2003. However, the growth rates were smaller than in the preceding period. Sectors with high growth rates had low employment in 1996. The figures suggest also that some existing Japanese plants expanded employment in Metal products and Machinery during that period.

As employment in L&M manufacturing increased, the fraction of large plants also changed. To elucidate the plant size trend, fractions of large plants, which are defined as

plants with 200 workers or more, were examined according to the nationality group, sector and period. The change in the fraction of large plants (P) can be expressed as follows:

$$P_1 - P_0 = [(1 - P_0)(L_1 - L_0) - P_0(S_1 - S_0)] / (L_1 + S_1),$$

where L_0 and L_1 respectively represent the numbers of large plants in periods 0 and 1. Similarly, S_0 and S_1 are defined as the numbers of small plants; in addition, $P_1 \equiv L_1 / (L_1 + S_1)$, $P_0 \equiv L_0 / (L_0 + S_0)$ (see *Appendix*). Similarly to employment growth described above, the three factors engender changes in the number of large plants ($L_1 - L_0$) and small plants ($S_1 - S_0$). Therefore, changes in fractions of large plants ($P_1 - P_0$) are also decomposable into the three factors.

Figure 4 shows the results of analyses. For example, fractions of large plants increased about 2.5 percentage points in locally owned plants in Chemicals (35) during 1990–1996; the increase was caused by employment growth at existing plants (4.5 percentage points) and a decrease resulting from entry and exit (-2.0 percentage points). According to the figure, during 1990–1996, the increased size in locally owned existing plants contributed to the increase in the fraction of large plants, whereas numerous new small plants entered, along with large plants' exiting, which contributed to the decrease in the fraction. A similar pattern is apparent for fractions of each group of foreign-owned plants during the period. A notable exception is Other Asian plants producing Metal products and Machinery (38). In that sector, the number of small Other Asian plants increased during the period, but the increase of large Other Asian plants was more rapid. Consequently, new plants' entry contributed to an increase (instead of a decrease) in the fraction of large plants in this sector and the nationality group.

During 1996–2003, the changes in fractions of large plants among all locally owned plants show different patterns from those of the previous period. In the group, the changes in numbers of large and small plants caused by changes of employment at existing plants decreased during 1996–2003. In Basic metals (37) and Metal products and Machinery (38), some large locally owned plants shrank and became small plants by definition. On the other hand, because the small plants' number of exits increased more rapidly than the number of large plants' exits, the fraction of large plants among all locally owned plants increased in many sectors during the period. However, for foreign ownership groups, because entry of small plants increased compared to the entry of large plants, the third factor contributed to the

Table 7 Proportion of exporters by group (%)

