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in East Asian Manufacturing**

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Recent Downturns and Foreign Multinationals in East Asian Manufacturing

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Abstract

This paper first examines trends in the shares of foreign-owned multinational corporations (MNCs) in the manufacturing industries of ten large, East Asian economies, Singapore, Japan, Hong Kong, Taiwan, China, Malaysia, Thailand, the Philippines, Indonesia, and Vietnam, focusing on three downturns surrounding 1998, 2001, and 2009. The paper reveals no consistent trends in MNC shares during the first two downturns and evidence for the most recent downturn is still limited to a few economies. However, it seems clear the trends in MNC shares have varied considerably depending on the downturn, host economy, or indicator used to measure MNC shares. On the other hand, there is a much clearer long-term tendency for MNC shares of firm or plant numbers to be relatively small, reflecting a tendency for MNCs to be relatively large. MNC shares of employment also tend to be smaller than shares of production, earnings, and fixed assets, indicating that MNCs usually have relatively high average labor productivity, earnings per worker, and capital intensity. MNC shares of earnings tend to be smaller than shares of value added while MNC shares of exports tend to be larger than shares of production, indicating relatively low labor shares of value added and relatively high export propensities in the region's manufacturing MNCs.

Keywords: Multinational corporations, Asia, manufacturing, Economic downturns and cycles
JEL categories: F23, L60, N15, N65, O53

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1. Introduction

There is now a substantial literature illustrating how foreign multinational corporations (MNCs) have made relatively large and important contributions to manufacturing industries in many of Asia's economies over the last three to four decades, a period when many of these economies achieved remarkable economy-wide growth.¹ However, since the Asian financial crisis surrounding 1998, manufacturing growth has declined in several economies, partially as a result of the crisis and two subsequent downturns surrounding the dot.com crash in 2001 and the sub-prime crisis in 2009. Both of these latter downturns were much milder than the Asian financial crisis for most of Asia's economies, largely because the Asian financial crisis resulted in numerous important adjustments. These included strengthened external positions (current account surpluses instead of deficits), lower fixed investment rates and less excess capacity, greater risk adversity among financial institutions, and tighter regulation of financial institutions by respective governments. Thus, although large declines in U.S. asset prices inevitably destroyed investor and consumer confidence in many advanced economies and adversely affected Asian exporters, most of whom are manufacturers, Asia's economies were able to recover relatively quickly in the aftermath of the 2009 downturn.

Several previous studies have emphasized how foreign direct investment (FDI) by MNCs has been more stable than other forms of international capital flows, especially after the Asian financial crisis.² These studies also emphasize how MNCs have generally been more stable financially, making them better able to exploit investment and export opportunities that resulted from adjustment (e.g., declines in asset prices and exchange rates) to the downturns. In addition, the most influential effects of MNCs are generally thought to result from the exploitation of MNCs' firm-specific, often intangible assets (e.g., patents, other results of

¹ See, for example, Athukorala (2007), Galenson (1985), Hill (1988), Kohpaiboon (2006), Kumar (1994), Ramstetter (1991, 1999, 2009), Ramstetter and Haji Ahmad (2009), Phan and Ramstetter (2004, 2009), and Ramstetter and Sjöholm (2006).

² For examples of this literature, see Aguiar, and Gopinath (2005), Athukorala (2003); Chung et al. (2007), Fukao (2001), Hill and Jongwanich (2009); Lipsey (2001), Narjoko and Hill (2007), Wang and Wong (2007).

R&D and technology development, marketing networks, and management know-how) that affect long-term firm performance, both in MNCs and in local firms in host economies.³ In the context of Asian downturns, which have often been accompanied by exchange rate depreciations, the fact that MNCs tend to be more export-oriented than local firms is also thought to be important.

This paper asks a simple question: have foreign-based manufacturing MNCs become more or less important in the manufacturing sectors during recent downturns in East Asia's large economies? Unfortunately, the answer to this question turns out to be a disconcerting "it depends", not only on the downturn and the economy examined, but also on the indicator employed to measure the size of MNCs relative to the host economy. Moreover, because data availability, definitions, and compilation methodologies differ greatly, the measures used are not strictly comparable across host economies. Correspondingly, the core analysis is presented in subsections of Section 2 organized by host economy. This focus on statistical detail may seem tedious but it is a crucial, distinguishing strength of this paper, which attempts to calculate MNC shares of host economy manufacturing as ratios of conceptually equivalent measures in the numerator and denominator (e.g., MNC employment, production, or exports divided by total employment, production, or exports, respectively). Hence despite differences among host economies, these measures are probably more consistently and meaningfully defined than more common alternatives such as ratios of FDI flows or stocks to fixed capital formation or GDP. This precision is in turn facilitated by access to numerous micro-data sets which allow custom aggregations from firm- or plant-level detail. Finally, the paper concludes with a summary of the major patterns emerging and the long agenda for future research (Section 3).

It is important to recognize that this study includes both advanced host economies with a

³ See Caves (2007), Dunning (2003), and Rugman and Brewer (2001) for summaries of or compilations of relevant literature.

tendency for manufacturing to grow more slowly than the overall economy (e.g, Singapore, Japan, Hong Kong, Taiwan; Asian Development Bank, various years) and developing hosts in which manufacturing has tended to grow more rapidly than GDP over the last two decades (e.g., Malaysia, China, Thailand, Indonesia, Vietnam). Thus, if one defines downturns in terms of manufacturing indicators alone, it is easy to confuse declines related to downturns and declines related to long-term structural changes. Even if one recognizes that downturns are macroeconomic phenomena and tries to define downturns in the standard way (two consecutive quarters of negative economic growth), problems arise because several East Asian economies have not published standard, quarterly GDP series for a long enough period to be useful here. Moreover, because East Asian economies have generally grown rapidly over the last two decades and population growth rates vary substantially across economies. Thus, slow growth can produce stagnation in living standards and is generally perceived as a downturn. I therefore choose to define downturns as any year in which the growth of real per capita GDP in domestic currency (probably the best available measure of how average living standards change over time) is negative or more than two standard deviations below the average for 1992-2011.⁴ According to this definition, there were downturns in nine of East Asia's 11 large economies in one or more years surrounding 1998, eight in 2009, and five in 2001.⁵ The 1998 downturn was by far the most severe for the affected economies (Ramstetter 2011).

Foreshadowing the disconcerting conclusion "it depends", I should emphasize that the purpose of this paper is to paint the "big" or "aggregate" picture, and measure trends in MNC shares during economic downturns across many economies using relatively short time series. Accordingly this paper will not be able to examine differences among industries or control for other influences that may explain the variations observed. On the other hand, the paper will provide a relatively comprehensive and up-to-date summary of trends and related

⁴ The data are estimates or forecasts as of October 2010 from IMF (2010).

⁵ In 1997-1999, China and Taiwan were the only exceptions and in 2009 there China, Indonesia, and Vietnam were exceptions. In 2001, Singapore, Japan, Taiwan, Malaysia, and the Philippines experienced downturns.

measurement issues that would be impossible in a study employing more econometric rigor.

2. Trends in MNC Shares and Relative Performance

There are two important problems that one must confront when trying to measure foreign MNC shares of manufacturing. First, there are important data constraints and related definitional issues. For example, this paper only includes data for 10 of East Asia's 11 large economies because I am unaware of any Korean data that can be used to estimate foreign shares in recent years.⁶ Even when data are available, definitions of ownership categories (e.g., the threshold foreign ownership share used to define MNCs) differ greatly across some economies. In principle, this paper tries to use two criteria, all MNCs defined as firms or plants with foreign ownership shares of 10 percent or more (1 percent is a common alternative) and MNCs with majority or larger foreign ownership shares (90 or 100 percent are common alternatives here). It is also important to understand that manufacturing firms or plants, especially large multi-product, multi-activity firms or plants, may also be heavily involved in trade and services or other non-manufacturing industries, even if their main activity is manufacturing. These problems affect compilations of firm-level data more than compilations of plant-level data, but manufacturing plants can also have substantial non-manufacturing operations. Coverage rates for firm- or plant-level samples also vary over time in many cases, making it difficult to sort out actual trends in MNC shares from trends related to changes in survey coverage. Correspondingly, where possible, trends in two measures of MNC shares, the share of MNC in sample plants or firms and the share of MNCs in economy-wide estimates for the same variables, are examined.

