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in Southeast Asia:
the Perils of Pooling Industries and Balancing Panels**

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Abstract

This paper uses micro data and published compilations of micro data to estimate shares of multinational corporations (MNCs) in Southeast Asian manufacturing. It first shows that MNC shares tended to be largest in Singapore, intermediate in Malaysia and (recently) in Vietnam, and lowest in Thailand and Indonesia. Shares tended to decline in Singapore and Thailand, were relatively constant in Malaysia, and increased in Indonesia and Vietnam. Shares of majority foreign MNCs also increased conspicuously in Indonesia and Thailand as MNCs bought out local partners in joint ventures after the Asian crisis. Second, it highlights how MNC shares were always lowest in terms of the number of plants or establishments, or in other words, how MNCs tended to be larger on average than local firms or plants. MNCs also tended to account for larger shares of production than employment, and even larger shares of exports. Hence MNCs tended to have relatively high labor productivity and export propensities. Because these simple comparisons do not account for other influences on productivity, wages, or exporting, for example, the paper also describes how micro-data have been used to analyze productivity, wages, and export propensities. This literature suggests that productivity differentials were generally positive but often statistically insignificant, especially at the industry level. Wage differentials were also positive and more often significant, but the largest and most consistent differentials are observed in export propensities. Third, the paper also reviewed literature suggesting positive productivity and wage spillovers in Indonesia, Thailand, and to some extent Vietnam. However, such analyses need to be treated with caution because unwarranted pooling across manufacturing industries is common and has the well-known potential to bias estimates. In addition, the paper emphasized that balanced panels can create important sampling biases because of large turnover that is particularly conspicuous among small non-MNCs in this dynamic region.

Key Words: micro data, manufacturing, Southeast Asia, multinational corporations

JEL Categories: C81, C83, D21, F23, L60, O14, O53

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1. Introduction

The study of multinational corporations (MNCs) and their activities has long been confounded by the lack of data, especially in developing regions like Southeast Asia. Fortunately, data on such activities have become increasingly available over the last two decades and the literature using such data to analyze MNC activity has increased markedly as a result. However, there is no recent review highlighting the strengths and weaknesses of existing data and analyses using these data. This paper attempts to fill that part of that gap by reviewing the data and literature on Southeast Asia.

More specifically, the paper uses the micro data and published compilations to estimate shares of foreign-owned multinational corporations (MNCs) in the manufacturing sectors of these economies to illustrate important characteristics of the data sets and the related literature. Because the data sets involved differ greatly across countries, the paper is organized by country. Care is taken to describe the characteristics of each data set and to highlight problems encountered when using the data. Reflecting the availability constraints, the paper focuses on micro data for Indonesian establishments or plants (Section 2), Malaysian plants (Section 3), Thai plants and large enterprises or firms (Section 4), and Vietnamese firms (Section 5). Shares calculated from official compilations for Singaporean plants are also examined, although the underlying micro data are not available to researchers (Section 6). And although there is only one known compilation, potential sources of micro data that could allow more comprehensive estimation of MNC shares for the Philippines and related studies are also mentioned in Section 6, before some concluding remarks are offered (Section 7).

To illustrate the roles of MNCs in these economies and some important characteristics of related data sets, the paper addresses three basic questions. First, how have MNC shares varied across these economies and time? Second, how do MNC shares depend on the

economic activity being measured and what are the implications of these differences? Third, how has the economic literature used these data to compare related activities (e.g., labor productivity, wages, exporting) in MNCs and local firms or plants, or how MNC presence may affect the activities of local firms or plants through so-called spillovers? Spillover analyses have become very popular in recent years and sometimes perform estimates using balanced panels in large cross sections encompassing many manufacturing industries. Unwarranted pooling of industries has the well known potential to bias coefficient estimates and the creation of balanced panels forces the analyst to sacrifice a large amount of information on new entrants and exiting firms or plants. Correspondingly, the paper highlights differences between estimates at the industry-level and estimates for all manufacturing combined, as well as the characteristics of balanced panels in this dynamic region.

2. Indonesia

Indonesia's main statistical agency, Badan Pusat Statistik (BPS) has compiled relatively comprehensive, surveys and censuses of manufacturing plants since 1975.¹ The annual surveys (except in census years) and three censuses conducted in 1986, 1996, 2006 are relatively comprehensive in coverage. For example, the 1996 census sample was not much larger than survey samples in surrounding years (7 percent compared to 1995 3 percent if relative to 1997, Table 1). BPS' practice of estimating missing values for several non-reporting plants by using information from surrounding years or other, similar plants, is one reason that sample size has been rather consistent through survey and census years. However, there is a notable break with the most recent census for 2006, when the sample jumps 42 percent in a single year to 29,468.

¹ See Indonesia, Badan Pusat Statistik (various years). BPS was also called Biro Pusat Statistik in the past, as well as the Central Bureau of Statistics and BPS-Statistics in English.

Sample coverage rates were lowest in terms of in terms of employment (36 percent or less) in 1990, 1999, 2001-2002, and 2005, but higher (40 percent or more) in 1992-1993, 1995, 1998, and 2006 (Table 1). Comparisons with GDP estimates for the entire economy suggest the lowest coverage rates (59 percent or less) were in 1990-1991, 1997, 1999, and 2001-2006, while coverage was higher (65 percent or more) in 1992-1996 and 1998. Likewise the implied coverage of export estimates was good in 1991-1997 (79-111 percent), but lower (63-69 percent) in 1990 and 2006, and a less than half (41-46 percent) in 1999-2000 and 2004.² These calculations highlight how smaller plants (19 or fewer employees) are very important in Indonesia, especially for job creation. The relatively large coverage rates in the early- to mid-1990s, and the large increase in the number of plants in the 2006 census, both suggest that survey coverage tended to be relatively low in the early 21st century. One possible reason for a drop in coverage was that the post-Suharto era reforms have included a number of measures that increased the financial and bureaucratic burden on medium-large plants. This may have encouraged a number of smaller plants to reduce employment or break themselves up into plants with fewer than 20 employees. BPS and other government agencies have also been affected by budget cuts during this period.

From the early 1990s through 1998, BPS prepared two data sets to check the coverage of the data, the so-called raw data sets which had a large number of variables as reported and processed annually by BPS, and the so-called backcast data sets which had few variables, but were subject to more rigorous checking for non-reporting or unrealistic values.³ In the raw data sets, the number of variables collected was greatly expanded in late 1980s and early

² Exports for survey/census plants are estimated as the export propensity times gross output. Economy-wide estimates are product-based and use a broad definition of manufacturing exports, including many food and mineral products often excluded from narrower definitions (United Nations Industrial Development Organization 2009).

³ See Takii and Ramstetter (2000) for a detailed comparison of data from the 1998 backcast and the annual raw data for 1985-1998. The 1998 backcast was apparently the last.

1990s, and subsequently reduced in the early 21st century. Two notable additions in 1988 and 1990, respectively, were estimates of fixed capital stocks and export propensities. However, these important variables have not been collected consistently since 1996 and 2001, respectively. Problems with extremely low export coverage since 1999 also make analyses of data for these years suspect.⁴ There are also large fluctuations in the amounts of fixed assets and corresponding MNC shares, which are unrealistic and indicative of severe inconsistencies in the definition and/or reporting of this variable (Table 1).⁵

Table 1 also shows the shares of two groups of MNCs, all MNCs and majority-foreign MNCs, in the number of plants, the number of workers, value added, and exports. Shares of all MNCs grew from 10 to 24 percent of sample employment and from 22 to 40 percent of sample value added in 1990-2006. However, again highlighting the importance of small plants, corresponding MNC shares of total employment, which increased from 3.5 to 10 percent, and manufacturing GDP, which increased from 13 to 22 percent, were markedly lower. Because these surveys and censuses probably covered most MNCs but do not cover many small, non-MNCs, the latter shares are a more accurate indication of overall MNC presence in Indonesian manufacturing.

Since the early 1990s, the micro data collected in the surveys and censuses have become widely available to researchers, and the literature using these data boomed in the late 1990s and thereafter. This literature is vast and goes back to important older studies of Indonesia such as Hill (1988). In recent years, perhaps the most common topic of analysis has been the

⁴ As noted in Table 1, export propensities for 1998 were not plausible for many plants.

⁵ Reflecting the problems in the data on fixed assets, many studies (e.g., Lipsey and Sjöholm 2004a, 2004b; Ramstetter and Takii 2006; Sjöholm and Lipsey 2006; Sjöholm and Takii 2006; Takii and Ramstetter 2005) use variables such as electricity consumption as a proxy fixed capital, because they are thought to have been compiled relatively accurately and are thought to be highly correlated with the use of fixed capital. There is also an investment series in the data which have been used in conjunction with simplifying assumptions about the nature of technology (Sjöholm, 1998, 1999a, 1999b).

issue of whether greater foreign presence is associated with relatively high or low productivity of local plants in the same industry, or in other words, the extent to which productivity spillovers are observed. Assuming relatively simple Cobb-Douglas technology, cross sectional analysis by Blomström and Sjöholm (1999) and Sjöholm (1998, 1999), found that spillovers tended to be positive, but the extent of spillovers depended on a number of industry-characteristics such as the degree of competition, technology gaps between MNCs and local plants, and to some extent on the degree of foreign ownership. Using panel data and more flexible, translog functions, Blalock and Gertler (2004) find evidence of positive spillovers through vertical supply chains and Takii's (2005, 2006) results suggest that productivity spillovers have usually been positive, but more prevalent in industries with small technical gaps and where minority foreign MNCs had relatively large shares.