| ISIC | Industry | Local | | | Japanese | | | Other Asian | | | Non-Asian | | |
|-------|----------------------------|-----------|-----------|-----------|-----------|------------|-----------|-------------|-----------|-----------|-----------|-----------|-----------|
| | | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 |
| 31 | Food, Beverages, Tobacco | <u>6</u> | <u>10</u> | <u>10</u> | - | <u>80</u> | <u>91</u> | <u>25</u> | <u>59</u> | <u>45</u> | <u>11</u> | <u>38</u> | <u>42</u> |
| 32 | Textiles, Garments, Leath. | <u>13</u> | <u>17</u> | <u>22</u> | <u>59</u> | <u>76</u> | <u>79</u> | <u>59</u> | <u>69</u> | <u>70</u> | <u>53</u> | <u>73</u> | <u>77</u> |
| 321 | -Textiles | 11 | 14 | 21 | 60 | 74 | 73 | 33 | 52 | 52 | - | 55 | - |
| 322 | -Garments | 14 | 19 | 23 | - | 83 | - | 70 | 70 | 81 | - | 92 | - |
| 323 | -Leather products | 19 | 25 | 32 | - | - | - | - | - | - | - | - | - |
| 324 | -Footwear | 18 | 24 | 20 | - | - | - | - | 91 | 62 | - | - | - |
| 33 | Wood prod., Furniture | <u>30</u> | <u>38</u> | <u>47</u> | - | <u>100</u> | <u>82</u> | <u>63</u> | <u>87</u> | <u>90</u> | - | <u>76</u> | <u>84</u> |
| 331 | -Wood products | 29 | 35 | 42 | - | 100 | - | 64 | 95 | 92 | - | - | - |
| 332 | -Furniture | 34 | 42 | 52 | - | 100 | - | - | 71 | 88 | - | 71 | 84 |
| 34 | Paper, Printing & pub. | <u>2</u> | <u>7</u> | <u>8</u> | - | - | - | - | <u>43</u> | <u>31</u> | - | - | - |
| 35 | Chemicals | <u>13</u> | <u>16</u> | <u>17</u> | <u>28</u> | <u>62</u> | <u>63</u> | <u>41</u> | <u>56</u> | <u>49</u> | <u>19</u> | <u>45</u> | <u>57</u> |
| 351-2 | -Chemicals | 10 | 16 | 19 | 27 | 56 | 53 | - | 42 | 50 | 15 | 39 | 57 |
| 355-6 | -Rubber, Plastics | 15 | 16 | 15 | 30 | 73 | 78 | 46 | 65 | 48 | 36 | 70 | 57 |
| 36 | Non-metallic minerals | <u>4</u> | <u>4</u> | <u>10</u> | - | <u>85</u> | - | - | <u>60</u> | - | <u>19</u> | <u>38</u> | <u>40</u> |
| 37 | Basic metals | <u>16</u> | <u>21</u> | <u>13</u> | <u>31</u> | <u>48</u> | <u>38</u> | - | <u>67</u> | <u>44</u> | - | - | - |
| 38 | Metal prod., Machinery | <u>4</u> | <u>9</u> | <u>9</u> | <u>35</u> | <u>60</u> | <u>61</u> | <u>38</u> | <u>54</u> | <u>52</u> | <u>19</u> | <u>50</u> | <u>52</u> |
| 381 | -Metal products | 4 | 9 | 9 | 47 | 56 | 75 | - | 52 | 55 | 15 | 52 | 36 |
| 382 | -Non-electric machinery | 2 | 6 | 10 | 18 | 50 | 74 | - | 23 | - | - | 30 | - |
| 383 | -Electrical equipment | 9 | 13 | 10 | 55 | 73 | 62 | - | 63 | 63 | 20 | 57 | 91 |
| 384 | -Transport equipment | 2 | 7 | 7 | 15 | 38 | 46 | - | 50 | - | - | - | - |
| 385 | -Professional equipment | 7 | 22 | 23 | - | - | - | - | - | - | - | - | - |
| 39 | Miscellaneous | <u>13</u> | <u>26</u> | <u>33</u> | - | - | <u>70</u> | - | <u>70</u> | <u>67</u> | - | <u>67</u> | - |
| 3 | L&M manufacturing | 11 | 16 | 19 | 37 | 66 | 66 | 46 | 64 | 60 | 20 | 49 | 57 |

Sources) Author's estimates from BPS-Statistics (various years a). "--" refers to the sectors where the number of plants reporting export status was less than 10.

decrease in fractions of foreign-owned plants in most sectors. Some existing Japanese plants expanded employment and the changes in fractions of large plants were therefore greater in several sectors compared to other foreign groups.

6. External Trade

6.1. Exports

The Indonesian economy was highly dependent on oil and gas exports through the mid-1980s. After a marked decline in oil prices, Indonesia undertook a series of bold economic reforms in the mid-1980s, drastically reducing import-protective measures and removing myriad barriers that made it difficult for Indonesian firms to export (Ramstetter and Takii, 2005). After policy changes toward an export orientation, manufacturing exports increased

drastically. Table 7 shows the fractions of exporters by each nationality group. Regarding L&M manufacturing, about one-tenth of the locally owned plants were exporting in 1990. That fraction increased to about two-tenths in 2003. The sector in which a large number of locally owned plants were exporting was Wood products and Furniture (33). In fact, more than half of locally owned plants were exporting Furniture (332) in 2003. There were also numerous locally owned exporters producing Textiles, Garments and Leather (32). These facts indicate that locally owned plants in these sectors came to export more easily than locally owned plants in other sectors. Actually, small and medium enterprises' exports were concentrated in these labor-intensive sectors (Sandee and van Diermen, 2004). The corresponding fractions in Metal products and Machinery (38) were low in the group of locally owned plants.

