Resource and Labor Cost Differentials between Japan and Asian Host Economies and Location Decisions of Japan's Manufacturing Multinationals

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Abstract

After a brief review of relevant literature, this paper uses survey data collect by JETRO (various years) to examine the extent of labor and energy cost differentials between Japan and major Asian hosts to Japan's manufacturing multinational enterprises (MNEs) in recent years. The comparisons reveal large differences in nominal labor costs, but these differences are often offset by similarly large differences in labor productivity. In other words, differences in productivity adjusted labor costs are generally rather modest, suggesting that they exert only a limited influence on location decisions by most of Japan's manufacturing MNEs. Differences in resource (energy and water) costs are also relatively small, again suggesting that these differences, as well as related differences in the stringency of environmental policy, are also likely to exert a modest influence on location choice. The fact that labor costs and resource costs account for much smaller shares of total costs or output than costs of materials and parts, for example, is another reason to expect that energy and labor-cost differentials exert only a mild influence on location decisions in most cases. This conclusion is broadly consistent with the previous literature on location choice by MNEs, which usually indicates that demand-side factors such as host market size, as well as agglomeration-related reductions in transaction costs, are of more consequence for location choice than resource or labor costs.

Keywords: multinational enterprise, manufacturing, location choice, labor costs, resource costs
JEL Categories: F23, J31, L60, O53, Q40
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1. Introduction

This primary purpose of this paper is to document the scope of differences in energy, water, and labor costs in the manufacturing industries of major Asian hosts to Japan's manufacturing multinational enterprises (MNEs). The paper's methodology is descriptive rather than statistically rigorous and designed to provide insight into the scope of price differentials facing Japan's manufacturing MNEs investing in the region. It relies primarily on data from annual surveys of investment-related costs in Asian economies by JETRO (Japan External Trade Organization, various years), comparing these data with actual distributions of Japanese MNE sales from METI (Ministry of Economy, Trade and Industry, various years). This simplistic analysis cannot definitively establish the importance or lack of importance for the costs examined. However, it does permit a detailed look at the scope of actual differences in these costs among host economies and provides insights into how location decisions by Japan's manufacturing MNEs are likely to be influenced by these cost differentials. The paper begins with a brief review of the literature on MNE location decisions and how it relates to the current distribution of Japanese affiliate sales in Asian manufacturing (Section 2). It then examines differences in labor and resource costs (Sections 3-4). The final section (5) concludes.

2. MNE Location Choice and the Role of Labor and Energy Costs: A Brief Review

The empirical literature on MNE location choice has often been inconsistent with the predictions of theory, especially the hypothesis that MNEs tend to invest capital where rates of return are relatively high and source it where returns are relatively low. This capital arbitrage hypothesis has long been discredited in the empirical literature because it fails to explain the concentration of MNE activity in relatively large and relatively high income

economies, with similar rates of return to capital. This failure inspired important advances in the theory of the MNE by Hymer (1960) and many thereafter.[1]

However, in recent years, the concentration of MNE activity in large, relatively rich economies is increasingly a statistical artifact, primarily because of increased economic integration in the European Union (EU). Intra-EU flows of foreign direct investment (FDI) are large, and substantial portions of intra-EU flows are difficult to consider "foreign". This is especially true for investment flows among the larger, older members of the EU such as France, Germany, Italy, and the United Kingdom. Because these economies are now highly integrated, investment flows among them are probably more similar to investment flows between California and New York, for example, than to investment flows between Japan and the EU or Japan and North America, for example. Similarly, Hong Kong and China have become increasingly integrated economically in recent years making it difficult to consider FDI flows between these two economies foreign in the same sense as FDI flows between China and Singapore or China and Japan are foreign, for example.

The econometric literature that examines the determinants of MNE location choice clearly indicates that the economic size of the host economy or region is probably among the most important attractions for investing MNEs (Ramstetter 2011, pp. 4-7). Indeed, measures of host economy or region size are probably the most consistent and most robust predictors of the geographical distribution of MNE activity. Growth expectations are also a key element of this discussion, especially in regions like Asia, where there are many relatively rapidly growing economies. For example, sales of Japanese manufacturing affiliates in China have been by far the largest of the 11 major Asian hosts in recent years, growing from US$105 million in 2006 to US$211 million in 2011 (Table 1). Thailand was a relatively close second in 2006 ($70 million) and remained the second largest host throughout this period. However, by 2010, sales

[1] See Caves (2007), Dunning and Lundan (2008), and Markusen (2002) for more comprehensive reviews of this literature.

of affiliates in Thailand were only about half the size of sales by affiliates in China. Relatively rapid growth in China almost certainly contributed to the relatively rapid expansion of Japan manufacturing affiliates there. However, the expectation of continued, relatively rapid, future growth in the much larger Chinese economy is another, perhaps more important, reason. Many Japanese affiliates expanding in China (and India or Indonesia, for example) do not invest with the aim of making large profits immediately, but instead invest with the aim of earning large profits in the medium- to long-term, which they believe will be facilitated by future expansion of these large host economies.