Second, there are important methodological problems. The major problem results because the questions this paper asks are best analyzed in single-country time series, in order to

⁶ Official survey data are available for older years (Lee and Ramstetter 1991) I am aware of some private databases for subsets of firms in the 1990s (e.g., listed firms or electronics firms), but I know of no reasonably comprehensive data sets covering firms in recent years which are comparable to those for other countries.

capture important differences between economic downturns and MNC involvement among host economies. However, as mentioned in the introduction, the time series available are far too short to facilitate sophisticated econometric modeling. Correspondingly, the paper's methodology is descriptive, focusing on how to interpret the trends observed. Because my interpretations may differ from others, this rather subjective approach is somewhat disconcerting, but after careful examination I have concluded it is the most transparent and constructive way to analyze the issues at hand. In the following subsections, I proceed with economies in order of income levels, starting with Singapore (estimated per capita GDP of US\$42,654 in 2010) and three other advanced, high-income economies (Japan=\$42,325, Hong Kong=\$31,799, and Taiwan=\$18,304), followed by three middle-income developing economies (Malaysia=\$7,755, Thailand=\$4,621, China=\$4,283) and three low-income developing economies (Indonesia=\$2,963, Philippines=\$2,011, and Vietnam=\$1,156).⁷

2a. Singapore

Singapore is a good example to start with because the government compiles and publishes timely data that are ideal for the purpose of this paper. Data come from a comprehensive census of industrial production which covers all plants contributing significantly to employment, output, or value added and a stratified sample of smaller plants (Singapore, Economic Development Board, various years). Published compilations include tables compiled by four ownership groups (wholly local, minority-foreign, majority-foreign, and wholly-foreign) the data in Table 1 are calculated from these compilations for all foreign MNCs (foreign ownership of 1 percent or more) and wholly-foreign MNCs compared to all sample establishments and corresponding economy-wide estimates. MNC shares are compiled

⁷ U.S. dollar values of per capita incomes are the focus here because most MNCs, particularly manufacturing MNCs, primarily produce tradeable goods and maintain their accounts in convertible currencies. Correspondingly, they are generally more focused on U.S. dollar measures than alternative measures that account for differences in purchasing power parity (which often stem from differences in prices of non-tradeables that are not accurately reflected in market exchange rates). Data come from International Monetary Fund (2010).

for seven indicators focused on in this paper: the number of workers or plants, and the amounts of total or gross output (value added plus intermediate consumption [materials plus operating costs]), value added (earnings plus indirect taxes, depreciation, and the net operating surplus), worker earnings (abbreviated as earnings below, called remuneration in the source), fixed assets, and direct exports (excluding entrepot exports).

First and foremost, Table 1 underscores how foreign MNCs, most of which are wholly-foreign MNCs, have dominated manufacturing in Singapore. For example, all MNCs accounted for 73-85 percent of value added, 78-85 percent of fixed assets, 81-86 percent of output, and 86-94 percent of direct exports in sample plants. Wholly foreign MNCs accounted for the vast majority of MNC activities. MNC shares of earnings (57-72 percent), workers (40-67 percent), and especially plants (10-29 percent) were always smaller than shares of production (either value added or output), fixed assets or direct exports, but they were still substantial.

If calculated relative to economy wide measures, MNC shares of employment were smaller in all years with particularly large differences in recent years (e.g., 32 vs. 42 percent in 2009). MNC shares of economy-wide estimates for value added and direct exports were also somewhat smaller than shares of sample plants in most years but differences between shares of sample totals and economy-wide estimates for these indicators were relatively small in most years. In other words, there is a fairly clear trend for the industrial census data to cover smaller portions of manufacturing employment over time and census coverage rates have always been rather high in terms of value added or direct exports.

Second, MNC shares have all declined since 1995 with particularly large declines in MNC shares of workers (67 to 42 percent) and plants (29 to 10 percent), but more modest declines in shares of value added (83 to 73 percent) or direct exports (92 to 87 percent), for example (Table 1). Meanwhile, MNC shares of fixed assets rose somewhat during the period. Thus,

although MNCs continue to dominate Singaporean manufacturing, the extent of their domination has generally waned some over this period.

Third, the fact that MNC shares differ consistently depending on the indicator reflects important differences between MNCs and non-MNCs in Singaporean manufacturing. The most obvious difference is the relatively low MNC share of plants, which means that MNCs are on average much larger than non-MNCs by any common measure (e.g., employment, output, or value added per plant). Relatively large shares of value added, fixed assets, and earnings compared to employment mean that MNCs tended to have relatively high average labor productivity (value added per worker), capital intensity (fixed assets per worker), and earnings per worker.⁸ Similarly high shares of direct exports compared to output indicate MNCs had higher export propensities (export-output or export-sales ratios) throughout the period. On the other hand, MNC shares of value added tended to exceed shares of fixed assets through 1999 but became noticeably smaller after 2005, suggesting that average capital productivity (the value added-fixed asset ratio) was initially higher in MNCs and then lower in more recent years. The fact that MNC shares of earnings were lower than shares of value added is also meaningful because it indicates that labor shares of value added were relatively low in MNCs, despite relatively high earnings per worker.

The above comparisons of foreign MNCs and wholly-local plants are generally consistent over the sample and appear to be long-term in nature.⁹ It is also important that they are consistent with theoretical expectations that MNCs tend to have substantial endowments of the firm-specific assets described in the introduction, which tend to make MNCs larger, more technology-intensive, more productive, and better able to export than their non-MNC counterparts. Although it is important to keep these characteristics in mind, the major concern is how MNCs reacted to the three downturns in the Singaporean economy during this period.

⁸ It is usually preferable to measure average labor productivity as value added per worker rather than the alternative of output per worker.

⁹ Similar characteristics are also observed in earlier years (Ramstetter 1999).

Singapore is small, open, regional hub, and was seriously affected by all three downturns with real per capita GDP declining 5.6 percent in 1998, 2.1 percent in 2001, and 3.0 percent in 2009 (IMF 2010).

In all of these years, total MNC shares of employment fell and the declines continued in 1999 and 2002. Shares of earnings also fell in most of these years (1999, 2001-2002, and 2009), but rose in 1998. Shares of value added fell in 2001, but were constant or increased in 1998-1999, 2002, and 2009. Shares of output declined in 2009 and 2001, but were unchanged or rose in 1998-1999, 2002, and 2009. Shares of direct exports fell in 2002 and 2009, but not in 1998-1999 or 2001. Moreover, the direct export shares of wholly-foreign MNCs increased conspicuously in 1998 and 2009, and more modestly in 2001, suggesting that these MNCs were particularly adept at expanding or preserving export markets during downturns. This is not surprising because many of these exports are intra-firm exports to parents or related affiliates. Wholly foreign MNCs also increased shares of value added, earnings and fixed assets conspicuously in 2009. In short, there was a tendency for MNC shares to decline some in downturns or the following year, but this pattern was not uniform across indicators or types of MNCs.

2b. Japan

Japan is a very different economy than Singapore. Most notably it is much larger, slower growing, and far less dependent on trade or foreign MNCs. Japan's data on foreign MNCs come from official compilations of voluntary survey data. Because firms are not legally required to participate in these surveys (unlike most of the official survey/census data used in this study), survey coverage has been uneven over time (e.g., the relatively large increase decrease in sample size in 2008, Table 2). These surveys use a relatively large foreign ownership threshold to distinguish foreign MNCs (33 percent) compared to other host

economies, most of which are majority-foreign MNCs. These data on foreign MNCs are compared to data from corporation statistics (both of which are on a fiscal year [ending in March of the following calendar year] basis) and economy-wide estimates (on a calendar year basis) from the national accounts or merchandise trade data to estimate foreign MNC shares of workers, sales, value added, earnings, exports, and firms.

Compared to the other host economies examined in this study, foreign MNCs account for very small shares of Japan's manufacturing activities. For example, foreign MNCs never accounted for more than 2.5 percent of corporate employment or 2.0 percent of total manufacturing employment in Japan during 1995-2008 (Table 2). Foreign MNC shares of value added or sales (output for economy-wide estimates) were larger but never exceeded 6.9 percent. Foreign MNC shares of manufacturing exports were higher still, but never larger than 10.4 percent. Foreign MNC shares of economy-wide value added and output were always substantially larger than shares of corporate value added or sales, respectively, probably because many manufacturing corporations have numerous plants in non-manufacturing activities, which are in principle excluded from economy-wide estimates for manufacturing. As in Singapore, foreign MNC shares of value added, sales or output, and to a lesser extent, earnings tended to be larger than shares of employment. In other words, foreign MNCs also tended to have relatively high average labor productivity and earnings per worker than other firms in Japan, but lower labor shares of value added. Shares of exports were also larger than shares of sales or output in 1999-2003, suggesting relatively high export propensities in these years, but this difference was relatively small in other years.

Japan experienced relatively large declines of per capita GDP in 1998 (2.3 percent) and 2009 (5.1 percent) and milder declines in 1999, 2001, and 2003 (0.05 to 1.15 percent, IMF 2010). MNC shares generally rose markedly in 1998 and/or 1999, partially because Renault acquired a substantial minority share in Nissan in March 1999. The jump in MNC shares of

exports in 1999 also reflects the foreign acquisition of this large exporter. Japan's prolonged slow growth during the 1990s and the 1998-1999 recession contributed to the worsening of Nissan's balance sheet and its subsequent acceptance of a large foreign investor. In 2001-2002, MNC shares of employment or value added did not change much, but there were noticeable declines in shares of earnings and in shares of sales and exports in 2002. Thus, the existing data suggest that MNC shares generally rose during the first slowdown but fell during or after the second one. Unfortunately, data for the more recent downturn in 2009 are not yet available.