The fractions of exporters were much higher in nationality groups of foreign-owned plants than in the group of locally owned plants. About three-fifths of foreign-owned plants in each foreign ownership group had exported in the most recent year. However, the fractions of exporters differed among foreign ownership groups in the early 1990s. The fraction of exporters in Other Asian plants was highest, at 46 percent, in 1990, followed by 37 percent of Japanese plants, and 20 percent of Non-Asian plants. According to Thee (1991), inward FDI had occurred mainly in fields where Indonesia had strong comparative advantages, such as labor-intensive and resource-intensive activities in the late 1980s and the early 1990s. Moreover, most new FDI was export-oriented, in contrast to 'older' FDI, most of which was concentrated in fields where Indonesia had not had a comparative advantage: capital-intensive and technology-intensive activities. The difference in fractions of exporters among foreign ownership groups in the early 1990s can be interpreted as a difference presented by Other Asian investment MNCs, which can be characterized as embracing 'new' FDI on one hand, and Japanese and Non-Asian investment MNCs, which can be characterized as relying on 'older' investment patterns on the other hand. However, as the number of Japanese and Non-Asian exporters has increased in production of Metal products and Machinery (38) and Chemicals (35), the difference in fractions of exporters among foreign ownership groups has narrowed in recent years.

Table 8 Average export propensity by group (%)

| ISIC | Industry | Local | | | Japanese | | | Other Asian | | | Non-Asian | | |
|-------|----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-----------|-----------|-----------|-----------|-----------|
| | | 1990 | 1996 | 2000 | 1990 | 1996 | 2000 | 1990 | 1996 | 2000 | 1990 | 1996 | 2000 |
| 31 | Food, Beverages, Tobacco | <u>69</u> | <u>67</u> | <u>74</u> | - | <u>83</u> | <u>90</u> | - | <u>58</u> | <u>74</u> | - | <u>65</u> | <u>77</u> |
| 32 | Textiles, Garments, Leath. | <u>69</u> | <u>68</u> | <u>73</u> | <u>59</u> | <u>74</u> | <u>83</u> | <u>82</u> | <u>86</u> | <u>88</u> | - | <u>82</u> | <u>78</u> |
| 321 | -Textiles | 54 | 50 | 60 | 59 | 66 | 78 | - | 67 | 77 | - | - | 75 |
| 322 | -Garments | 78 | 82 | 84 | - | 89 | 98 | 95 | 93 | 94 | - | 89 | 84 |
| 323 | -Leather products | 77 | 54 | 63 | - | - | - | - | - | - | - | - | - |
| 324 | -Footwear | 80 | 71 | 64 | - | - | - | - | 92 | 87 | - | - | - |
| 33 | Wood prod., Furniture | <u>76</u> | <u>82</u> | <u>88</u> | - | <u>81</u> | <u>87</u> | <u>90</u> | <u>87</u> | <u>92</u> | - | <u>89</u> | <u>97</u> |
| 331 | -Wood products | 72 | 79 | 84 | - | 81 | 77 | 89 | 87 | 89 | - | - | - |
| 332 | -Furniture | 82 | 86 | 92 | - | 81 | 100 | - | 88 | 98 | - | 87 | 97 |
| 34 | Paper, Printing & pub. | <u>34</u> | <u>35</u> | <u>54</u> | - | - | - | - | - | - | - | - | - |
| 35 | Chemicals | <u>64</u> | <u>54</u> | <u>65</u> | <u>34</u> | <u>40</u> | <u>60</u> | <u>83</u> | <u>63</u> | <u>68</u> | <u>31</u> | <u>40</u> | <u>57</u> |
| 351-2 | -Chemicals | 57 | 39 | 55 | - | 30 | 51 | - | 33 | 41 | 9 | 26 | 46 |
| 355-6 | -Rubber, Plastics | 67 | 62 | 70 | - | 55 | 73 | 95 | 75 | 87 | - | 76 | 81 |
| 36 | Non-metallic minerals | <u>53</u> | <u>39</u> | <u>54</u> | - | <u>60</u> | - | - | - | - | - | - | - |
| 37 | Basic metals | <u>25</u> | <u>35</u> | <u>55</u> | - | <u>28</u> | - | - | <u>56</u> | <u>69</u> | - | - | - |
| 38 | Metal prod., Machinery | <u>44</u> | <u>47</u> | <u>50</u> | <u>32</u> | <u>62</u> | <u>71</u> | - | <u>70</u> | <u>77</u> | - | <u>52</u> | <u>65</u> |
| 381 | -Metal products | 38 | 47 | 49 | - | 59 | 78 | - | 64 | 82 | - | 38 | - |
| 382 | -Non-electric machinery | - | 22 | 39 | - | 38 | 66 | - | - | - | - | - | - |
| 383 | -Electrical equipment | 39 | 58 | 56 | 32 | 72 | 82 | - | 75 | 76 | - | 68 | - |
| 384 | -Transport equipment | - | 42 | 48 | - | 37 | 43 | - | - | - | - | - | - |
| 385 | -Professional equipment | - | 62 | - | - | - | - | - | - | - | - | - | - |
| 39 | Miscellaneous | <u>63</u> | <u>70</u> | <u>76</u> | - | - | - | - | <u>85</u> | <u>94</u> | - | - | - |
| 3 | L&M manufacturing | 68 | 68 | 76 | 44 | 62 | 74 | 76 | 76 | 82 | 40 | 57 | 71 |