In related analysis, Takii (2004, 2006) and Takii and Ramstetter (2005) find evidence that MNCs were generally more productive than non-MNCs, but that these differences often became insignificant if production functions were estimated for separate industries. Ito (2004a) and Okamoto and Sjöholm (2000) provide evidence for the automobile industry suggesting that MNCs had relatively high productivity. Here it is important to note that many analyses, including most spillover analyses, assume identical technology, either in all manufacturing industries or in groups of many industries. However, the results of estimating production functions at a more disaggregate level often indicate large differences in many slope coefficients (technology parameters) across industries, suggesting that pooling across industries may be inappropriate.

Lipsev and Sjöholm (2004a, 2004b, 2005, 2006) and Sjöholm and Lipsey (2006) find substantial wage differentials between MNCs and local plants and that the wage differentials persist even after industries are disaggregated and when the educational level of the workforce

and other controls are considered. Moreover, they also provide evidence of positive wage spillovers from MNCs both from regressions and from comparisons of wages before and after takeovers or sales by MNCs. Simultaneity concerns are important when examining spillovers, especially when using cross sectional data, because MNCs may be attracted to industries where productivity or wages are high, for example. The concerns can be partially alleviated by using panel data or by comparing productivity and wages before and after takeovers.

Similarly, Sjöholm (2003) examines the determinants of exporting in the mid-1990s when survey coverage was apparently best, emphasizing the finding that MNCs had a greater tendency to enter exporting and interpreting this as a result of relatively low, export-related, sunk costs in MNCs, who have access to relatively extensive foreign networks. Ramstetter (1999b) and Ramstetter and Takii (2006) also present results for the 1990s in a series of cross sections or pooled-cross sections of 2 years each, suggesting that MNCs have a higher propensity to export than local plants and that export propensities tend to be highest among MNCs with large (90%+) foreign ownership shares. On the other hand, panel GMM estimates by Sjöholm and Takii (2006) for 1990-2000 suggest that MNC takeovers increased the probability of a higher export propensity while local takeovers had the reverse effect, but that changes between minority- and majority-foreign statuses had no significant impact.

It is also important to highlight the fact that, analyses using balanced panels during this period can be hazardous for Southeast Asian economies like Indonesia, primarily because high entry and exit rates over relatively short periods of time result in substantially lower coverage for panels than for unbalanced panels or a series of cross section analyses covering the same period. Correspondingly, most panel studies of Indonesia, including most of those cited above, rely on unbalanced panels. Because the coverage Indonesian samples tended to

be relatively comprehensive for most of the 1990s, low panel coverage probably results primarily from high entry and exit rates.

For example, even if one tries to create a small, two-year, balanced panel for 1990 and 1996, the resulting panel covers less than half of the plants, three fifths of employment, and three-fourths of value added in 1996, though these shares were larger in 1990 (60%, 77%, and 87% percent, respectively). However, members of the balanced panel for 1990-1996 were clearly larger and had higher average labor productivity than the average plant. MNC shares also tended to be slightly larger in the panel for 1990, with large differences in MNC shares of exports (23% vs. 7%), which were not well covered in this year. By 1996, this story was reversed, however, with MNC shares 4 percentage points lower in terms of employment, 2 percentage points lower in terms of value added, and 9 percentage points lower in terms of exports. In short, the panels understate the growth of MNC shares for the period, in addition to consisting of plants with relatively high value added and exports per worker.

Comparisons of the balanced panel for 1996-2000 with original data also suggested that the panel estimates understated MNC shares in the latter year but slightly overstated them in the initial year. However, similar patterns are not observed in the two panels involving 2006, beginning in 1996 and 2000, respectively. In principle, one would have the most faith in the 1996-2006 panel because these were census years. This balanced panel resulted in lower MNC shares for employment, value added, and exports in both years, and the differences were larger (in absolute value) in 2006 than in 1996. Moreover, the coverage of these panels was also limited to about two-thirds or three-fourths of employment, value added and exports. These low coverage rates reflect the impact of the 1997-1998 economic and political crisis, which eventually led to substantial restructuring and turnover among firms and plants. Thus, there are important differences between the balanced panel samples and the overall samples,

which affect estimates of MNC shares, average labor productivity, and export propensities, even when care is taken to include census years and thus maximize panel coverage.

3. Malaysia

Changes in Malaysia, particularly those brought on by the 1997-1998 crisis and Malaysia's somewhat unorthodox response to the crisis, also resulted in large turnover and low panel coverage in 1994-1999, 62 percent of employment and 76 percent of value added in 1994, and 76 and 89 percent, respectively, in 1999 (Table 2). Because both of these years were sample years and Malaysian surveys cover a relatively small portion of plants compared to Indonesian surveys, for example, these coverage rates should probably be considered relatively high given the survey design. Coverage of another panel including the census year 2000 and the most recent survey year 2004, was somewhat higher, 75 and 85 percent of employment and value added, respectively, in 2000, and 87 and 85 percent, respectively, in 2004. Coverage of plant numbers tended to be even smaller (2004 in the 2000-2004 panel being the major exception), again suggesting that balanced panels generally included relatively large plants. Higher coverage rates in the 2000-2004 panel also suggest that Malaysian manufacturing settled down somewhat after the crisis, despite substantial disruption experienced after the 2001 dot.com crash and the related downturn in the electronics sector, which is very important to the country (Ramstetter and Haji Ahmad 2009).

The Malaysian panels also consistently overstate MNC shares relative to the cross sections encompassing all sample or census plants. The degree to which MNC shares were overstated was relatively large (3 percentage points or more) for employment in 1994, 1999, and 2000 in related panels, for the number of plants in the same three years, and for fixed assets and exports in 2004 (Table 2). On the other hand, panels yielded relatively small differences

between panel shares for MNCs and cross section shares (1 percent or less in absolute value) for value added and fixed assets in 1994, fixed assets in 2000, and employment, value added, and number in 2004. Given the relatively high level of MNC shares in Malaysia, differences of this scope may not be that important to comparisons of MNCs and non-MNCs, but they do indicate biases which need to be carefully considered in any balanced panel analysis.

One notable change in the 2000 census and subsequent surveys was the addition of a question asking for export propensities. Implied exports of sample plants (Table 2) were 76 percent of total manufacturing exports (from Bank Negara Malaysia 2009) in 2000-2002 and 73 percent in 2003, but only 52 percent in 2004. In other words, the 14 percent decline in exports of sample plants in 2004 was the result of poor sample coverage in that year; total manufacturing exports actually increased 20 percent in that year. As in Indonesia, MNC shares tended to be largest in terms of exports, 68-72 percent in 2000-2003. This share was lower in 2004, suggesting that the 2004 sample omitted export data for some large MNCs.

Historically MNCs have been far more important in Malaysia and Singapore than other Southeast Asian economies. Moreover, majority-foreign MNC shares were sometimes higher in the 1970s for these economies than in the 1980s, or even during the FDI boom of the early- to mid-1990s (Ramstetter 1999a). Majority-foreign MNC shares of employment (about two-fifths), value added (a little over two fifths in most years), exports (about two-thirds in 2000-2003) were all substantial (Table 2). Malaysia's surveys/censuses also cover a relatively large portion of overall manufacturing. For example, sample plants accounted for 64 to 84 percent (73 percent mean) of total manufacturing employment in 1994-2004 and ratios of GDP produced by these plants to total manufacturing GDP ranged between 94 and 103 percent in 1994-1996 and in 1999-2004. In 1997 the ratio ballooned to 201 percent because of an

apparent error in the plant-level data obtained. MNC shares were again smallest in terms of their number (10-15 percent in survey years, 8 percent in the census year).

In other words, MNCs tended to be relatively large by any measure and to have relatively high average labor productivity and export propensities. MNC-local differences in average labor productivity were relatively small (i.e., MNC shares of employment and value added were similar). They were also inconsistent across manufacturing industries and years during 2000-2004, but differences in size and export propensities were much larger and consistent (Ramstetter and Haji Ahmad 2009). Similar calculations also indicated positive, relatively large and consistent MNC-local differentials for plant size and compensation per worker.

Access to the Malaysian plant-level data described in this section has been difficult to arrange according to several sources. However, Haji Ahmad (2010), Khalifah and Adam (2009), and Ramstetter and Haji Ahmad (2009) have recently used the micro data and related compilations. Thus, it is likely that more plant-level analyses of the role MNCs play in Malaysian manufacturing will be forthcoming. Several past studies (Athukorala, and Menon 1996; Menon 1998; Oguchi et al 2002, 2004; Okamoto 1994) were also able to arrange for unpublished industry-level compilations from these data.