2c. Hong Kong

As in Singapore, data for Hong Kong refer to manufacturing plants and come from standard industrial surveys with quite comprehensive coverage for production but less comprehensive coverage for employment (Table 2).¹⁰ Published compilations of these data are also similar to Singapore's because they allow identification of several MNC ownership thresholds. Hong Kong's economy also resembles Singapore's in important respects; it is a city with large finance and trade sectors and has substantial entrepot trade, mainly involving China. Like Singapore, it has also benefitted from rapid growth in entrepot partners and was severely affected by regional downturns in 1998 and 2009 when per capita GDP declined 7.0 and 3.6 percent, respectively (IMF 2010). On the other hand, it was not as severely affected by the 2001 downturn, largely because it relies far less on domestic exports of electronics-related products, which were severely affected by this downturn. More generally, manufacturing has become a much portion of Hong Kong's economy than in Singapore.¹¹

In addition, MNCs have always played a much smaller role in Hong Kong's manufacturing

¹⁰ This fact is reflected in similar MNC shares of sample plants and economy totals in Table 3.

¹¹ In 2000, for example, manufacturing accounted for 20 percent of Singapore's employment (including non-residents) and 25 percent of its GDP, but only 10 percent of Hong Kong's employment and 5 percent of its GDP (Asian Development Bank, various years).

industries than in Hong Kong (Tables 1, 3; Ramstetter 1999), although total FDI has been larger relative to GDP in Hong Kong in many recent years.¹² For example, foreign MNCs never accounted for more than 11 percent of total manufacturing employment in 1995-2007, although this ratio did rise to 17 percent in 2008; shares of sample plants were somewhat larger, however, 13-21 percent. MNC shares of plant numbers were particularly small, no more than 3 percent. Shares of value added were also one-third or less, though they were generally larger when measured relative to economy-wide estimates (i.e., industrial survey estimates of value added were always larger than national accounts' estimates). Similar patterns are observed in shares of output, which were as large as 46 or 51 percent in 2008, and earnings, which tended to be slightly below shares of value added. In other words, these data also suggest that foreign MNCs were much larger than the average in Hong Kong manufacturing and had relatively high average labor productivity and earnings per worker.

During the Asian financial crisis all MNC shares first increased or stayed the same in 1998, but subsequently fell markedly in 1999, with particularly large declines in shares of production (value added or output). A similar pattern was observed in MNC shares of employment or earnings in 2001 (increase or no change) and 2002 (sharp declines). On the other hand, shares of value added or output remained unchanged or fell in both years. Thus, evidence from these two downturns suggests a MNC shares behaved somewhat differently during the year of the downturns but tended to fall in the following year in both cases.

2d. Taiwan

Taiwan's Investment Commission in the Ministry of Economic Affairs has long published surveys of foreign MNCs which have been used in numerous previous studies (Ramstetter 1999), but recent issues of the survey appear to suffer from important coverage problems and

¹² Recent data indicate FDI-GDP ratios were larger in Hong Kong in 2000 and 2004-2010 (Ramstetter 2011).

suggest large increases or decreases in foreign MNC activity that do not appear to reflect reality. Fortunately, China Credit Information Service (various years) compiles comprehensive information on sales and employment in large firms and identifies majority-foreign MNCs, which makes it possible to calculate shares of these MNCs in Taiwan's manufacturing employment and sales (Table 4). Similar to Japan, these data suggest that foreign MNC shares were relatively small and that MNC shares of sales were consistently larger than shares of employment. In other words, MNCs had, on average, relatively high sales per worker.

Although Taiwan was one of East Asia's few economies to avoid a downturn during the Asian financial crisis, it experienced declines of real per capita GDP of 2.2 and 2.3 percent, respectively, in 2001 and 2009. Preliminary compilations of the data on large firms suggest substantial declines in MNC numbers, employment, and sales, as well as MNC shares of large firm numbers and economy-wide employment and sales or output in 2001 and 2002 compared to 1996 and 2000.¹³ In other words, these data indicate that MNCs were hit relatively hard by the 2001 downturn. This would make sense because many of these MNCs are in electronics-related businesses, which were severely affected by the 2001 downturn. MNC shares also seem to have declined in 2008, a year before the 2009 downturn, but shares in 2009 were similar to those in 2007. Although the extent of the reaction will not be clear until data for 2010 and subsequent years are available, it does seem that the reaction of large MNCs to the 2001 downturn contrasts with that to the 2009 downturn. On the other hand, trends in shares of employment and shares of sales have been more consistent in Taiwan than in several other East Asian economies.

¹³ Data for other surrounding years (1997-1999, 2003-2005) are in the process of being compiled.

2e. Malaysia

Malaysian data also come from industrial surveys and censuses, and are similar to those from Singapore and Hong Kong, but they differ in five important ways. First, although Malaysia was severely affected by the Asian financial crisis, no survey data were published for 1998 and published compilations for 1999 indicate an unusually large number of MNC plants for that year, though reported values for the number of workers and other variables do not diverge much from previous and subsequent trends. Second, there were comprehensive censuses for 2000 and 2005 which means that coverage of the underlying micro data is much better in these years than others. However, the published estimates summarized in Table 5 use stratified sample information to smooth out the various series published. Third, it is only possible to identify MNCs that have ownership shares of 50 percent or more. Fourth, total earnings data are not available but estimates of wages and salaries (usually the vast majority of earnings) are. Fifth, I have used unpublished compilations from the plant-level data for 2000-2004 to estimate export data (Haji Ahmad and Ramstetter 2009) but it appears that coverage of the export data is poorer for 2004 than for other years in the sample.¹⁴

Although smaller than in Singapore, MNC shares have been relatively large in Malaysia where majority-foreign MNCs accounted for roughly one-third to two-fifths of employment and just over one-third to one-half of value added in sample plants in 1995-2008 (Table 5). Difference in shares of employment and value added became rather small in 2006-2008 and similarly small differences were also observed in the late 1980s and early 1990s (Ramstetter 1999, Oguchi et al. 2002). This suggests that average labor productivity in MNCs did not differ much from local plants during these periods. On the other hand, average labor productivity differentials appear to have been relatively large in the late 1990s and in 2000-2005. MNC shares of fixed assets were also smaller than shares of employment in

¹⁴ This is evidenced by the large decline in MNC shares of economy-wide exports of manufactures and the relatively small change in shares of exports by sample plants.

several years (especially in 1999, 2003-2004, 2006) and smaller than shares of value added in all years, indicating that MNCs were on average more labor intensive and had higher average capital productivity than local plants. MNC shares of sample plants tended to be by far the largest in terms of exports, which suggests they depended more on exports than local plants. These characteristics all reflect the important role foreign MNCs continue to play in generally labor-intensive production of electronics-related exports, which are important in Malaysia.

Malaysia is also a very open economy and experienced marked slowdowns in 1998, 2001, and 2009, when per capita GDP declined 9.7, 2.7, and 3.4 percent, respectively. As indicated above, there are no data for 1998 and data for 1999 seem strange in that they contain far more MNC plants than in other years. Correspondingly, increases in MNC shares in 1997-1999 may be related to sampling differences, and it is important to note that 2000 shares were similar to 1997 levels. Meanwhile, in 2001, MNC shares of sample employment and value added rose slightly while shares of economy-wide measures declined. But by 2002 all shares were similar to 2000 levels. Thus, it appears that MNCs increased shares after the Asian financial crisis and while evidence was mixed for the 2001 downturn; however in both cases these changes were only short-term in nature.

2f. Thailand

In Thailand, the only comprehensive data on foreign MNCs come from industrial censuses of manufacturing plants for 1996 and 2006. Comparisons over this period are of interest because Thailand was at the epicenter of the Asian financial crisis and the crisis led to very extensive corporate restructuring, but the lack of annual data makes it difficult to see how foreign MNC shares changed during or after the financial crisis itself.¹⁵ Fortunately, some

¹⁵ Thailand also conducts much smaller surveys periodically between censuses (e.g., 1998, 1999, 2000, 2002), but the published compilations that attempt to calculate consistent totals based on stratified samples do not contain compilations for MNCs or other ownership groups and compilations from the underlying micro data yield totals that are much smaller than census or extrapolated totals (Ramstetter 2009), and thus not comparable.

sense of annual changes can be discerned from data on large firms compiled by Ramstetter (2003) for 1995-2000 (large firm sample 1 in Table 6). There are also similar compilations of alternative samples of large firms for 1996 and 2006 by Kohpaiboon and Ramstetter (2008) that can facilitate some comparisons between the large firm data and the official, plant-level data for these years.

Official plant-level data indicate that total MNC shares fell between 1996 and 2006, and that the fall in the sales share was particularly large.¹⁶ This is in marked contrast to trends in alternative estimates from large firm data, which suggest an increase in the sales share. These contrasting trends may be related to the existence of relatively large, rapidly growing, non-manufacturing operations in large manufacturing firms, which are excluded from the plant-level data but included in the firm-level compilations. However, annual data for the late 1990s suggest that MNC shares of large firm sales initially fell in 1997, but then rose in 1998, 1999, and especially 2000, while shares of employment rose in 1997, fell in 1998, and rebounded again in 1999. Ratios to economy totals showed similar trends. Thus, the large firm samples suggest that MNC shares tended to rise but the plant data suggest they fell overall.