Sources) Author's estimates from BPS-Statistics (various years a). "-" refers to the sectors where the number of plants reporting export status was less than 10.

Table 8 shows averages of the export propensity of exporters by sector and ownership nationality group. Not only the relative number of exporters (Table 7) but also the export propensity of exporters increased during 1990–2000.⁶ Although the fraction of exporters in the group of locally owned plants was smaller compared to groups of foreign-owned plants, the export propensity of locally owned exporters was not always lower than that of foreign-owned exporters. That fact suggests that, once locally owned plants started exporting, they tended to concentrate on export markets. Similarly to locally owned plants, Other Asian exporters also have high export propensity, reflecting the large number of Other Asian plants in labor-intensive and resource intensive sectors, which have comparative advantages in

⁶ Data on export propensity in 2003 are not available.

Table 9 Average import propensity by group (%)

| ISIC | Industry | Local | | | Japanese | | | Other Asian | | | Non-Asian | | |
|-------|----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-----------|-----------|-----------|-----------|-----------|
| | | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 | 1990 | 1996 | 2003 |
| 31 | Food, Beverages, Tobacco | <u>1</u> | <u>1</u> | <u>2</u> | - | <u>8</u> | <u>12</u> | <u>14</u> | <u>12</u> | <u>17</u> | <u>13</u> | <u>15</u> | <u>17</u> |
| 32 | Textiles, Garments, Leath. | <u>8</u> | <u>6</u> | <u>8</u> | <u>41</u> | <u>31</u> | <u>30</u> | <u>52</u> | <u>42</u> | <u>38</u> | <u>54</u> | <u>28</u> | <u>35</u> |
| 321 | -Textiles | 9 | 8 | 9 | 43 | 32 | 30 | 26 | 29 | 28 | - | 28 | - |
| 322 | -Garments | 6 | 3 | 7 | - | 30 | 26 | 67 | 49 | 42 | - | 21 | 30 |
| 323 | -Leather products | 8 | 8 | 5 | - | - | - | - | - | - | - | - | - |
| 324 | -Footwear | 8 | 8 | 7 | - | - | - | - | 56 | 50 | - | - | - |
| 33 | Wood prod., Furniture | <u>1</u> | <u>1</u> | <u>1</u> | - | <u>11</u> | <u>14</u> | <u>4</u> | <u>4</u> | <u>7</u> | - | <u>5</u> | <u>9</u> |
| 331 | -Wood products | 1 | 1 | 1 | - | 8 | 8 | 4 | 2 | 7 | - | - | - |
| 332 | -Furniture | 1 | 1 | 1 | - | 16 | 21 | - | 8 | 7 | - | 2 | 6 |
| 34 | Paper, Printing & pub. | <u>9</u> | <u>6</u> | <u>4</u> | - | - | <u>17</u> | - | <u>14</u> | <u>12</u> | - | - | - |
| 35 | Chemicals | <u>21</u> | <u>13</u> | <u>12</u> | <u>47</u> | <u>39</u> | <u>40</u> | <u>24</u> | <u>36</u> | <u>26</u> | <u>49</u> | <u>46</u> | <u>37</u> |
| 351-2 | -Chemicals | 26 | 21 | 19 | 47 | 43 | 41 | - | 45 | 37 | 57 | 53 | 43 |
| 355-6 | -Rubber, Plastics | 16 | 9 | 7 | 45 | 31 | 39 | 14 | 30 | 20 | 15 | 10 | 16 |