As in Indonesia, much of the academic literature has been concerned with trying to evaluate MNC-local productivity differentials and the extent of productivity spillovers from MNCs to local plants. Menon (1998) first provided evidence that total factor productivity (TFP) tended to grow more slowly in MNCs than in local plants in the late 1990s. Oguchi et al (2002) added further evidence that TFP growth was relatively slow in MNCs and provided important evidence that productivity levels tended to be slightly higher in MNCs. More recently Khalifah and Adam (2009) analyze balanced panel with a simplified Cobb-Douglas specification (assuming constant returns to scale) and samples of all manufacturing plants

combined, finding that productivity spillovers were positive when MNC presence is measured as the share of value added or fixed assets, but insignificant or negative when MNC presence is measured as the share of employment. Spillovers are also found to depend on the foreign ownership shares. They also examine productivity differentials with a fixed effects specification in the same sample, suggesting firms taken over by MNCs often had relatively low labor productivity.⁶ In this case, the failure to account for large differences in slope coefficients across industries as in Haji Ahmad (2010) may be related to the results obtained.

There are a number of other potentially interesting sources of micro data in Malaysia. The financial survey of limited companies is no longer published, but it is a valuable source of data for 1969-1995 (Ramstetter 1999a). The Malaysia Industrial Development Authority (MIDA) also maintained data on the employment, fixed assets, and paid-up capital of FDI projects from the 1980s until 1996, but this series has not been published for more recent years. There are also numerous other surveys (e.g., Lee 2004, 2008; Phang 1998; Rasiah 2003, 2004), which have been conducted periodically for specific purposes, though most of these data are less comprehensive than the industrial censuses/surveys and are proprietary.

4. Thailand

Numerous sources of micro data have also been used to study firm and plant behavior in Thailand. Early studies analyzed firms and projects promoted by the Board of Investment (BOI).⁷ These studies generally failed to find statistically significant differences between various productivity measures for MNCs and local firms. Some of these papers speculated

⁶ Note that the authors misinterpret this result and do not examine the static, cross section question of whether MNCs had higher productivity at a given point or period in time.

⁷ See studies of 1973-74 and 1985-86 by Tambunlertchai and Ramstetter (1991), 1982-83 by Khanthachai et al. (1987) and 1990 by (Ramstetter 1993, 1994).

that BOI-promoted firms were among the more productive local firms and that the puzzling result (of few significant, productivity differentials) would be reversed if a more comprehensive set of data on Thai firms could be accessed.

More comprehensive samples became available in the National Statistical Office's (1999) industrial census for 1996. Tests using these data continued to suggest that MNCs generally had higher productivity by a number of measures, but that variation was large among both MNCs and non-MNCs and differentials were often insignificant statistically (Ramstetter 2006). Ito's (2004b) results for the automobile industry were similar. On the other hand, cross section results for 1996 from Kohpaiboon (2006a, 2006b) and suggested positive productivity spillovers from MNCs that were relatively strong in industries with relatively low protection (see also Ramstetter 2006). The 2006 census has recently become available, but access to the micro data is now more limited than before and no known studies use these data yet.

As in the Indonesian and Malaysian cases, MNC-local differences in wages and exporting were positive and more consistent in 1996 than corresponding differences in productivity. However, the evidence regarding wage differentials (Movshuk and Matusoka-Movshuk 2006) is weaker than in the Indonesian case because the 1996 Thai census did not contain data on worker education levels, making it impossible to control for the influence of this important cause of wage differentials. Export propensities appear to have been significantly higher in MNCs than in local plants and higher in heavily-foreign-owned (90%+ ownership share) MNCs than in other majority- or minority-owned affiliates (Ramstetter 1994, 1998, 2006).

The 1996 and 2006 censuses are the only comprehensive micro data sets on the Thai manufacturing (National Statistical Office 2006). In 1996, the universe of establishments was estimated at 32,489 and this grew to 73,391 in 2006 (Table 3). The large increase in this decade also appears related to the inclusion of a large number of plants with employment

below the 10 person cutoff used in the 1996 census. Census coverage rates were quite high in terms of gross output (value added plus intermediate consumption), with the census output amounting to 91 and 89 percent in 1996 and 2006, respectively, of total income reported in the national accounts by the National Social and Economic Development Board (NESDB).⁸ Compared to labor force survey estimates, the coverage of manufacturing employment was much lower, however, and increased from 56 to 68 percent. These censuses indicate that overall MNC shares of decreased markedly during this period from 39 to 25 percent of census employment and 54 to 43 percent of census output. However, part of the reason for the decline was the large increase in the number of small, primarily local establishments covered in the 2006 census. If MNC shares of all manufacturing are calculated, the decrease was also substantial, from 22 to 17 percent of employment, and from 49 to 37 percent of gross output.

Although the 1996 and 2006 censuses are by far the most comprehensive data on Thai manufacturing, researchers faced important problems when trying to use the 1996 data for analytical purposes and not much is known about the 2006 data yet. First, National Statistical Office officials said that factory identity codes change from time to time, which precludes the creation of panels with these data. Second, at least for 1996, the sample included a large number of duplicates or near duplicates (Ramstetter 2006), many of which appeared to contain firm-wide estimates for some groups of factories belonging to multi-plant firms. There were also a large number of plants that report unrealistic (non-positive) values for basic variables such as employment or revenue in both censuses. Thus, samples used for analytical purposes have generally been much smaller than the universe of plants in the census. There

⁸ Gross output as reported by the NSO and total income as reported by the NESDB are conceptually similar and should be of similar magnitude. However, there are often large differences between NESDB and NSO estimates even for census years (as seen in 2006). Differences are even more obvious at the industry-level, where there are several large mismatches despite the use of apparently identical industry definitions.

were also several surveys between the two censuses, but survey coverage is much more limited and not very consistent. For example, the employment of surveyed plants amounted to only two-fifths of 1996 (census) levels in 1998, one-fifth in 1999, and a little under one-third in 2000 (Table 3).⁹ In short, the coverage in survey years is so low and inconsistent that it is difficult to consider these samples representative.

Partially because access to the industrial census and survey data has not been easy to arrange, and partially because there are no good time series data on the real activities (e.g., employment, revenue) of MNCs in Thailand, researchers have used compilations based on mandatory reports to the Ministry of Commerce. For example, Ramstetter (2003) compiled employment and revenue data for a rather comprehensive sample of large firms in 1990-1991 and 1994-2000, while Kohpaiboon and Ramstetter (2008) use data from a smaller sample of the largest firms in each of 55 3- or 4-digit industries for the census years (1996 and 2006).

Table 4 includes data from the latter dataset for comparison and suggests three important patterns. First, large firm revenues grew slightly more rapidly than plant output (113 vs. 101 percent for the decade). By 2006 large firm revenues amounted to 92 percent of plant output reported in the industrial census and 80 percent of the total income reported by NESDB. Second, the large firm data contrast with the census' plant data by suggesting that MNC shares rose from 58 to 69 percent of large firm revenue and from 35 to 55 percent of total income reported by the NESDB. These large-firm data may overstate the growth of revenue in manufacturing MNCs, because large firm revenues includes earnings from non-manufacturing activities such as services, and it seems likely revenue growth from non-manufacturing was relatively rapid. Nonetheless, the discrepancies between the firm- and plant-level calculations

⁹ There was also a survey in 2003 covering 2002 data, which contained a similar number of plants (8,862) and had coverage issues like those in the surveys of 1998, 1999 and 2000 data, but is omitted from Table 3 because I have not had the time (or reason) to compile the micro data from this survey yet.

are substantial and not easy to explain. Third, both the plant- and firm-level calculations are consistent in suggesting a sharp rise in the shares of majority-foreign MNCs, which rose from 34 to 52 percent of large firm revenue and from 21 to 41 percent of total income reported by the NESDB. In other words, these data suggest contrasting trends in the shares of all MNCs, but similar, sharp increases in the shares of majority-foreign MNCs.

Finally, Table 4 also shows that panels created from the large-firm data cover about three fourths of large firm revenues in both 1996 and 2006. This suggests that exit rates may have been relatively low in large firms. MNC shares were larger for 1996 in the balanced panel than in the corresponding cross section (e.g., 61 vs. 58 percent for all MNCs) but there was little difference in 2006. In other words, the creation of balanced panels of large-firms leads to overestimates of MNC shares in the initial year and underestimates of their growth over the period, reflecting lower turnover among large MNCs than among large local firms.