Largely because of China's large shares in sales of Japan's manufacturing MNEs and its huge economic size, correlation coefficients between the country-wise distribution of MNE sales and host country manufacturing GDP in Asia have been quite high in recent years (0.81 in 2006 and 0.91 in 2010; Table 1).[2] Corresponding rank correlations were lower, however, 0.21 in 2006 and 0.58 in 2010. Nonetheless, as will be seen in the following sections, all of these correlations are relatively strong, compared to corresponding correlations with the labor and resource cost indicators, for example.

Per capita incomes and labor costs are highly correlated with each other and this makes it difficult to sort out their differing effects on MNE location choice. If one considers the demand side, per capita income is likely to be positively correlated with MNE location because MNEs often produce goods and services for which demand is relatively large at relatively high income levels. When this is the case, one expects per capita income to be positively correlated with MNE presence. However, simple correlations to manufacturing value added per worker (which is often positively correlated with value added per worker in all sectors) can be negative, as in the case of Japanese MNEs in Asia (Table 1). Negative correlations can reflect the negative effect of high labor costs on MNE location decisions,

[2] Correlation coefficients for 2006 and 2010 are the focus because Indian manufacturing employment data are not available for 2006-2009, and 2005 data are used as a proxy for 2006 data).

because manufacturing value added per worker is likely to be highly correlated with manufacturing wages.

On the other hand, nominal wage differentials are clearly not an important determinant of MNE location by themselves. Rather firms need to consider both nominal labor costs and labor productivity in order to know whether use of nominally cheap labor will indeed reduce production costs. For example, Table 1 indicates that Japan's manufacturing labor productivity was, on average, more than 50 times higher than Vietnamese levels in 2006-2010. This differential appears to be larger than corresponding wage differentials between Japan and Vietnam (see Section 3 below).[3] If productivity differentials are indeed larger than nominal wage differentials, Japanese MNEs could increase their productivity-adjusted labor costs by transferring activities from high (nominal) wage Japan to low (nominal) wage Vietnam, not reduce them. Moreover, many econometric studies fail to find a statistically significant and economically reasonable correlation between measures of per capita income and labor costs (when are usually positively correlated as indicated above) on the one hand, and MNE location choice on the other hand (Ramstetter 2011, pp. 205-206).

Energy costs have received relatively little attention in the literature on MNE location choice compared to the attention given to market size and labor costs, for example. However, there is a growing literature on the related pollution haven hypothesis, which suggests that MNEs will tend to locate pollution-intensive activities in developing economies with relatively lax environmental regulations. Analysis of the effects of environmental regulations is related to analysis of energy costs because energy or carbon taxes are among the more effective tools policy makers have to encourage conservation and discourage pollution related to energy consumption. Correspondingly, countries with relatively stringent environmental regulations also tend to have relatively high energy taxes and energy costs.

[3] It is important to note that the measures of wage differentials in Section 3 and the measures of productivity differentials in Table 1 are taken from different sources, and are not directly comparable.

Most analysis of the pollution haven hypothesis is performed by estimating models of MNE location choice and adding variables that reflect the extent of environmental regulation and/or pollution in host economies or regions. In general, the evidence supporting this hypothesis is weak (Dean et al. 2009; Eskeland and Harrison 2003; Kirkpatrick and Shimamoto 2008; Smarzynska and Wei 2001), but there is some evidence consistent with the hypothesis (He 2006; Wagner and Timmons 2008). As Smarzynska and Wei (2001) emphasize, it is important to recognize that the extent of environmental regulation and pollution levels tend to be correlated with other measures of governance such as corruption, as well as with per capita incomes. In short, relatively high-income host economies tend to have relatively good "general governance" (terminology from Ramstetter 2011, pp. 210-211), relatively strict environmental regulations, and relatively low pollution levels. Because it is reasonable to expect that MNEs are attracted to economies with relatively good governance, omitting measures of corruption or other aspects of general governance can potentially bias estimates of the correlations between environmental regulation or pollution levels and MNE location (as seems likely for the estimates in Kirkpatrick and Shimamoto 2008, for example).