However, both plant- and large firm data indicate that shares of majority-foreign MNCs rose while shares of minority-foreign MNCs fell, though the firm-level data again suggest much larger increases. This reflects the fact that the crisis often forced local, joint-venture partners into bankruptcy, leaving MNCs with a choice between raising ownership shares or letting affiliates go bankrupt. In most cases, MNCs apparently had expectations of a Thai recovery and the financial resources to raise their ownership shares. Changes in Thai policy from 1998, namely the effective removal of foreign ownership restrictions, which were previously among the strictest in Asia (though with many loopholes), were also important in

¹⁶ The Thai data for 1996 include some duplication because several plants belonging to large multi-plant firms apparently reported the same, firm-level information. Removing all but one of each set of duplicates reduces MNC shares from 49 percent of national output to 40 percent (Ramstetter 2001, Appendix Table A6 and Appendix Table 6 below), but the plant-level still suggest a fall in MNC shares over the decade.

this respect.

The plant data also suggest that MNC shares of the number of sample plants was very small and that shares of employment were smaller than shares of value added, output, earnings, and fixed assets. In other words, on average, foreign MNC plants were relatively large and had high average labor productivity, capital intensity, and earnings per worker. In 2006, MNC shares were largest, suggesting relatively high export propensities in that year. On the other hand, the large firm data for 1995-1999 suggest that MNC shares of employment were larger than shares of sales. In other words, sales per employee appeared to be relatively low in MNCs compared to large, local firms. Finally, it is important to note that MNC shares of economy-wide totals were always much smaller than shares of sample plants or large firms, reflecting the fact that the large firm data and the industrial censuses omit a large number of small, predominately local firms and plants.

2g. China

Analysis of the Chinese case is problematic for three important reasons. First, data constraints are severe. In 1998, China did not publish compilations from its large firm survey and this survey differed in important respects before 1998 and afterwards. Published compilations from these surveys also excluded employment through 2003 and value added in several years. Second, estimates of manufacturing totals are often unavailable; value added is only available for 2004-2008, and the manufacturing employment series is only available through 2003. On the other hand, estimates for a slightly broader category, industry (the vast majority of which is manufacturing and includes mining and utilities) are available for several more years and included in Table 7 for reference. There are also good data on exports by ownership category which are useful because the vast majority of Chinese exports are manufactures and the majority of exports have originated in MNCs since 2002. Third, because

China's per capita GDP growth has been consistently high in 1995-2009 (a minimum of 6.7 percent, IMF 2010), it has not experienced a meaningful slowdown during this period. Thus, the discussion of MNC shares and downturns is not very meaningful in the Chinese context.

The Chinese data do highlight a couple of important points, however. First, for 2004-2009, MNC shares of manufacturing or industrial employment were not very different from shares of value added, output, or fixed assets in many years. Correspondingly, the large firm data suggest that average labor productivity, capital intensity, and average capital productivity were similar in MNCs and local, large firms. On the other hand, MNCs tended to be larger by any measure as the MNC share of firms was relatively small. Second, MNC shares of exports (mainly manufacturers), increased rapidly and reached much higher levels than shares of production. This in turn suggests that export propensities have been much larger in MNCs than in local firms in China despite small differences in average factor productivity.

2h. Indonesia

Like Hong Kong and Singapore, Indonesia has a long series of annual industrial surveys and censuses covering medium-large plants with 20 or more employees. However, estimates for MNCs are not published and must be calculated from the underlying micro data. These calculations indicate that MNC shares have been markedly smaller than in other Southeast Asian economies, but not as small as in Japan or Taiwan.

Indonesia came through the 2001 and 2009 downturns without real per capita growth falling below 2 percent. However, the contraction during and after the Asian financial crisis, when real per capita GDP fell 15 percent in 1998 and another 0.7 percent in 1999 (IMF 2010), was far more severe than in any other downturn in the region's large economies during this period. It also experienced relatively low growth of real per capita GDP (under 4 percent) during 2001-2005. Slow growth and steep declines in the value of the rupiah in 1997 (19

percent) and 1998 (71 percent) meant that the current U.S. dollar value of per capita GDP did not recovery to 1996 levels until almost a decade later in 2005.

The sharp contraction in 1998 was accompanied by a rise MNC shares of sample output (measured as production value for Indonesia), while shares of sample employment and value added were unchanged and shares of earnings fell. In 1999, shares of workers, output, and earnings all rose while shares of value added remained constant. Relative to economy-wide totals, MNC shares of employment and value added both rose in 1998, with the increase in the value added share of majority-foreign MNCs being particularly conspicuous. In other words, MNC shares of medium-large plants changed little but shares of total manufacturing production rose because production in small plants excluded from these surveys fell. MNC shares of exports by sample plants also increased conspicuously between 1997 and 1999-2000, but MNC shares of economy-wide exports of manufactures were substantially smaller than shares of sample plants because the coverage of exports reported by sample plants was apparently quite a bit smaller for most years after 1997.

As in many other economies, MNC shares of plants were much smaller than other shares, indicating that MNCs tended to be much larger than local plants on average. MNC shares of employment were also smaller than shares of production (value added or output) and earnings, suggesting that MNCs had relatively high labor productivity and earnings per worker. However, earnings shares were generally lower than value added shares; in other words, MNCs had relatively small labor shares of value added. Export shares exceeded shares of output (and value added) reflecting relatively high export propensities in MNCs.¹⁷

¹⁷ Differentials in export propensities were also much higher in 1999 than in 1993-1997 or 2000, suggesting another aspect of this pattern. However, these differentials were not much different than in 2004 or 2006, and the coverage of the export data was clearly much lower less reliable in 1990-1991 and after 1997 than in 1992-1996, for example (Ramstetter and Takii 2005).

2i. The Philippines

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 the manufacturing output of surveyed firms in 1995.¹⁸ Although I have not been able to access the official, plant-level data, Business World (various years) has published basic data on the Top 1000 firms in the Philippines for many years now and Table 9 summarizes data on MNC sales from that source.

These data show that MNCs have accounted for very large shares of large manufacturing firm sales and the 52 percent share observed in 1995 (Table 9) is comparable with Hill's aforementioned estimate of the MNC share in manufacturing output. There was also a strong upward trend in MNC shares of large firm sales between the late 1990s and 2002-2007. However, ratios of large manufacturing firm sales to manufacturing output (a similar concept) from the industrial surveys used by Hill were quite a bit smaller in 1995-1999, but similar in 2001, 2003, 2005. It appears that this may be the result of reduced coverage in the industrial survey data for the later years. This is evidenced by the fact that ratios of MNC sales to industrial survey estimates of GDP were much larger than corresponding ratios to national accounts' GDP estimates in 2001, 2003, and 2005, but similar in 1995-1999. Thus, although ratios of MNC sales to value added are not meaningful indicators per se, ratios of MNC sales to national accounts-based GDP estimates probably give the best idea of how MNC shares of Philippine manufacturing, including small firms, have changed over time.

¹⁸ 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.

The Philippines also felt the impacts of the three regional downturns, albeit less severely than other economies in Southeast Asia, for example. In 1998 per capita GDP fell 2.8 percent and this was followed by declines of 0.4 percent in 2001 and 0.9 percent in 2009. In 1998, MNC shares of large firm sales and MNC sales-GDP ratios all fell markedly and remained relatively low in 1999 before recovering in 2000. In 2001 and 2002, the reaction was reversed as MNC sales rose markedly relative to large firm sales and GDP. In other words, MNCs apparently reduced sales relatively rapidly during and after the Asian financial crisis but expanded relatively rapidly in 2001.

2j. Vietnam

The Vietnamese story is similar to the Chinese one in two important respects. First, Vietnam has not experienced a major slowdown since MNCs starting investing actively in the early 1990s. Per capita GDP growth did fall to 3.3 percent in 1999 (IMF 2010), which was low enough compared to the period average (more than two standard deviations below the 1992-2010 average of 6.0 percent) to qualify as slowdown according to the definition used in this paper. However, it was clearly a very mild downturn compared to those in other Southeast Asian economies after the Asian financial crisis. Second, partially because Vietnamese policy prohibited FDI until the late 1980s, there has been a rather strong upward trend in MNC shares of the economy since reforms began in the late 1980s. Increases accelerated after the mid-1990s when Vietnam successfully controlled the high inflation that followed the *doi moi* (reform) in the late 1980s and early 1990s. For example, MNC shares of industrial output in manufacturing rose from 18 percent in 1995 to 30 percent in 2000 and then 42 percent in 2008 (Table 10). Importantly, these data suggest that the increase of MNC shares slowed in 1999-2001 after the mild downturn, but then reaccelerated. Between 2000 and 2008, the MNC share of total manufacturing employment also rose sharply from 10 to 26 percent. Notably the

growth of this share does appear to have slowed in 2008, when consumer price inflation rose to 23 percent, but Vietnam still did not experience a meaningful economic downturn as usually understood.