5. Vietnam

Vietnam conducted its first annual enterprise census or survey in 2000, and this author has since been able to obtain underlying micro data for 2000-2007 (Vietnam, General Statistics Office, various years a).¹⁰ This section focuses on these enterprise data sets because they are quite rich (lots of variables), have good coverage of enterprises in both manufacturing and most non-manufacturing sectors (household firms are the largest omission), and are increasingly used to analyze MNC activities in Vietnam. The data contain firm identity codes that should be useful for constructing panels, but these codes have been increasingly duplicated over time. By 2005, 1.0 percent of the 24,018 records for manufacturing firms

¹⁰ The official name of this publication and the introductions to the more recent issues indicate that these are survey data, but the original publication for 2000 (Vietnam, General Statistics Office, 2002) indicated that they were census data.

included duplicate identity codes compared to 0.5 percent in 2003-2004, 0.4 percent in 2000, 0.1 percent in 2001, and none in 2000. If the number of duplicate identity codes continues to increase, panel creation will become increasingly difficult.¹¹

As in Malaysia, MNC shares have been relatively high in Vietnam recently, and increased from 22 to 39 percent of firm employment and from 41 to 46 percent of firm sales during 2000-2006 (Table 5).¹² In other words, in 2000 there was a relatively large differential between sales per worker in MNCs and local firms, but by 2006, this differential had narrowed markedly. Wholly-foreign MNCs have always accounted for the majority of MNC activity, and their share of employment doubled in 2000-2006, from 17 to 35 percent, but the corresponding share of sales increased more slowly, from 22 to 32 percent. Thus, as soon as 2003, wholly-foreign MNCs had lower sales per worker than other firms (local firms and other MNCs combined). MNC shares of fixed assets were relatively high throughout, indicating relatively high capital intensity among MNCs, but differences between wholly-foreign MNCs and local firms were smaller than differences between other MNCs (minority & other majority-owned MNCs) and local firms. Here again, MNC shares were smallest in terms of their number, indicating that MNCs were larger than local firms by any measure.

Because of the rapid growth in the corporate sector during this period, the cost of creating balanced panels is extremely high in Vietnam. For example, even a short, balanced panel for 2000 to 2004 covers only 70 percent of total sample employment in the earlier year and one-half in the latter year (Table 5). Coverage of sales was slightly higher, but still only three-fourths and three-fifths, respectively. Ramstetter and Phan (2007a, Table 6) show that the low

¹¹ Duplication apparently results primarily because different branches of the same firm are reported as separate records. 2006-2007 data obtained by this author do not yet contain the correct identity codes so it is not clear if the trend toward greater duplication has continued.

¹² In Table 5, 2000-2005 data come from compilations of micro data and may differ slightly from official compilations, but not by much. 2006 data are from an official publication and 2007 data are omitted because official compilations of sufficient detail are not yet available.

panel coverage results both from high entry rates among all types of firms (state-owned enterprises [SOEs], private firms, and MNCs), as well as from high exit rates among SOEs and private firms (though the exit rate was relatively low for MNCs).

In short, analysis of balanced panel data for Vietnam in recent years tells us very little about general economic conditions, but instead illustrates the special characteristics of surviving firms, which often differ from new entrants and exiting firms. For example, MNC shares tend to be larger in the panel than in corresponding cross sections. The largest differences were for 2000, when MNC shares of employment were 6 percentage points higher than in the corresponding cross section and shares of sales were 7 points higher. Sales' shares in 2004, and fixed asset shares in both years were also 5-7 percentage points higher. In other words, balanced panels overstate the degree of MNC presence and could therefore have an influence on estimates of productivity differentials or spillovers involving MNCs.

Nguyen, T.T.A. et al (2006) were among the first to utilize these data to show that MNCs had relatively high sales per employee in three manufacturing groups ((a) mechanics & electronics, (b) textiles, garments, & footwear, (c) food processing) in 2001-2003. Ramstetter and Phan (2008) calculate value added per worker, revealing similar patterns in most manufacturing industries in 2000, 2002, and 2004. However, when they estimate translog production functions for eight manufacturing industry groups, productivity differentials between MNCs and private, local firms were statistically insignificant in six of these groups.

Nguyen, T.T.A. et al (2006) examine four channels of potential spillovers, labor turnover, technology diffusion & transfer, production linkages, and competition. They also perform cross section, Cobb-Douglas estimates of spillovers, concluding that “there is little evidence of positive spillover effects at the firm level”, though there are also “no signs of negative spillover effect either” (p. 56). In contrast, Pham's (2008) cross section, Cobb-Douglas

estimates generally suggested positive spillovers that were largest in Hanoi and Ho Chi Minh City, and from MNCs that were not wholly-foreign. Combining firm-level data for 2000-2005 with the 2000 input-output table, Nguyen, P.L. (2008) estimates cross section Cobb Douglas functions finding that both horizontal and vertical spillovers were generally positive, and largest in more advanced regions and in more sophisticated local firms. In analysis using an unbalanced panel of the same data, Nguyen, N.A. et al. (2008) finds that backward, vertical spillovers were positive in manufacturing, while horizontal spillovers were positive in services. Le and Pomfret (2008) also use a similar approach to estimate spillovers in an unbalanced panel of all industrial firms (including mining and utilities) for 2000-2004, finding positive backward spillovers in manufacturing but negative horizontal spillovers, which were relatively strong on private firms, domestic-oriented firms, firms without R&D, and firms in low technology industries.¹³ Translog estimates for 2000, 2002, and 2004 from Ramstetter and Phan (2008) also suggest the existence of positive spillovers from MNCs to private firms in cross sections, but no significant spillovers in unbalanced panels. In sum, these results all suggest some degree of positive spillovers, especially in cross sections, but results vary markedly depending on specification, sample, and productivity measures, and evidence from panel analysis is relatively weak.¹⁴

In related research, Ramstetter and Phan (2007b) examine wage differentials between MNCs and local, private firms for 2000, 2002, and 2004. There is evidence of positive and

¹³ The use of the 2000 input-output table in these studies may be unrealistic because of large changes in Vietnam's industrial structure during 2000-2005, for example.

¹⁴ Panel estimates are preferred when estimating spillovers because they examine the question of how changes in foreign shares are related to changes in local firm productivity. Ramstetter and Phan (2008), Nguyen, N.A. et al. (2008), Nguyen, T.T.A. et al. (2006) use value-added-based estimates of productivity, while Le and Pomfret (2008) and Nguyen, P.L. (2008) use a sales-based measure. Value added data must be compiled from product-level data and omit some portions of sales, but the coverage of the value added samples seems reasonably good for 2000, 2002, and 2004 (Ramstetter and Phan 2008, Table 1, Appendix Tables 1a-1p).

significant differentials after firm-level labor skill (measured as shares of scientists and technicians and of female workers) was accounted for, both in manufacturing overall and all eight industry groups examined. Cross section evidence suggested that MNC presence was positively correlated with local firm wages in 2002 and 2004, but fixed effects estimates in unbalanced panels suggest that changes in MNC presence was not significantly related to changes in local firm wage levels in 2000-2002-2004.¹⁵ Le (2007) combines the 2000 input-output data and labor skill proxies from provincial data with a panel of firm data for 2000-2004, finding evidence of both vertical and horizontal wage spillovers from MNCs.

In addition to the enterprise data highlighted above, there are several other sources of micro data in Vietnam. First, Phan and Ramstetter (2004) analyze patterns in published compilations of a firm census for 1995 and an industrial survey for 1998, again suggesting the MNCs tended to be relatively large and have relatively large sales per worker. Second, Phan and Ramstetter, (forthcoming) also use a database of FDI projects to show how MNCs with large foreign ownership shares (90% or more) account for a large share of Vietnam's exports and have much higher export propensities than other MNCs. Macro data also suggested that export propensities were much higher in MNCs than local firms or plants. Nguyen (no date) analyzes a 1998-1999 survey of 96 textiles and garments firms, first finding that MNCs had relatively low profit rates after controlling for industry, location, scale, export propensities, and other firm-level characteristics. He also found relatively high TFP in MNCs, with the difference generally being strongest in Cobb-Douglas estimates. However, even in translog estimates, there was weak evidence (significant at the 10 percent level, but not the normal 5 percent level) of higher productivity in MNCs.

¹⁵ Data on labor quality were not available for 2001 and 2003, so those years were omitted.

6. Singapore and the Philippines

Singapore has long-published compilations of major indicators by ownership category and/or nationality of major investor for all manufacturing plants combined in its *Census of Manufacturing Activities* (previously known as the *Census of Industrial Production*). These aggregate compilations have been used in several previous analyses of MNCs (e.g., Ramstetter 1999a; Ramstetter and Matsuoka 2001). Calculations of MNC shares from these data are provided for recent years in Table 6.

Contrary to trends through the late-1980s noted in previous studies, there has been a fairly clear and strong, downward trend in MNC shares of employment since 1990, which fell from 72 percent to under half in 2007 (Table 6). MNC shares of value added also fell some but remained relatively high at 79 percent in 2007. In other words, the average product of labor is relatively high in MNCs in Singaporean manufacturing as well. Similarly, average worker compensation was also relatively high in MNCs (Ramstetter 1999a, Singapore, Economic Development Board, various years). And here again, MNC shares were by far the largest in terms of exports, especially for majority-foreign plants, indicating that MNCs also tended to have relatively high export propensities. On the other hand, MNC shares of fixed assets and value added were similar (slightly lower in 1993-2000 and slightly larger in 2001-2008), suggesting that differences in average capital productivity were a good deal smaller than differences in average labor productivity, for example.¹⁶

¹⁶ As far as this author knows, Singapore does not allow access to the micro data underlying this or other publically managed data sets. Although the process was very time consuming, I have in the past been able to arrange to unpublished compilations from the underlying data, but these were extremely simple calculations and I know of no researcher who has been able to contract the authorities for more sophisticated analyses (e.g., regressions). There is a relatively good set of data on large firms from a publication called the *Singapore 1000* (see Ramstetter and Matsuoka 2001 for details), but it contains only a limited number of indicators (sales, profits, assets, equity) and is therefore of limited use academically.