| 36 | Non-metallic minerals | <u>4</u> | <u>3</u> | <u>4</u> | - | <u>47</u> | - | - | <u>33</u> | <u>35</u> | <u>39</u> | <u>26</u> | <u>30</u> |
| 37 | Basic metals | <u>18</u> | <u>18</u> | <u>14</u> | <u>34</u> | <u>44</u> | <u>34</u> | - | <u>23</u> | <u>24</u> | - | - | - |
| 38 | Metal prod., Machinery | <u>16</u> | <u>11</u> | <u>10</u> | <u>45</u> | <u>52</u> | <u>44</u> | <u>61</u> | <u>44</u> | <u>45</u> | <u>51</u> | <u>49</u> | <u>43</u> |
| 381 | -Metal products | 12 | 9 | 9 | 31 | 44 | 44 | - | 33 | 40 | 44 | 51 | 42 |
| 382 | -Non-electric machinery | 17 | 10 | 9 | 54 | 41 | 36 | - | 30 | 31 | - | - | - |
| 383 | -Electrical equipment | 36 | 21 | 22 | 52 | 57 | 47 | - | 53 | 54 | - | 53 | 35 |
| 384 | -Transport equipment | 11 | 9 | 7 | 45 | 55 | 45 | - | 59 | - | - | - | - |
| 385 | -Professional equipment | 21 | 14 | 12 | - | - | - | - | - | - | - | - | - |
| 39 | Miscellaneous | <u>17</u> | <u>9</u> | <u>6</u> | - | - | <u>32</u> | - | <u>33</u> | <u>38</u> | - | <u>33</u> | - |
| 3 | L&M manufacturing | 7 | 5 | 5 | 40 | 39 | 36 | 29 | 31 | 30 | 39 | 34 | 31 |

Sources) Author's estimates from BPS-Statistics (various years a). "-" refers to the sectors where the number of plants reporting import propensity was less than 10.

Indonesia. During 1990–2003, the average export propensity of Japanese exporters increased from 32 percent to 71 percent in Metal products and Machinery (38).

6.2. Imports

The import propensity declined for each group during 1990–2003. However, because the propensity is calculated as the average share of imported intermediate goods in all intermediates goods for each plant, it does not take into account the change of relative prices of imported goods. For that reason, the trend of import propensity is not clear in real terms. Comparing the propensities among groups, the average import propensity was by far the lowest, at 5–7 percent, in locally owned plants. In particular, the import propensity was very low in Wood products and Furniture (33) and Textiles, Garments and Leather (32). As described in the preceding section, numerous locally owned plants of these sectors

participated in export markets. These facts indicate that a low import propensity is an important reason for locally owned plants to be able to start exporting in the sectors.

Other Asian plants had the lowest import propensity among the groups of foreign-owned plants in the L&M manufacturing because numerous Other Asian plants produced Textiles (321), Wood products (331), and Rubber and Plastics (355–356), for which the import propensity was low. On the other hand, numerous Japanese plants produced Metal products and Machinery (38), for which the import propensity is high.