Vietnam is also similar to China in that it compiles and publishes a relative large number of economic indicators by ownership category, including all MNCs and wholly-foreign MNCs. In 1995, wholly-foreign MNCs accounted for a little under half of MNC employment, but this share rose to over three-fourths in 2000 and over 90 percent in 2008 (Table 10). The best source of data on MNCs (and other firms) in Vietnam is the enterprise census that has been conducted annually since 2000 and there was also a less comprehensive economic census in 1994-1995. These censuses probably cover the vast majority of MNC activity, but coverage of local firms, especially, smaller private firms is probably not as comprehensive. These data suggest that MNCs share of firms were relative small; in other words, MNCs were much larger than local firms in all years. They also suggest that MNC shares of sales and fixed assets were larger than share of employment. Thus, MNCs also tended to have relatively high sales per worker and capital intensity. However, by 2007-2008 sales shares and fixed asset shares on the one hand, and employment shares on the other, had fallen, suggesting that these differences became smaller over time. Unfortunately, the census data for recent years appear to have larger coverage problems than for earlier years, so it is difficult to ascertain how much of this trend results from changes in census coverage and how much results from actual changes in MNC shares. Moreover, economy-wide data suggest that MNC shares of output and especially non-oil exports remain relatively high.

3. Conclusions and the Future Research Agenda

This paper has examined trends in the activities of foreign manufacturing MNCs during economic downturns experienced by some of Asia's major economies over the last three

decades. The major finding is that there was no consistent trend in MNC shares of host economy manufacturing among downturns, host economies, or indicators used. Thus, it seems wise to avoid sweeping conclusions about how manufacturing affiliates of foreign MNCs have responded to economic downturns in the region.

On the other hand, there was a stronger tendency for MNC shares of firm or plant numbers and MNC shares of employment to be relatively small compared to shares of production, fixed assets, and especially exports. Where available, shares of earnings also tended to be larger than shares of employment, but smaller than shares of value added. In other words, there is substantial evidence that foreign MNCs tend to be relatively large and have relatively high average labor productivity, earnings per worker, capital intensity, and export propensities, but relatively low labor shares of value added in these economies and the choice of the variable used to measure MNC shares is thus important. It is also important to understand how the results of this aggregate analysis compare to results of the growing micro literature that examine firm- or plant-level determinants of productivity, wages, capital intensity, and export propensities, for example.

There is also substantial variation in MNC shares among manufacturing industries, which has been ignored here. For example, MNC shares tend to be much larger in chemicals, electronics-related industries, and motor vehicles than in most other manufacturing industries. Given the important role of electronics-related manufacturing in the 2001 downturns in Singapore, Malaysia, and Taiwan, for example, it would be enlightening to further scrutinize the relationships among these MNCs and economic downturns. Also, it would be quite interesting to perform further microanalyses of how a firm or plant's ownership relates to its chance of survival during periods of economic downturn, though data constraints often confound such attempts.

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Table 1: Indicators for Foreign MNCs in Singaporean Manufacturing

Year	All MNCs (1%+ share)							Majority-foreign MNCs						
	Wor- kers	Value added	Out- put	Earn- ings	Fixed assets	Direct export	Plants	Wor- kers	Value added	Out- put	Earn- ings	Fixed assets	Direct export	Plants
Foreign MNCs (thousands of workers, no. of plants, US\$ billions for other variables)														
1995	248	15.80	67.59	5.44	14.91	44.73	1,164	203	13.69	61.12	4.36	12.65	41.81	858
1996	237	16.43	71.44	5.47	16.15	47.97	1,140	197	14.40	64.75	4.47	12.64	44.51	850
1997	233	16.39	71.57	5.50	17.72	47.73	1,144	193	14.45	64.87	4.51	14.77	44.50	872
1998	222	14.62	61.31	4.87	18.18	42.33	1,092	178	12.97	56.07	3.95	15.20	39.84	833
1999	205	17.43	66.86	4.50	18.78	46.78	1,057	168	15.60	61.31	3.69	16.01	43.85	819
2000	206	18.82	81.35	4.95	20.24	50.58	1,042	164	16.46	74.70	3.99	16.67	47.15	806
2001	204	14.26	65.46	4.81	21.97	43.70	1,050	166	12.81	60.61	3.95	18.64	41.37	828
2002	195	16.33	69.71	4.71	22.70	45.44	1,083	160	14.76	64.50	3.89	19.49	42.76	862
2003	189	17.18	77.80	4.81	22.16	52.61	1,049	155	15.50	72.70	3.96	19.10	50.35	817
2004	194	22.44	96.37	5.17	24.56	63.72	1,039	158	19.78	86.44	4.22	20.77	58.46	814
2005	197	23.13	109.83	5.49	23.74	72.53	984	161	20.27	97.97	4.46	19.97	66.10	768
2006	194	28.02	127.22	5.96	26.45	79.26	985	162	25.02	114.71	4.91	22.25	72.51	786
2007	195	29.34	140.49	6.62	27.86	87.39	975	168	26.35	127.32	5.61	24.03	80.65	797
2008	192	24.28	154.73	7.28	27.46	103.98	963	163	21.69	138.82	6.15	23.60	95.90	783
2009	176	24.38	126.30	6.60	28.23	89.90	950	157	22.88	116.98	5.89	27.08	85.58	784
Foreign MNC shares of sample totals (%)														
1995	67	83	85	72	80	92	29	55	72	76	58	68	86	21
1996	65	82	84	69	78	93	28	54	72	76	56	61	86	21
1997	64	82	84	68	80	93	28	53	72	76	56	67	86	21
1998	63	83	85	69	81	94	27	50	73	77	56	68	88	21
1999	61	85	85	68	81	93	27	50	76	78	56	69	87	21
2000	60	83	86	69	83	93	26	48	73	79	55	68	87	20
2001	59	80	85	68	84	93	26	48	72	79	56	72	88	20
2002	55	80	85	65	82	92	13	45	73	78	54	71	87	10
2003	54	81	85	65	82	93	12	44	73	80	53	71	89	10
2004	54	82	85	65	84	92	12	44	72	76	53	71	85	9
2005	53	79	84	64	84	90	12	44	69	75	52	71	82	10
2006	51	82	85	62	85	89	12	42	73	77	51	72	82	10
2007	48	79	84	60	84	86	12	42	71	76	51	72	80	10
2008	44	73	83	58	84	88	11	37	65	74	49	72	81	9
2009	42	73	81	57	84	87	10	38	69	75	51	80	83	8
Foreign MNC shares of economy totals (%)														
1995	64	73	-	-	-	77	-	53	63	-	-	-	72	-
1996	58	73	-	-	-	80	-	49	64	-	-	-	74	-
1997	56	73	-	-	-	80	-	47	65	-	-	-	74	-
1998	55	75	-	-	-	79	-	44	66	-	-	-	74	-
1999	52	89	-	-	-	80	-	42	80	-	-	-	75	-
2000	47	76	-	-	-	79	-	38	66	-	-	-	74	-
2001	47	70	-	-	-	83	-	39	63	-	-	-	79	-
2002	46	74	-	-	-	85	-	38	67	-	-	-	80	-
2003	45	75	-	-	-	76	-	37	67	-	-	-	73	-
2004	43	76	-	-	-	77	-	35	67	-	-	-	71	-
2005	41	72	-	-	-	80	-	34	63	-	-	-	73	-
2006	37	76	-	-	-	77	-	31	67	-	-	-	71	-
2007	34	72	-	-	-	79	-	30	65	-	-	-	73	-
2008	33	65	-	-	-	97	-	28	58	-	-	-	89	-
2009	32	73	-	-	-	96	-	29	68	-	-	-	91	-

Note: Economy total exports estimated as the sum of SITC sections 5-9 of domestic exports (excluding re-exports).

Sources: Singapore, Department of Statistics (various years); Singapore, Economic Development Board (various years), Singapore, Ministry of Manpower (2010); World Bank (2010).