In the Philippines, the National Statistics Office conducts the *Annual Survey of Philippine Business and Industry* (previously the *Annual Survey of Establishments*), which contains ownership information and could potentially be used to perform analyzes of MNC activities similar to those of other countries reviewed above. However, Hill (2003, p. 236) provides the only known, limited compilation of these data, showing that MNCs accounted for 56 percent of manufacturing of the output of surveyed firms in 1995. Using a separate, more limited survey of firms in food, clothing, and electronics in 2002 which was carried out by the Asian Development Bank, Dueñas-Caparas (2006) examines the determinants of exports, finding that MNC affiliates had higher export propensities than local firms in all industries and specifications examined. Lall (2000, p. 10) also provides a list of the top 50 exporters in the Philippines, showing that most of them were MNCs, many of which were in electronics. This evidence is consistent with similar analyses of Indonesia and Thailand, and with the descriptive statistics presented for Malaysia and Singapore above. However, there are no known data facilitating calculations of MNC shares or known evidence on other comparisons of MNCs and local plants or firms in the Philippines.

7. Conclusion

This paper has used micro data and published compilations of these data to estimate shares of multinational corporations (MNCs) in Southeast Asian manufacturing. It first shows that MNC shares tended to be largest in Singapore, intermediate in Malaysia and (recently) Vietnam, and lowest in Thailand and Indonesia. In the decade or so since the mid-1990s, MNC shares have continued to rise in Indonesia and Vietnam, fluctuated but remained largely unchanged in Malaysia, fallen in Singapore, and probably fallen in Thailand. Another notable trend was the tendency for shares of majority-foreign MNCs to rise markedly in Indonesia

and Thailand as many local partners in joint-ventures sold shares to their MNC partners in order to cope with financial difficulties related to the 1997-1998 crisis.

Second, there were also clear differences in MNC shares depending on the economic activity being measured. MNC shares of plant or firm numbers were always smallest, indicating that MNCs tended to be larger than non-MNCs. Shares of production (value added or gross output/sales) tended to be larger than shares of employment, reflecting relatively high average labor productivity in MNCs. Especially in Malaysia and Thailand, and also to some extent in Vietnam, differences in labor productivity tended to be relatively small and/or inconsistent. However, the evidence for Indonesia suggests a somewhat more consistent pattern of relatively high labor productivity in MNCs. A review of more sophisticated studies accounting for the influence of related factors such as factor intensity suggested similar patterns. Related studies have also found substantial and significant wage differentials in favor of MNCs in Indonesia, Thailand, and Vietnam in a relatively large number of industries and periods. Descriptive data for Malaysia and Singapore are also consistent with the existence of substantial wage differentials. Perhaps the most consistent differences between MNCs and local firms or plants were in exporting, however, with MNCs, particularly those with high foreign ownership shares, having relatively high export propensities. These results are also underscored by studies of Indonesia, the Philippines, Thailand, and Vietnam that account for numerous influences on export propensities ignored in these simple calculations.

Third, the paper also reviewed the growing literature on productivity and wage spillovers, which tends to find evidence of positive spillovers in Indonesia and Thailand, but less consistent evidence regarding spillovers in Malaysia and Vietnam. Unlike some of the literature on productivity and wage differentials, the spillover literature almost always assumes identical production function slope coefficients for a wide range of industries, which

can bias estimates. The use of balanced panel samples may also bias the existing results for Malaysia, for example, because balanced panels often omit substantial information and consist of relatively large and productive firms or plants, as well as relatively large numbers of MNCs in at least one year. On the other hand, studies of Indonesia and Vietnam generally use unbalanced panels or cross sections, recognizing that balanced panels often contain a set of firms or plants that differ from the overall samples in ways that may bias estimates.

References

- Asian Development Bank (various years), *Key Indicators for Asia and the Pacific*, 2008-2009 issues, *Key Indicators*, 2007 issue, and *Key Indicators of Developing Asian and Pacific Countries*, 2000-2006 issues. Manila: Asian Development Bank (http://www.adb.org/documents/books/key_indicators/).
- Athukorala, Premachandra and Jayant Menon (1996), "Foreign Investment and Industrialization in Malaysia: Exports, Employment and Spillovers", *Asian Economic Journal*, 10(1), 215-228.
- Bank Negara Malaysia (2009), *Monthly Statistical Bulletin*, August issue, Table 7.6 data (<http://www.bnm.gov.my/files/publication/msb/2009/8/xls/7.6.xls>)
- Blalock, Garrick and Paul J. Gertler (2004), "Welfare Gains from Foreign Direct Investment through Technology Transfer to Local Suppliers," Mimeo, Cornell University.
- Blomström, Magnus and Fredrik Sjöholm (1999), "Technology Transfer and Spillovers: Does Local Participation with Multinationals Matter?" *European Economic Review*, 43: 915-923.
- Dueñas-Caparas, Ma. Teresa S. (2006), "Determinants of Export Performance in the Philippine Manufacturing Sector", Discussion Paper Series No. 2006-18, Manila: Philippine Institute for Development Studies (also published in *Philippine Journal of Development*, 34(1) and available at <http://publication.pids.gov.ph/details.phtml?pid=3839>).
- Haji Ahmad, Shahrazat Binti (2010), "A Quantitative Study on the Productivity of the Manufacturing Industry in Malaysia", Ph.D. Dissertation, Graduate School of Social Systems Studies, University of Kitakyushu (March).
- Hill, Hal (1988), *Foreign Investment and Industrialization in Indonesia*, Oxford University Press, Singapore.
- Hill, Hal (2003), "Industry" in Arsenio M. Balisacan and Hal Hill (eds.), *The Philippine Economy: Development, Policies, and Challenges*, Oxford and New York: Oxford University Press, pp. 219-253.
- Indonesia, Badan Pusat Statistik (various years), *Statistik Industri (Industrial Statistics)*, various volumes and underlying plant-level data, 1975-2006 issues. Jakarta: Badan Pusat Statistik.

- Ito, Keiko (2004a), "Foreign Ownership and Productivity in the Indonesian Automobile Industry: Evidence from Establishment Data for 1990-1999, in Takatoshi Ito and Andrew K. Rose, eds., *Growth and Productivity in East Asia*, Chicago and London: University of Chicago Press, pp. 229-270.
- Ito, Keiko (2004b), "Foreign Ownership and Plant Productivity in the Thai Automobile Industry in 1996 and 1998: a Conditional Quantile Analysis", *Journal of Asian Economics*, 15(2), 321-353.
- Khalifah, Noor Aini and Radziah Adam (2009), "Productivity Spillovers from FDI in Malaysian Manufacturing: Evidence from Micro-panel Data", *Asian Economic Journal*, 23(2), 143-167.
- Khantachai, Nathabhol, Kanchana Tanmavad, Tawatchai Boonsiri, Chantana Nisaisook and Anucha Arttanuchit (1987), *Technology and Skills in Thailand*, Singapore: Institute of Southeast Asian Studies.
- Kohpaiboon, Archanun (2006a) "Foreign Direct Investment and Technology Spillover: A Cross-Industry Analysis of Thai manufacturing", *World Development*, 34(3): 541-556.
- Kohpaiboon, Archanun (2006b) *Multinational Enterprises and Industrial Transformation: Evidence from Thailand*. Cheltenham, UK: Edward Elgar.
- Kohpaiboon, Archanun and Eric D. Ramstetter (2008), "Foreign Ownership and Producer Concentration in Thai Manufacturing", Working Paper 2008-05, Kitakyushu: International Centre for the Study of East Asian Development.
- Lall, Sanjaya (2000), "Export Performance and Competitiveness in the Philippines", Queen Elizabeth House, University of Oxford: QEH Working Paper Series QEHWPS49.
- Le Quoc Hoi (2007), "Foreign Direct Investment and Wage Spillovers in Vietnam: Evidence from Firm Level Data" Working Paper Series No. 2008/10, Hanoi: Development and Policies Research Center, http://depocenwp.org/upload/pubs/LeQuocHoi/Foreign%20Direct%20Investment%20and%20Wage%20Spillovers_DEPOCENWP.pdf
- Le Quoc Hoi and Richard Pomfret (2008), "Technology Spillovers from Foreign Direct Investment in Vietnam: Horizontal or Vertical Spillovers", Working Paper 085, Hanoi: Vietnam Development Forum, <http://www.vdf.org.vn/workingpapers/vdfwp085.pdf>.
- Lee, Cassey (2004), "The Determinants of Innovation in the Malaysian Manufacturing Sector", *ASEAN Economic Bulletin*, 21(3), 319-329.
- Lee, Cassey (2008), Innovation, Productivity and Exports: Firm-Level Evidence from Malaysia, Working Paper Series 2008-06, International Centre for the Study of East Asian Development, Kitakyushu.
- Lipsey, Robert E., and Fredrik Sjöholm (2004a), "Foreign Direct Investment, Education, and Wages in Indonesian Manufacturing", *Journal of Development Economics*, 73: 415-22.
- Lipsey, Robert E., and Fredrik Sjöholm (2004b), "FDI and Wage Spillovers in Indonesian Manufacturing," *Review of World Economics*, 40: 321-32.
- Lipsey, Robert E. and Fredrik Sjöholm (2005), "Host Country Impacts of Inward FDI: Why Such Different Answers?" in Theodore H. Moran, Edward M. Graham, and Magnus Blomstrom, eds., *Does Foreign Direct Investment Promote Development?*, Washington D.C.: Institute for International Economics, pp. 23-43.