Possibly, Non-Asian plants have the lowest import propensity among foreign ownership groups because import costs would be most expensive for the group when foreign-owned plants import goods from home countries. For that reason, Non-Asian plants might seek to procure intermediate goods in local markets instead of importing them from home countries. However, import propensity in Non-Asian plants was not always low compared to Japanese and Other Asian plants.

7. Summary

This paper has described differences in characteristics of plants according to the nationality of the ultimate beneficial owner using a unique dataset for Indonesian large and medium manufacturing enterprises. A salient finding is that Japanese plants account for considerable shares of total employment and added value in Indonesian L&M manufacturing, as is readily implied by historical figures of FDI. The important role of Japanese plants is clarified by the employment growth that was apparent after the economic crisis. Although existing locally owned plants tended to exhibit decreased employment overall, Japanese plants expanded employment during 1996–2003 in some sectors. An important characteristic of Japanese plants is their high concentration in specific sectors and location. Most Japanese plants have been located in the regions where industrial estates had been developed, manufacturing electrical equipment or transport equipment. These products are generally characterized as technology-intensive: an area in which Indonesia had not had comparative advantages. Consequently, Japanese plants and locally owned plants might be mutually complementary. On the other hand, numerous Other Asian plants have remained engaged in resource-intensive or labor-intensive sectors, in which Indonesia had been thought to have

comparative advantages, indicating substitutable relations with locally owned plants. Another important characteristic of Other Asian plants is that they have tended to participate in export markets and showed a higher export propensity in the early 1990s. These observations suggest that Other Asian plants were export-oriented mainly in resource-intensive or labor-intensive sectors, and contributed to the increase of exports of these products in the 1990s.

The environment surrounding Indonesia is changing in a freer trade regime; comparative advantages of the country are under pressure from those of other developing countries. One indicator that mirrors the change of comparative advantages of the economy is foreign direct investment from less-developed countries. If an industry loses comparative advantage, then inward foreign direct investment would decrease and foreign firms would exit from production in the country. The fact that the relative number of Other Asian plants increased in metal and machinery producing sectors and decreased in textile and other traditional labor-intensive sectors might indicate changes of comparative advantage. In addition, numerous Japanese plants are situated in the metal and machinery sectors. The increase of Other Asian plants in those sectors might be interpreted to reflect backward linkage effects from the existence of Japanese plants. This interpretation supports the important role of Japanese plants, as well as those of Other Asian plants, in the L&M manufacturing sectors. In recent years, the pattern of industrial distribution of Other Asian plants has come to resemble that of Japanese plants. However, Other Asian plants appear to have low labor productivity in the metal and machinery sectors, indicating that they are engaging in more labor-intensive activities.

Finally, the different characteristics of foreign-owned plants according to the origins of their investors can cause different effects of foreign presence on the host economy. The question of how differently foreign-owned plants with different ownership affect the performance of locally owned plants should be examined further.

Appendix

Define L_0 and L_1 , respectively as the numbers of large plants in periods 0 and 1. Similarly S_0 and S_1 are defined as the number of small plants, and $P_1 \equiv L_1 / (L_1 + S_1)$, $P_0 \equiv L_0 / (L_0 + S_0)$, $\Delta L \equiv L_1 - L_0$, $\Delta S \equiv S_1 - S_0$. The change in the fraction of large plants can be expressed as follows.

$$\begin{aligned}
P_1 - P_0 &= (L_0 + \Delta L) / (L_0 + \Delta L + S_0 + \Delta S) - L_0 / (L_0 + S_0) \\
&= [L_0 L_0 + L_0 S_0 + \Delta L L_0 + \Delta L S_0 - L_0 L_0 - \Delta L L_0 - L_0 S_0 - \Delta S L_0] / (L_1 + S_1)(L_0 + S_0) \\
&= [\Delta L S_0 - \Delta S L_0] / (L_1 + S_1)(L_0 + S_0) \\
&= [(1 - P_0)(L_1 - L_0) - P_0(S_1 - S_0)] / (L_1 + S_1)
\end{aligned}$$

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