Table 2: Indicators for Foreign MNCs in Japanese Manufacturing

Year	All MNCs (33%+ share)						Majority-foreign MNCs					
	Wor- kers	Value added	Sales	Earn- ings	Ex- ports	Firms	Wor- kers	Value added	Sales	Earn- ings	Ex- ports	Firms
Foreign MNCs (thousands of workers, no. of plants, US\$ billions for other variables)												
1995	163	43.75	126.76	12.93	16.80	452	-	-	105.09	-	-	-
1996	165	36.82	107.49	10.54	16.14	478	-	-	88.50	-	-	-
1997	172	36.08	106.96	9.89	15.75	516	-	-	93.89	-	-	-
1998	241	35.84	94.98	8.98	18.41	526	-	-	82.74	-	-	-
1999	230	46.98	143.82	14.09	42.84	508	-	-	126.64	-	-	-
2000	240	55.65	170.23	17.27	44.73	518	-	-	125.45	-	-	-
2001	232	47.16	144.20	14.25	37.91	534	166	36.54	105.86	10.32	24.94	474
2002	202	45.06	130.50	12.08	36.20	552	136	33.89	91.07	8.53	20.76	494
2003	236	55.70	166.50	15.70	40.88	596	179	45.31	127.69	11.98	26.96	539
2004	229	58.55	173.53	17.26	37.66	639	186	50.12	142.49	14.40	30.84	585
2005	221	58.76	177.32	16.15	35.29	640	186	51.74	150.47	13.81	30.85	584
2006	225	51.76	178.22	12.22	38.17	631	193	44.65	147.76	10.11	32.19	572
2007	232	50.37	190.57	11.99	44.35	635	200	43.20	158.12	9.96	34.34	579
2008	195	-	198.25	-	38.37	525	148	-	154.38	-	35.88	476
Foreign MNC shares of corporations (%)												
1995	1.5	2.8	3.1	1.9	-	0.3	-	-	2.6	-	-	-
1996	1.6	2.7	2.8	1.8	-	0.3	-	-	2.3	-	-	-
1997	1.6	2.8	3.2	1.8	-	0.2	-	-	2.8	-	-	-
1998	2.2	3.2	3.3	1.8	-	0.2	-	-	2.9	-	-	-
1999	2.1	3.6	4.2	2.4	-	0.2	-	-	3.7	-	-	-
2000	2.4	4.0	4.6	3.0	-	0.2	-	-	3.4	-	-	-
2001	2.3	4.1	4.7	2.8	-	0.2	1.7	3.2	3.4	2.0	-	2.7
2002	2.2	4.1	4.4	2.6	-	0.2	1.5	3.1	3.1	1.9	-	3.0
2003	2.5	4.6	5.0	3.2	-	0.3	1.9	3.8	3.9	2.4	-	3.6
2004	2.5	4.5	4.6	3.3	-	0.3	2.0	3.9	3.8	2.8	-	4.0
2005	2.4	4.6	4.6	3.2	-	0.3	2.0	4.0	3.9	2.7	-	4.2
2006	2.4	4.1	4.6	2.5	-	0.3	2.1	3.5	3.8	2.1	-	4.3
2007	2.4	3.9	4.7	2.4	-	0.3	2.1	3.4	3.9	2.0	-	4.6
2008	2.1	-	4.9	-	-	0.3	1.6	-	3.8	-	-	3.9
Foreign MNC shares of economy totals (economy-wide data refer to output used instead of sales, %)												
1995	1.1	3.6	3.9	2.0	3.9	-	-	-	3.2	-	-	-
1996	1.2	3.4	3.7	1.8	4.0	-	-	-	3.1	-	-	-
1997	1.2	3.7	4.0	1.9	3.8	-	-	-	3.5	-	-	-
1998	1.8	4.1	4.1	1.9	4.8	-	-	-	3.5	-	-	-
1999	1.7	4.9	5.6	2.7	10.4	-	-	-	5.0	-	-	-
2000	1.8	5.4	6.1	3.1	9.5	-	-	-	4.5	-	-	-
2001	1.8	5.5	6.1	3.0	9.6	-	1.3	4.3	4.5	2.1	6.3	-
2002	1.7	5.6	5.9	2.7	8.8	-	1.1	4.2	4.1	1.9	5.1	-
2003	2.0	6.3	6.9	3.4	8.8	-	1.5	5.1	5.3	2.6	5.8	-
2004	2.0	6.0	6.4	3.4	6.8	-	1.6	5.1	5.2	2.9	5.6	-
2005	1.9	6.0	6.3	3.3	6.1	-	1.6	5.3	5.4	2.8	5.3	-
2006	1.9	5.6	6.3	2.6	6.1	-	1.7	4.8	5.3	2.1	5.1	-
2007	2.0	5.4	6.6	2.6	6.4	-	1.7	4.7	5.5	2.1	5.0	-
2008	1.7	-	5.9	-	-	-	1.3	-	4.6	-	-	-

Sources: International Monetary Fund (2011); Japan, Cabinet Office (2011), Japan, Ministry of Finance (2011); Japan, Ministry of Economy, Trade, and Industry (various years); Japan, Statistics Bureau (2011); United Nations (2011).

Table 3: Indicators for Foreign MNCs in Hong Kong Manufacturing

Year	All MNCs (1%+ share)					Majority-foreign MNCs				
	Wor- kers	Value added	Out- put	Earn- ings	Plants	Wor- kers	Value added	Out- put	Earn- ings	Plants
Foreign MNCs (thousands of workers, no. of plants, US\$ billions for other variables)										
1995	57.565	2.690	10.237	1.268	526	51.536	2.424	9.343	1.124	422
1996	52.012	2.611	9.167	1.237	500	46.026	2.346	8.359	1.094	417
1997	47.656	2.854	8.949	1.292	445	42.382	2.585	8.188	1.152	352
1998	41.697	2.570	8.682	1.188	375	37.461	2.368	8.122	1.069	328
1999	32.001	1.878	6.974	0.931	293	28.046	1.670	6.427	0.817	230
2000	34.195	2.006	7.569	0.946	361	27.418	1.643	6.694	0.770	282
2001	32.818	1.633	6.313	0.949	341	27.633	1.451	5.753	0.818	302
2002	24.182	1.405	4.788	0.718	253	20.375	1.221	4.263	0.612	234
2003	24.328	1.319	5.050	0.717	276	21.054	1.168	4.527	0.636	201
2004	24.638	1.277	5.209	0.716	195	20.820	1.107	4.730	0.611	153
2005	22.105	1.258	6.050	0.615	221	17.038	1.047	5.180	0.508	137
2006	21.276	1.309	7.445	0.615	391	17.572	1.139	6.823	0.527	122
2007	20.999	1.250	7.321	0.569	372	18.583	0.991	5.478	0.438	347
2008	29.186	1.324	10.396	0.845	411	27.940	1.281	10.328	0.815	409
Foreign MNC shares of sample totals (%)										
1995	16	25	26	20	2	14	22	24	18	2
1996	16	24	25	21	2	14	22	23	19	2
1997	16	28	26	22	2	15	25	24	20	1
1998	17	28	29	23	2	15	26	27	21	1
1999	14	22	26	20	1	13	20	24	18	1
2000	16	22	26	21	2	13	18	23	17	1
2001	17	21	25	22	2	14	18	23	19	2
2002	13	21	22	18	2	11	18	19	15	1
2003	14	22	25	20	2	12	19	23	18	1
2004	15	21	26	21	1	12	18	23	18	1
2005	13	21	29	18	2	10	17	25	15	1
2006	14	21	34	18	3	12	18	31	15	1
2007	14	22	35	18	3	13	18	26	14	3
2008	21	24	46	26	3	20	24	46	25	3
Foreign MNC shares of economy totals (%)										
1995	11	28	-	-	-	10	26	-	-	-
1996	11	28	-	-	-	9	25	-	-	-
1997	11	31	-	-	-	10	29	-	-	-
1998	11	32	-	-	-	10	30	-	-	-
1999	9	25	-	-	-	8	23	-	-	-
2000	10	26	28	23	-	8	21	25	19	-
2001	10	24	27	25	-	8	21	24	21	-
2002	8	24	24	21	-	7	21	21	18	-
2003	9	27	27	23	-	8	24	25	21	-
2004	11	26	28	24	-	9	22	26	20	-
2005	10	25	31	21	-	8	21	27	18	-
2006	10	26	37	22	-	8	23	34	19	-
2007	10	31	39	23	-	9	24	30	17	-
2008	17	33	51	32	-	16	32	51	31	-

Sources: Asian Development Bank (various years); Hong Kong, Census and Statistics Department (2011; various years).

Table 4: Revenues and Employment of Large, Majority-Foreign MNCs in Manufacturing in Taiwan

Year	Large MNCs, number	MNC shares of large firm numbers	Large MNC workers, thousands	MNC shares of employment, %		Large MNC sales, US\$ billions	MNC shares of revenues or output, %	
				Industrial & commercial census estimates	Labor force survey estimates		Industrial & commercial census estimates	National accounts' estimates
1996	173	8.58	95.80	3.79	3.94	19.80	6.83	7.41
2000	208	8.18	96.42	-	3.62	29.09	-	9.54
2001	185	7.10	80.57	3.33	3.11	20.26	6.53	7.96
2002	179	7.11	72.11	-	2.80	20.65	-	7.55
2006	225	8.31	93.97	3.49	3.38	34.17	5.42	7.68
2007	208	7.61	93.02	-	3.27	34.41	-	7.21
2008	212	7.77	84.86	-	2.94	31.11	-	6.33
2009	205	7.65	87.68	-	3.14	27.61	-	7.06

Note: The large firm data identified refer to revenues of MNCs in the largest firms; in some cases the author has reclassified MNCs which the source classified as non-manufacturers as manufacturers based on information from surrounding years, Toyo Keizai (various years), and corporate home pages.

Sources: MNC data refer to large manufacturers included in China Credit Information Service (various years); industrial and commercial census and labor force survey estimates from Republic of China, Directorate-General of Budget Accounting and Statistics (various years, 2011), exchange rates from Asian Development Bank (various years).