- Lipsey, Robert E. and Fredrik Sjöholm (2006), "Foreign Multinationals and Wages in Indonesia" in Eric D. Ramstetter and Fredrik Sjöholm, eds., *Multinationals in Indonesia and Thailand: Wages, Productivity and Exports*. Hampshire, UK: Palgrave-Macmillan, pp. 35-53.
- Malaysia, Department of Statistics (2002), *Census of Manufacturing Industries 2001* [2000 data] and underlying plant-level data, Kuala Lumpur: Department of Statistics.
- Malaysia, Department of Statistics (2007), *Malaysia Economic Statistics-Time Series*, Kuala Lumpur: Department of Statistics.
- Malaysia, Department of Statistics (various years a), *Annual Survey of Manufacturing Industries*, 1992-1994, 1996-1998, 2000, 2002-2005 issues [1992-1997, 1999, 2001-2004 data] and underlying plant-level data, Kuala Lumpur: Department of Statistics.
- Malaysia, Department of Statistics (various years b), *Report of the Financial Survey of Limited Companies*, 1969-1995 issues, Kuala Lumpur: Department of Statistics. (no longer published)
- Menon, Jayant (1998), "Total factor productivity growth in foreign and domestic firms in Malaysian manufacturing", *Journal of Asian Economics*, 9(2), 251-280.
- Movshuk, Oleksandr and Atsuko Matsuoka-Movshuk (2006), "Multinationals and Wages in Thai Manufacturing", in Eric D. Ramstetter and Fredrik Sjöholm, eds., *Multinationals in Indonesia and Thailand: Wages, Productivity and Exports*. Hampshire, UK: Palgrave-Macmillan, pp. 54-81.
- Nguyen Manh Cuong (no date), "Does the Ownership Matter to Enterprise Performance? A Comparative Study of State and Private Enterprises in Vietnam's Textile-garment Industry", mimeo.
- Nguyen, Ngoc Anh, Nguyen Thang, Le Dang Trung, Pham Quang Ngoc, Nguyen Dinh Chuc and Nguyen Duc Nhat (2008) "Foreign Direct Investment in Vietnam: Is there any evidence of technological spillover effects" Working Paper Series 2008/18, Hanoi: Development and Policies Research Center, http://www.depocenwp.org/upload/pubs/NguyenNgocAnh/Vietnam_FDI_Spillover_DEPOCENWP.pdf
- Nguyen, Phi Lan (2008) "Productivity Spillovers from Foreign Direct Investment: Evidence from Vietnamese Firm Data", mimeo, School of Commerce, University of South Australia. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1101203
- Nguyen Thi Tue Anh, Vu Xuan Nguyet Hong, Tran Toan Thang, and Nguyen Manh Hai (2006), "The Impacts of Foreign Direct Investment on Economic Growth in Vietnam", Hanoi, Central Institute for Economic Management.
- Oguchi, Noriyoshi, Nor Aini Mohd Amdzah, Zainon Bakar, Rauzah Zainal Abidin, and Mazlina Shafii (2002), "Productivity of Foreign and Domestic Firms in Malaysian Manufacturing Industry", *Asian Economic Journal*, 16: 215-228.
- Oguchi, Noriyoshi, Anuar Abdol Karim and Nor Aini Amdzah (2006), "Productivity of Large Firms and SMEs of Malaysian Manufacturing", *Senshu Shogaku Ronshu*, 83, 135-146
- Okamoto, Yumiko (1994), "Impact of Trade & FDI Liberalization Policies on the Malaysian Economy", *The Developing Economies*, 32(4), 460-478.
- Okamoto Yumiko and Fredrik Sjöholm (2000), "Productivity in the Indonesian automotive industry", *ASEAN Economic Bulletin*, 17: 60-73.

- Pham, Xuan Kien (2008) "The impact of Foreign Direct Investment on the Labor Productivity in host countries: the case of Vietnam" Vietnam Development Forum, Hanoi, Vietnam. <http://www.vdf.org.vn/workingpapers/vdfwp0814.pdf>
- Phan, Minh Ngoc and Eric D. Ramstetter (2004), "Foreign Multinationals and Local Firms in Vietnam's Economic Transition", *Asian Economic Journal*, 18(4), 371-404.
- Phan, Minh Ngoc and Eric D. Ramstetter (forthcoming). "Foreign Ownership and Exports in Vietnamese Manufacturing", *Singapore Economic Review*, accepted for publication August 2008 (previous version published as Working Paper 2004-32, Kitakyushu: International Centre for the Study of East Asian Development).
- Phang, Hooi Eng (1998), *Foreign Direct Investment: A Study of Malaysia's Balance of Payments Position*. Kuala Lumpur: Pelanduk Publications.
- Philippines, National Statistical Coordination Board (various years), *Annual Survey of Philippine Business and Industry*, 2002-2003, 2005 issues. Manila: NSCB.
- Ramstetter, Eric D. (1993) 'Production Technology in Foreign and Local Firms in Thai Manufacturing', Discussion Paper No. 8, Nagoya: Graduate School of International Development, Nagoya University.
- Ramstetter, Eric D. (1994) 'Comparisons of Japanese Multinationals and Other Firms in Thailand's Non-oil Manufacturing Industries', *ASEAN Economic Bulletin*, 11: 36-58.
- Ramstetter, Eric D. (1998), "Export Propensities and Foreign Ownership Shares in Southeast Asian Manufacturing", in F. Gerard Adams and Shinichi Ichimura, eds., *East Asian Development: Will the East Asian Miracle Survive?* Westport, CN: Praeger, pp. 171-192.
- Ramstetter, Eric D. (1999a). "Comparisons of Foreign Multinationals and Local Firms in Asian Manufacturing Over Time", *Asian Economic Journal*, 13 (3): 163-203
- Ramstetter, Eric D. (1999b), "Trade Propensities and Foreign Ownership Shares in Indonesian Manufacturing", *Bulletin of Indonesian Economic Studies*, 35: 43-66.
- Ramstetter, Eric D. (2003). "Foreign Multinationals in Thailand After the Crisis: The Challenge of Measuring and Interpreting Recent Trends ", in Mitsuru Toida and Jinichi Uemura, eds., *Ajia Kogyoken no Keizai Tenbo 2003 [Projections for Asian Industrializing Region 2003]*, Tokyo: Institute of Developing Economies, pp. 83-170.
- Ramstetter, Eric D. (2006), "Are Productivity Differentials Important in Thai Manufacturing?", in Eric D. Ramstetter and Fredrik Sjöholm, eds. *Multinational Corporations in Indonesia and Thailand: Wages, Productivity, and Exports*, Hampshire, UK: Palgrave Macmillan, pp. 114-142.
- Ramstetter, Eric D. and Shahrazat Binti Haji Ahmad (2009), "Foreign Multinationals in Malaysian Manufacturing After the Crisis", Working Paper 2009-13, Kitakyushu: International Centre for the Study of East Asian Development.
- Ramstetter, Eric D. and Atsuko Matsuoka (2001), "Recent Trends in Large Firms in Singapore and Thailand: Did Foreign Multinationals Perform Differently than Local Firms Through the Crisis?", in Mitsuru Toida and Daisuke Hiratsuka, eds., 2001. *Ajia Kogyoken no Keizai Tenbo 2001 [Projections for Asian Industrializing Region 2001]*, Tokyo: Institute of Developing Economies, pp. 79-180.