Table 5: Indicators for Majority-Foreign MNCs in Malaysian Manufacturing (ownership shares of 50% or greater)

Year	Workers	Value added	Output	Wages & salaries	Fixed assets	Plants	Exports
Majority foreign MNCs (thousands of workers, no. of plants, US\$ billions for other variables)							
1995	527	9.92	45.13	2.65	14.77	1,507	-
1996	555	12.41	50.46	3.21	17.38	1,474	-
1997	558	12.61	50.07	3.12	12.17	1,866	-
1998	-	-	-	-	-	-	-
1999	570	11.67	50.76	2.64	13.87	2,949	-
2000	601	12.34	58.29	2.92	16.53	1,696	41.32
2001	548	11.33	53.78	2.91	17.61	1,766	36.44
2002	572	12.58	60.14	3.08	18.19	1,981	39.68
2003	575	13.77	66.06	3.17	16.59	1,791	43.77
2004	608	15.84	76.28	3.46	17.65	1,870	32.07
2005	551	11.69	75.15	3.29	16.92	1,602	-
2006	617	13.22	87.88	4.00	18.10	1,636	-
2007	606	14.95	93.79	4.39	18.35	1,822	-
2008	577	16.32	93.81	4.60	18.78	1,732	-
Majority-foreign MNC shares of sample totals (%)							
1995	38	42	46	40	38	7	-
1996	38	44	46	42	39	7	-
1997	40	45	47	43	37	8	-
1998	-	-	-	-	-	-	-
1999	42	51	53	47	37	13	-
2000	38	44	50	42	38	8	69
2001	39	45	52	45	42	9	68
2002	38	44	50	43	39	10	69
2003	38	43	49	43	34	9	72
2004	39	44	48	43	36	10	61
2005	33	37	43	38	33	6	-
2006	36	37	45	42	33	5	-
2007	34	36	43	39	33	6	-
2008	33	35	38	38	32	5	-
Majority-foreign MNC shares of economy totals (%)							
1995	30	42	-	-	-	-	-
1996	29	44	-	-	-	-	-
1997	28	44	-	-	-	-	-
1998	-	-	-	-	-	-	-
1999	29	48	-	-	-	-	-
2000	28	43	-	-	-	-	51
2001	25	42	-	-	-	-	51
2002	28	43	-	-	-	-	52
2003	27	42	-	-	-	-	53
2004	30	42	-	-	-	-	33
2005	28	29	-	-	-	-	-
2006	30	29	-	-	-	-	-
2007	31	29	-	-	-	-	-
2008	30	28	-	-	-	-	-

Note: Total manufactured exports defined narrowly (SITC 5-9) and exclude many food- and resource-based manufactures..

Sources: Malaysia, Department of Statistics (2010, various years a, various years b); Haji Ahmad and Ramstetter (2009).

Table 6: Indicators for Foreign MNCs in Thai Manufacturing

Year	All MNCs (1%+ share)							Majority-foreign MNCs						
	Wor- kers	Value added	Out- put, sales	Earn- ings	Fixed assets	Ex- ports	Plants, Firms	Wor- kers	Value added	Out- put, sales	Earn- ings	Fixed assets	Ex- ports	Plants, Firms
Foreign MNC Plants (thousands of workers, no. of plants, US\$ billions for other variables)														
1996	947	19.44	75.75	4.41	36.77	-	2,746	403	7.36	31.28	1.90	15.58	-	990
2006	944	16.80	80.60	3.61	35.42	36.15	2,657	639	13.33	54.40	2.51	24.17	28.26	1,437
Foreign MNC Plants, shares of sample totals (%)														
1996	39	49	54	48	53	-	8	16	19	22	21	22	-	3
2006	25	40	43	33	42	55	4	17	32	29	23	28	43	2
Foreign MNC Plants, shares of economy totals (%)														
1996	22	34	49	-	-	-	-	9	13	20	-	-	-	-
2006	17	23	37	-	-	32	-	12	18	25	-	-	25	-
Foreign MNCs, Large Firm Sample 1 (thousands of workers, no. of plants, US\$ billions for other variables)														
1996	-	-	53.83	-	23.15	-	479	-	-	31.92	-	11.11	-	244
2006	-	-	119.81	-	26.48	-	501	-	-	89.89	-	19.25	-	346
Foreign MNC, Large Firm Sample 1, shares of sample totals (%)														
1996	-	-	58	-	47	-	44	-	-	34	-	23	-	22
2006	-	-	69	-	58	-	56	-	-	52	-	42	-	39
Foreign MNCs, Large Firm Sample 1, shares of economy totals (%)														
1996	-	-	35	-	22	-	-	-	-	21	-	11	-	-
2006	-	-	55	-	16	-	-	-	-	41	-	11	-	-
Foreign MNCs, Large Firm Sample 2 (thousands of workers, no. of plants, US\$ billions for other variables)														
1995	256	-	48.28	-	-	-	682	-	-	-	-	-	-	-
1996	425	-	56.24	-	-	-	775	-	-	-	-	-	-	-
1997	463	-	36.22	-	-	-	405	-	-	-	-	-	-	-
1998	479	-	36.12	-	-	-	426	-	-	-	-	-	-	-
1999	550	-	42.37	-	-	-	464	-	-	-	-	-	-	-
2000	-	-	54.66	-	-	-	530	-	-	-	-	-	-	-
Foreign MNCs, Large Firm Sample 2, shares of sample totals (%)														
1995	55	-	50	-	-	-	41	-	-	-	-	-	-	-
1996	61	-	52	-	-	-	41	-	-	-	-	-	-	-
1997	64	-	49	-	-	-	41	-	-	-	-	-	-	-
1998	63	-	53	-	-	-	46	-	-	-	-	-	-	-
1999	69	-	57	-	-	-	46	-	-	-	-	-	-	-
2000	-	-	61	-	-	-	47	-	-	-	-	-	-	-
Foreign MNCs, Large Firm Sample 2, shares of economy totals (%)														
1995	6	-	34	-	-	-	-	-	-	-	-	-	-	-
1996	10	-	37	-	-	-	-	-	-	-	-	-	-	-
1997	11	-	28	-	-	-	-	-	-	-	-	-	-	-
1998	11	-	36	-	-	-	-	-	-	-	-	-	-	-
1999	13	-	38	-	-	-	-	-	-	-	-	-	-	-
2000	-	-	46	-	-	-	-	-	-	-	-	-	-	-

Note: Economy total exports are as defined by Bank of Thailand (various years).

Sources: Bank of Thailand (2011), Thailand, National Statistical Office (various years), Thailand, National Economic Social and Development Board (2010a, 2010b), Kohpaiboon and Ramstetter (2008)-large firm sample 1, Ramstetter (2003)-large firm sample 2.

Table 7: Indicators for Foreign MNCs in Chinese Manufacturing and Industry

Year	Large manufacturing firms					Large industrial firms			Total Ex-ports
	Wor- kers	Value added	Output	Fixed assets	Firms	Wor- kers	Value added	Output	
Foreign MNCs (thousands of workers, no. of firms, US\$ billions for other variables)									
1995	-	29	123	-	-	-	31	128	47
1996	-	32	137	-	-	-	34	144	62
1997	-	39	163	-	-	-	43	172	75
1998	-	-	-	-	-	-	-	202	81
1999	-	53	216	91	25,306	-	59	229	89
2000	-	66	267	99	26,786	-	74	283	119
2001	-	77	309	110	29,600	-	86	329	133
2002	-	93	368	-	32,437	-	104	392	170
2003	1,244	130	516	139	38,048	12.59	140	536	240
2004	1,429	-	711	165	42,189	14.44	184	711	339
2005	1,877	233	940	227	55,597	19.00	250	975	444
2006	2,094	302	1,217	287	60,016	21.18	320	1,255	564
2007	2,324	399	1,628	366	66,490	23.53	422	1,678	695
2008	2,546	-	2,085	470	76,674	25.79	-	2,156	790
2009	2,419	-	2,165	514	74,200	24.50	-	2,235	672
Foreign MNC shares of sample totals (%)									
1995	-	20	21	-	11	-	17	19	-
1996	-	17	20	-	9	-	16	19	-
1997	-	21	23	-	10	-	18	23	-
1998	-	-	-	-	-	-	-	25	-
1999	-	27	28	23	18	-	22	26	-
2000	-	28	30	24	19	-	24	27	-
2001	-	29	31	26	19	-	25	29	-
2002	-	30	31	-	20	-	26	29	-
2003	-	32	34	28	21	-	28	31	-
2004	27	-	31	29	21	24	28	31	-
2005	32	33	35	32	22	28	28	32	-
2006	33	33	35	33	21	29	28	32	-
2007	34	32	35	34	21	30	27	31	-
2008	33	-	33	33	19	29	-	30	-
2009	31	-	31	31	18	28	-	28	-
Foreign MNC shares of economy totals (%)									
1995	-	-	-	-	-	-	10	-	32
1996	-	-	-	-	-	-	10	-	41
1997	-	-	-	-	-	-	11	-	41
1998	-	-	-	-	-	-	-	-	44
1999	-	-	-	-	-	-	14	-	45
2000	-	-	-	-	-	-	15	-	48
2001	-	-	-	-	-	-	16	-	50
2002	-	-	-	-	-	-	18	-	52
2003	14	-	-	-	-	8	21	-	55
2004	-	-	-	-	-	9	23	-	57
2005	-	32	-	-	-	11	27	-	58
2006	-	34	-	-	-	11	28	-	58
2007	-	35	-	-	-	11	29	-	57
2008	-	-	-	-	-	12	-	-	55
2009	-	-	-	-	-	11	-	-	56

Note: Industry includes mining, manufacturing, & utilities; using a narrow definition (SITC 5-9) that excludes many food- and resource-based manufactures, shares of manufactures in total exports rose from 85-87% in 1995-1997 to 95% percent in 2006-2009.

Sources: China, National Bureau of Statistics (various years).

Table 8: Indicators for Foreign MNCs in Indonesian Manufacturing

Year	All MNCs (1%+ share)						Majority-foreign MNCs					
	Wor- kers	Value added	Out- put	Earn- ings	Ex- ports	Plants	Wor- kers	Value added	Out- put	Earn- ings	Ex- ports	Plants
Foreign MNCs (thousands of workers, no. of plants, US\$ billions for other variables)												
1995	715	9.49	23.42	2.17	7.45	1,198	570	6.93	18.06	1.76	6.37	978
1996	768	12.15	29.02	2.78	10.33	1,321	594	8.31	21.13	2.30	8.17	1,092
1997	781	10.20	22.34	3.37	6.99	1,416	639	8.34	18.89	2.79	5.84	1,210
1998	789	5.40	12.85	1.11	-	1,567	664	4.39	10.71	0.91	-	1,363
1999	865	8.52	21.09	1.25	5.90	1,707	730	6.88	17.37	1.03	5.09	1,498
2000	932	10.71	27.88	1.32	7.48	1,754	792	8.52	21.85	1.08	6.56	1,544
2001	941	8.87	23.29	1.37	-	1,710	804	6.29	18.76	1.16	-	1,506
2002	930	11.05	30.39	1.35	-	1,669	796	7.61	22.46	1.13	-	1,489
2003	987	13.79	33.34	2.61	-	1,766	848	11.49	28.29	2.34	-	1,571
2004	964	14.33	36.73	1.70	8.57	1,686	816	12.04	31.48	1.46	7.85	1,505
2005	978	15.04	37.39	1.74	-	1,681	849	12.65	31.91	1.54	-	1,512
2006	1,161	22.28	53.05	2.40	18.40	2,154	1,018	19.27	45.61	2.04	16.61	1,948
2007	1,197	24.97	58.35	2.42	-	2,179	1,073	21.45	50.70	2.18	0.00	1,976
2008	1,274	34.63	81.66	3.10	16.44	2,206	1,161	31.37	73.51	2.76	15.37	2,009
Foreign MNC shares of sample totals (%)												
1995	17	29	29	26	33	6	14	21	22	21	28	5
1996	18	31	30	23	37	6	14	21	22	19	29	5
1997	19	35	31	32	38	6	15	29	26	27	32	5
1998	19	35	33	30	-	7	16	28	27	25	-	6
1999	20	35	34	32	46	8	17	28	28	27	40	7
2000	21	38	37	30	42	8	18	30	29	25	37	7
2001	21	34	33	27	-	8	18	24	27	23	-	7
2002	21	33	32	27	-	8	18	23	24	23	-	7
2003	23	36	34	37	-	9	20	30	29	33	-	8
2004	22	36	33	29	45	8	19	30	29	25	42	7
2005	23	37	33	29	-	8	20	31	28	26	-	7
2006	24	40	38	30	50	7	21	34	32	25	45	7
2007	26	38	34	31	-	8	23	33	30	28	-	7
2008	29	47	41	36	46	9	26	42	37	32	43	8
Foreign MNC shares of economy totals (%)												
1995	7	19	-	-	31	-	6	14	-	-	27	-
1996	7	21	-	-	39	-	6	14	-	-	31	-
1997	7	18	-	-	23	-	6	14	-	-	20	-
1998	8	23	-	-	-	-	7	18	-	-	-	-
1999	8	23	-	-	21	-	6	19	-	-	18	-
2000	8	23	-	-	20	-	7	19	-	-	18	-
2001	8	18	-	-	-	-	7	13	-	-	-	-
2002	8	20	-	-	-	-	7	14	-	-	-	-
2003	9	21	-	-	-	-	7	17	-	-	-	-
2004	9	20	-	-	23	-	7	17	-	-	21	-
2005	8	19	-	-	-	-	7	16	-	-	-	-
2006	10	22	-	-	38	-	9	19	-	-	34	-
2007	10	21	-	-	-	-	9	18	-	-	-	-
2008	10	24	-	-	28	-	9	22	-	-	26	-

Note: Economy total exports estimated as the sum of SITC sections 5-9 of domestic exports (excluding re-
Sources: Singapore, Department of Statistics (various years); Singapore, Economic Development Board
(various years), Singapore, Ministry of Manpower (2010); World Bank (2010).

Table 9: Revenues of Large Foreign MNCs in Manufacturing and Other Major Industries in the Philippines

Year	MNC sales, US\$ billions	MNC sales/ large firm sales, %	MNC sales/ gross output (industrial survey estimates), %	MNC sales/ GDP (industrial survey estimates), %	MNC sales/ GDP (national accounts estimates), %
1995	15.99	52	41	104	94
1996	20.61	58	45	108	109
1997	22.37	59	49	118	122
1998	15.94	50	40	97	112
1999	18.73	56	42	108	114
2000	23.51	63	-	-	139
2001	23.90	68	65	199	147
2002	27.84	74	-	-	157
2003	29.68	73	71	286	160
2004	31.66	73	-	-	158
2005	35.18	79	67	283	153
2006	38.20	74	-	-	142
2007	44.57	79	-	-	141
2008	36.26	59	-	-	97

Note: Data refer to revenues of MNCs in the Top 1000 firms for each year from the source.

Sources: Business World (various years); Asian Development Bank (various years); UNIDO (2010).

Table 10: Indicators for Foreign MNCs in Vietnamese Manufacturing and Non-oil Exports

Year	Enterprise survey data, firms with positive sales & workers								Economy-wide	
	All MNCs				Wholly-foreign MNCs				Mfg. output	Non-oil Exports
	Workers	Sales	Fixed assets	Firms	Workers	Sales	Fixed assets	Firms		
Foreign MNCs (thousands of workers, no. of firms, US\$ billions for other variables)										
1995	74	0.65	-	382	33	-	-	124	-	-
1996	-	-	-	-	-	-	-	-	2.18	-
1997	-	-	-	-	-	-	-	-	2.84	-
1998	-	-	-	-	-	-	-	-	3.39	-
1999	-	-	-	-	-	-	-	-	3.94	-
2000	356	7.18	5.07	1,035	275	3.77	2.39	691	5.62	-
2001	431	7.94	5.08	1,253	345	4.24	2.62	910	6.58	-
2002	622	9.84	5.54	1,619	509	5.42	3.17	1,231	8.04	-
2003	782	12.62	5.98	1,930	655	7.24	3.69	1,517	10.70	-
2004	959	16.27	6.94	2,287	826	10.22	4.60	1,866	13.95	-
2005	1,110	19.61	8.04	2,516	973	12.83	5.69	2,100	18.70	11.13
2006	1,329	25.15	10.19	2,972	1,178	17.28	7.46	2,543	24.15	14.54
2007	1,518	32.15	12.15	3,273	1,353	21.91	9.21	2,842	30.86	19.36
2008	1,682	41.20	15.05	3,922	1,524	29.33	11.78	3,469	41.28	24.46
2009	-	-	-	-	-	-	-	-	-	23.64
2010	-	-	-	-	-	-	-	-	-	33.88
Foreign MNC shares of sample totals (%)										
1995	7	11	-	4	3	-	-	1	-	-
2000	22	41	64	10	17	22	30	7	-	-
2001	24	39	62	11	19	21	32	8	-	-
2002	29	42	58	11	23	23	33	9	-	-
2003	31	43	56	12	26	25	34	9	-	-
2004	34	44	53	11	29	28	35	9	-	-
2005	37	44	55	11	32	29	39	9	-	-
2006	41	47	53	11	36	32	39	10	-	-
2007	41	45	50	11	37	31	38	9	-	-
2008	43	45	50	10	39	32	39	9	-	-
MNC shares of economy totals (% , in 1994 prices for manufacturing output)										
1995	-	-	-	-	-	-	-	-	18	-
1996	-	-	-	-	-	-	-	-	20	-
1997	-	-	-	-	-	-	-	-	23	-
1998	-	-	-	-	-	-	-	-	26	-
1999	-	-	-	-	-	-	-	-	28	-
2000	10	-	-	-	8	-	-	-	30	-
2001	11	-	-	-	9	-	-	-	30	-
2002	15	-	-	-	12	-	-	-	32	-
2003	17	-	-	-	14	-	-	-	33	-
2004	20	-	-	-	17	-	-	-	33	-
2005	21	-	-	-	18	-	-	-	36	46
2006	23	-	-	-	21	-	-	-	38	48
2007	25	-	-	-	22	-	-	-	40	50
2008	26	-	-	-	23	-	-	-	41	48
2009	-	-	-	-	-	-	-	-	42	48
2010	-	-	-	-	-	-	-	-	-	52

Note: A broad (ISIC-based, including many food- and resource-based manufactures) definition of manufactured exports amounted to 66-71% of the non-oil total in 2005-2008.

Sources: Vietnam, General Statistics Office (1998, various years a, various years b, various years c).