- Ramstetter, Eric D. and Phan Minh Ngoc (2007a), "Changes in Ownership and Producer Concentration after the Implementation of Vietnam's Enterprise Law", Working Paper 2007-06, Kitakyushu: International Centre for the Study of East Asian Development.
- Ramstetter, Eric D. and Phan Minh Ngoc (2007b), "Employee Compensation, Ownership, and Producer Concentration in Vietnam's Manufacturing Industries", Working Paper 2007-07, Kitakyushu: International Centre for the Study of East Asian Development (by Eric D. Ramstetter and Phan Minh Ngoc).
- Ramstetter, Eric D. and Phan Minh Ngoc (2008), "Productivity, Ownership, and Producer Concentration in Transition: Evidence from Vietnamese Manufacturing", Working Paper 2008-04, Kitakyushu: International Centre for the Study of East Asian Development.
- Ramstetter, Eric D. and Sadayuki Takii, (2006) 'Exporting and Foreign Ownership in Indonesian Manufacturing', *Economics and Finance in Indonesia* 54 (3): 317–345.
- Rasiah, Rajah (2003), "Foreign ownership, technology and electronics exports from Malaysia and Thailand", *Journal of Asian Economics*, 14(5), 785-781.
- Rasiah, Rajah (2004), "Exports and Technological Capabilities: A Study of Foreign and Local Firms in the Electronics Industry in Malaysia, the Philippines and Thailand", *The European Journal of Development Research*, 16(3), 587-623.
- Singapore, Economic Development Board (various years), *Report on the Census of Manufacturing Activities, 2000-2007 issues and Report on the Census of Industrial Production, 1986-1999 issues*. Singapore: Economic Development Board.
- Sjöholm, Fredrik (1998), "Joint Ventures, Technology Transfer and Spillovers: Evidence from Indonesian Establishment Data", in Economic Planning Agency, ed., *Foreign Direct Investment in Asia*, papers and proceedings of an international symposium, 22-23 October, Tokyo: Economic Planning Agency, pp. 587-616.
- Sjöholm, Fredrik (1999a), "Productivity Growth in Indonesia: The Role of Regional Characteristics and Direct Foreign Investment," *Economic Development and Cultural Change*, 47: 559-584.
- Sjöholm, Fredrik (1999b), "Technology Gap, Competition and Spillovers from Direct Foreign Investment: Evidence from Establishment Data," *Journal of Development Studies*, 36: 53-73.
- Sjöholm, Fredrik (2003), "Which Indonesian Firms Export? The Importance of Foreign Networks," *Papers in Regional Science*, 82: 333-50.
- Sjöholm, Fredrik and Robert E. Lipsey (2006), "Foreign Firms and Indonesian Manufacturing Wages: An Analysis with Panel Data", *Economic Development and Cultural Change*, 55(1), 201-221
- Sjöholm, Fredrik and Sadayuki Takii (2006), "Multinational Companies and Exports in Indonesian Manufacturing", in Eric D. Ramstetter and Fredrik Sjöholm, eds., *Multinationals in Indonesia and Thailand: Wages, Productivity and Exports*. Hampshire, UK: Palgrave-Macmillan, pp. 173-193.
- Takii, Sadayuki (2004), "Productivity Differentials between Local and Foreign Plants in Indonesian Manufacturing, 1995," *World Development*, 32: 1957-1969.

- Takii, Sadayuki (2005), “Productivity Spillovers and Characteristics of Foreign Multinational Plants in Indonesian Manufacturing 1990-1995,” *Journal of Development Economics*, 76: 521-542.
- Takii, Sadayuki (2006), “Productivity Differentials and Spillovers in Indonesian Manufacturing”, in Eric D. Ramstetter and Fredrik Sjöholm, eds. *Multinational Corporations in Indonesia and Thailand: Wages, Productivity, and Exports*, Hampshire, UK: Palgrave Macmillan, pp. 85-103.
- Takii, Sadayuki and Eric D. Ramstetter (2000). “Foreign Multinationals in Indonesian Manufacturing 1985-1998: Shares, Relative Size, and Relative Labor Productivity”, Working Paper 2000-18, Kitakyushu: International Centre for the Study of East Asian Development.
- Takii, Sadayuki and Eric D. Ramstetter (2005) “Multinational Presence and Labor Productivity Differentials in Indonesian Manufacturing 1975-2001”, *Bulletin of Indonesian Economic Studies* 41(2):221-242.
- Tambunlertchai, Somsak and Eric D. Ramstetter (1991) ‘Foreign Firms in Promoted Industries and Structural Change in Thailand’, in Eric D. Ramstetter, ed., *Direct Foreign Investment in Asia’s Developing Economies and Structural Change in the Asia-Pacific Region*, Boulder, CO, Westview Press, pp. 65-104.
- Thailand, National Economic and Social Development Board (2008). Unpublished data on GDP and Total Income at the TSIC 5-digit level, delivered by email.
- Thailand, National Statistical Office (various years a), Report of the ____ Industrial Census, Whole Kingdom, 1997 and 2007 issues (1996 and 2006 data) and underlying plant-level data sets. Bangkok: National Statistical Office.
- Thailand, National Statistical Office (various years b), Report of the ____ Industrial/Manufacturing Survey, Whole Kingdom, 1999-2001, 2003 issues (1998-2000 and 2002 data) and underlying plant-level data sets. Bangkok: National Statistical Office.
- United Nations Industrial Development Organization (2009), *Industrial Demand-Supply Balance Database*, Vienna: UNIDO.
- Vietnam, General Statistics Office (2002), *The Results of the Enterprise Census at 1st April 2001*, Hanoi: Statistical Publishing House (text in Vietnamese only).
- Vietnam, General Statistics Office (various years a), *The Real Situation of Enterprises Through the Results of Surveys Conducted in _____*, 2001-2002-2003 to 2006-2007-2008 issues and underlying firm-level data for 2000-2007, Hanoi: Statistical Publishing House, and related data downloaded from the GSO website (http://www.gso.gov.vn/default_en.aspx?tabid=479&idmid=4&ItemID=4362)
- Vietnam, General Statistics Office (various years b), *Statistical Yearbook*, 1995-2008 issues, Hanoi: Statistical Publishing House, and related data downloaded from the GSO website (“Statistical Data” section of http://www.gso.gov.vn/default_en.aspx?tabid=491).

Table 1: Large- and Medium-Sized Manufacturing Plants in Indonesia

Year	Employees (1,000s)				Value Added (trillion Rupiah)			
	Nat'l total	Sample total	MNC shares %		Nat'l total	Sample total	MNC shares %	
			10%+	50%+			10%+	50%+
1990	7,693	2,663	10	7	43.6	25.2	22	13
1991	7,946	2,994	12	9	53.4	29.9	21	15
1992	8,255	3,313	14	11	62.0	41.4	24	18
1993	8,784	3,575	15	12	73.6	49.8	23	16
1994	10,841	3,814	17	13	89.2	59.9	27	19
1995	10,127	4,174	17	14	109.7	73.9	29	21
1996c	10,773	4,215	18	14	136.4	93.3	31	21
1997	11,009	4,155	19	15	168.2	84.1	35	29
1998	9,934	4,124	19	16	238.9	154.7	35	28
1999	11,516	4,124	19	16	285.9	154.7	35	28
2000	11,642	4,367	21	18	385.6	236.9	38	30
2001	12,086	4,386	21	18	506.3	269.6	34	24
2002	12,110	4,365	21	18	523.2	310.0	33	23
2003	11,496	4,274	23	20	568.9	326.8	36	30
2004	11,070	4,325	22	19	644.3	358.9	36	30
2005	11,953	4,227	23	20	760.4	396.4	37	31
2006c	11,578	4,756	24	21	919.5	514.3	40	34
Balanced Panel 1990 & 1996								
1990	-	2,053	11	8	-	21.9	22	13
1996	-	2,612	14	10	-	70.3	29	18
Balanced Panel 1996 & 2000								
1996	-	3,706	19	14	-	86.4	31	20
2000	-	3,783	20	17	-	205.1	35	27
Balanced Panel 2000 & 2006								
2000	-	3,314	20	17	-	186.3	37	27
2006	-	3,324	24	20	-	403.8	41	35
Balanced Panel 1996 & 2006								
1996	-	2,815	18	13	-	71.1	30	19
2006	-	2,880	23	19	-	358.2	39	32

Table 1 (continued)

Year	Number			Fixed Assets (bil.Rup.)			Exports (bil. Rupiah)		
	Sample total	MNC shares %		Sample total	MNC shares %		Sample total	MNC shares %	
		10%+	50%+		10%+	50%+		10%+	50%+
1990	16,536	4	3	167	47	43	11.9	7	6
1991	16,494	4	3	189	8	6	18.8	22	15
1992	17,648	5	4	117	14	10	27.1	33	26
1993	18,163	5	4	155	39	36	29.4	28	23
1994	19,017	6	5	108	29	23	40.3	32	27
1995	21,551	6	5	110	22	16	53.6	33	28
1996c	22,997	6	5	-	-	-	70.4	37	30
1997	22,386	6	5	112	25	21	56.8	39	32
1998	21,423	7	6	318	18	15	-	-	-
1999	22,070	8	7	197	19	16	108.6	47	40
2000	22,174	8	7	245	22	18	166.5	45	40
2001	21,396	8	7	769	17	16	-	-	-
2002	21,146	8	7	409	35	28	-	-	-
2003	20,324	9	8	1,368	69	66	-	-	-
2004	20,685	8	7	437	60	56	178.8	45	42
2005	20,729	8	7	1,045	40	39	-	-	-
2006c	29,468	7	7	95,835	34	29	364.3	50	46
Balanced Panel 1990 & 1996									
1990	9,937	5	3	156	49	46	10.3	23	16
1996	9,937	5	4	-	-	-	43.7	28	19
Balanced Panel 1996 & 2000									
1996	16,897	7	6	-	-	-	64.3	37	29
2000	16,897	7	6	210	14	10	137.7	39	33
Balanced Panel 2000 & 2006									
2000	13,476	9	8	208	23	18	124.4	38	32
2006	13,476	10	8	61,148	27	19	271.5	47	42
Balanced Panel 1996 & 2006									
1996	10,801	8	6	-	-	-	48.3	34	25
2006	10,801	8	7	53,169	29	21	236.9	44	39

Note: c=census year; samples consist of plants with 20 or more workers; national totals come from labor force data for employment and national accounts for value added; exports estimated as export propensities times gross output and not shown for 1998 because reported export propensities were not plausible (well above 100%) for many plants; MNC shares are percentages of sample totals.

Sources: Asian Development Bank (various years); Indonesia, Badan Pusat Statistik (various years).

Table 2: Manufacturing Plants in Malaysia 1994-2004

Year	Employees (thousands)			Value added (RM mil)		
	National	Sample	MNC %	National	Sample	MNC %
1994	1,892	1,225	43	52.1	49.4	44
1995	1,780	1,421	37	58.7	60.0	41
1996	1,912	1,449	38	70.6	73.0	44
1997	2,002	1,395	40	80.0	160.8	35
1999	1,991	1,677	41	93.0	90.7	61
2000c	2,174	1,575	38	110.0	108.7	44
2001	2,184	1,392	39	103.4	97.6	45
2002	2,069	1,489	38	112.1	112.8	43
2003	2,131	1,503	38	125.3	123.2	43
2004	2,023	1,543	39	144.0	140.9	43
Balanced Panel 1994 & 1999						
1994	-	757	46	-	37.5	46
1999	-	1,272	46	-	81.0	58
Balanced Panel 2000 & 2004						
2000	-	1,180	42	-	92.0	46
2004	-	1,346	41	-	119.1	45

Year	Number		Fixed Assets		Exports	
	Sample	MNC %	Sample	MNC %	Sample	MNC %
1994	8,328	15	81	40	-	-
1995	7,553	12	99	38	-	-
1996	7,865	11	239	44	-	-
1997	6,751	13	136	38	-	-
1999	6,494	13	144	36	-	-
2000c	20,455	8	154	38	226	69
2001	13,934	10	149	41	203	68
2002	13,482	11	167	40	218	69
2003	13,672	11	174	35	232	72
2004	12,451	11	177	37	200	61
Balanced Panel 1994 & 1999						
1994	3,629	18	65	40	-	-
1999	3,629	18	108	38	-	-
Balanced Panel 2000 & 2004						
2000c	9,556	13	141	40	65	50
2004	9,556	13	148	39	160	66

Notes: c=census year; national totals come from labor force data for employment and national accounts for value added; annual survey totals are calculated from plant-level data and differ substantially from published figures for 1996-1997 (fixed assets), 1997 (value added), and 1999 (employment); exports estimated as export propensities times gross output; MNC shares are percentages of sample totals.

Sources: Asian Development Bank (2008); Malaysia, Department of Statistics (2002, 2007, various years)

Table 3: Manufacturing Plants in Thailand

Year	Employees (1,000s)				Gross Output (billion Baht)			
	Total	Survey total	MNCs %		Total	Survey total	MNCs %	
			10%+	50%+			10%+	50%+
1996c	4,329	2,445	39	16	3,898	3,557	54	22
1998	4,264	1,020	43	-	4,126	1,524	59	-
1999	4,274	466	40	-	4,183	706	64	-
2000	4,650	742	43	-	4,784	1,337	59	-
2006c	5,504	3,726	25	17	8,305	7,147	43	29

Year	Number			Fixed Assets			Exports		
	Survey total	MNCs %		Survey total	MNCs %		Survey total	MNCs %	
		10%+	50%+		10%+	50%+		10%+	50%+
1996	32,489	8	3	1,789	53	22	-	-	-
1998	8,552	13	-	879	60	-	-	-	-
1999	9,360	5	-	404	71	-	-	-	-
2000	9,294	7	-	774	62	-	-	-	-
2006c	73,931	4	2	3,072	42	28	2,476	55	43

Note: c=census year; surveys and censuses include all plants with 10 or more employees to 2002, all plants in the 2006 census; national totals come from labor force data for employment and national accounts for gross output (proxied with total income); exports estimated as export propensities times gross output; MNC shares are percentages of sample totals.

Sources: Asian Development Bank (various years); Thailand, National Statistics Office (various years a, various years b); Thailand, National Economic and Social Development Board (2008).

Table 4: Large Manufacturing Firms in Thailand

Year	Revenue (bil. Baht)				Number Rev.>0			Fixed assets (bil. Baht)		
	Nat'l total	Sample total	MNCs %		Sample total	MNCs %		Sample total	MNCs %	
			10%+	50%+		10%+	50%+		10%+	50%+
1996	3,898	2,368	58	34	1,099	44	22	1,250	47	23
2006	8,305	6,604	69	52	889	56	39	1,655	58	42
Balanced Panel 1996-2006										
1996	-	1,747	61	37	514	51	27	898	47	21
2006	-	5,008	70	49	514	57	37	1,186	57	38

Note: The sample consists of the largest firms in within 58 3- or 4-digit industries; intra-industry conglomerates (groups of firms in which the same ultimate parent has a majority-ownership share) are consolidated when possible, or combined and counted as a single firm; MNC shares are relative to sample totals.

Source: Compilations from numerous sources detailed Kohpaiboon and Ramstetter (2008).

Table 5: Manufacturing Firms in Vietnam

Year	Employees (1,000s)				Sales (bil. Dong)		
	Nat'l total	Sample total	MNC shares %		Sample total	MNC shares %	
			10%+	100%		10%+	100%
2000	3,550	1,598	22	17	246	41	22
2001	3,887	1,808	24	19	302	39	21
2002	4,160	2,203	29	23	379	41	23
2003	4,560	2,557	31	26	476	42	24
2004	4,832	2,893	33	29	623	43	27
2005	5,249	3,099	36	32	743	43	28
2006	5,656	3,402	39	35	906	46	32
Balanced Panel 2000 & 2004							
2000	-	1,119	28	22	182	48	26
2004	-	1,438	34	29	366	49	27

Year	Number			Fixed Assets (bil. Dong)		
	Sample total	MNC shares %		Sample total	MNC shares %	
		10%+	100%		10%+	100%
2000	10,405	10	7	115	64	30
2001	13,237	11	8	127	61	32
2002	14,794	11	9	150	58	33
2003	16,915	12	9	171	55	34
2004	20,531	11	9	213	52	34
2005	24,018	11	9	239	54	38
2006	26,863	11	10	-	-	-
Balanced Panel 2000 & 2004						
2000	5,479	15	10	92	69	32
2004	5,479	15	11	110	59	33

Notes: Data from censuses or surveys of firms in Vietnam; national totals come from labor force data for employment; comprehensive value added data not available (see Ramstetter and Phan 2008); MNC shares are percentages of sample totals.

Sources: Vietnam, General Statistics Office (various years a; various years b).

Table 6: Manufacturing plants in Singapore (published data)

Year	Employees (1,000s)				Value Added (S\$ billions)			
	Nat'l total	Sample total	MNC shares %		Nat'l total	Sample total	MNC shares %	
			1%+	50%+			1%+	50%+
1990	439	352	72	60	17.3	16.5	85	74
1991	430	358	69	58	19.9	17.8	83	73
1992	434	358	69	57	20.6	18.1	82	69
1993	429	355	67	55	23.8	21.1	82	71
1994	423	366	67	55	26.3	23.3	82	70
1995	385	370	67	55	29.5	26.9	83	72
1996	406	368	65	54	30.7	28.2	82	72
1997	414	367	64	53	32.0	29.7	82	72
1998	404	352	63	50	31.5	29.6	83	73
1999	396	339	61	50	31.9	34.9	85	76
2000	434	345	60	48	41.2	39.0	83	73
2001	384	345	59	48	35.2	31.9	80	72
2002	368	357	55	45	38.2	36.4	80	73
2003	365	351	54	44	38.6	37.1	81	73
2004	357	358	54	44	48.0	46.3	82	72
2005	485	370	53	44	51.1	49.0	79	69
2006	517	382	51	42	56.7	54.1	82	73
2007	568	404	48	42	57.7	56.0	79	71

Year	Number			Fixed Assets (S\$bil.)			Exports (S\$bil.)		
	Sample total	MNC shares %		Sample total	MNC shares %		Sample total	MNC shares %	
		1%+	50%+		1%+	50%+		1%+	50%+
1990	3,703	32	23	18.0	85	72	47.0	93	87
1991	3,785	32	23	18.7	83	71	45.9	91	85
1992	3,917	30	22	20.2	82	70	46.9	92	84
1993	3,993	29	21	22.3	80	69	53.0	91	85
1994	4,013	29	22	24.1	80	68	61.5	91	85
1995	4,036	29	21	26.4	80	68	69.0	92	86
1996	4,068	28	21	29.1	78	61	73.0	93	86
1997	4,108	28	21	37.0	80	67	76.4	93	86
1998	4,004	27	21	37.2	81	68	75.5	94	88
1999	3,928	27	21	38.6	81	69	85.4	93	87
2000	4,044	26	20	42.4	83	68	93.9	93	87
2001	4,041	26	20	48.1	84	72	84.2	93	88
2002	8,609	13	10	47.9	82	71	88.4	92	87
2003	8,597	12	10	45.8	82	71	98.7	93	89
2004	8,725	12	9	47.8	84	71	116.8	92	85
2005	8,037	12	10	47.1	84	71	134.6	90	82
2006	7,892	12	10	47.5	85	72	141.1	89	82
2007	8,166	12	10	47.8	84	72	152.3	86	80

Source: Singapore, Economic Development Board (various years).