Nonetheless, the existing literature does not reveal a strong relationship between general governance and MNE location choice, with the literature on the effects of corruption being particularly ambiguous (Ramstetter 2011, p. 211). In marked contrast, an increasing number of recent studies have found MNE location to be strongly correlated with the degree of MNE agglomeration, particularly agglomeration of MNEs from specific home economies such as Japan (Ramstetter 2011, pp. 209-210). The most logical interpretation of this correlation is that relatively large MNE presence in an economy or region is often negatively correlated with transactions costs related to information gathering, network creation, and other aspects of firm operation. For example, there is a rather large Japanese and foreign presence in the greater Bangkok area, which makes it relatively easy for Japanese firms to gather information

from other Japanese MNEs, the Japanese Chamber of Commerce Bangkok, JETRO's Bangkok office, the Japanese embassy, a large network of Japanese expatriates, and similar organizations and networks serving other nationalities, as well as from the Thai government, which generally encourages FDI by MNEs from Japan and elsewhere. Especially for new investors, this greatly reduces transaction costs for firms investing in the greater Bangkok area, compared to firms investing in Myanmar or India, for example, where Japanese and foreign presence is substantially smaller.

In short, the existing literature suggests that host country market size and agglomeration are among the two most robust determinants of MNE location. One the other hand, correlations between labor costs and resource or environment-related costs (as well as costs of capital, land, and a large number of other operating costs, Ramstetter 2011, pp. 206-207), on the one hand, and MNE location on the other, are generally weaker. These analytical results are consistent with METI surveys of Japanese manufacturing MNE parents, which revealed that about twice as many parents considered high demand or potential demand in the host market to be an important investment motive than considered availability of cheap, high quality labor to be important.[4] The subsequent analysis of labor cost and resource cost differentials will reinforce the impression that labor and resources cost differentials are likely to be relatively minor considerations for location choice by most Japanese MNEs.

3. Labor Costs

JETRO (various years) conducts surveys of investment costs that collect information on a variety of nominal labor costs, including minimum wages and wage ranges for three types of

[4] For example, in 2006-2008, and average of 72 percent of and average of 449 large parents considered high demand to be important compared while only 32 percent of these large parents considered labor availability to be important. Among an average of 279 smaller parents, these figures were 59 and 39 percent, respectively (Ramstetter 2011, p. 201).

manufacturing labor, production workers, mid-level technicians, and managers. Table 2 presents this information for surveys covering fiscal years 2006-2010, while Table 3 presents some more detailed information from the fiscal 2011 (January 2012) survey.[5] There is clearly wide variation in these labor costs among these economies. It is also important to note that the data often present ranges for wages rather than precise estimates. In such cases, the simple average of all available estimates for a worker type is used and this can be misleading in some cases. Nonetheless, these data facilitate among the more reliable estimates of wage differentials among potential host economies that I am aware of.

Analysis of minimum wages is somewhat complicated because the two richest economies in the region (Hong Kong and Singapore) and Malaysia all have a zero minimum wage (i.e., no requirement). Vietnam's minimum wages are the lowest, but have quickly caught up to Indian levels in 2006-2010 (Table 2). On the other hand, minimum wages were highest in Korea and Taiwan. Correlations to MNE sales were consistently negative but relatively weak (-0.08 to -0.13). Rank correlations were generally weaker and inconsistent in sign.

Correlations of production worker wages to Japan's manufacturing MNE sales were a bit stronger and consistently negative, between -0.20 and -0.29 (Table 2). Rank correlations were usually positive, however. Production worker wages were lowest in Vietnam, but did not increase as rapidly as minimum wages. Production worker wages were also relatively low in India and Indonesia. Notably, production worker wages grew rapidly in China in recent years. This is consistent with the common perception that China has begun losing its comparative advantage in low-skilled, labor-intensive production. At the other end of the scale, production worker wages were much higher in four advanced host economies (Hong Kong, Singapore, Korea, and Taiwan).

[5] Survey 17 was conducted in November 2006, while surveys 18-22 were conducted in January of 2008-2012.

Technician and manager wages follow a similar pattern, usually being the lowest in Vietnam, India, and Indonesia, and highest in the four advanced economies (Table 2). Correlations of both technician wages and manager wages to MNE sales were also negative and relatively strong in 2007 (-0.34 and -0.35, respectively). However, these correlations were substantially weaker (-0.06 to -0.21) in other years. Moreover, rank correlations again became positive in several years.

Conversely, when technician or manager wages are measured relative to production worker wages, correlation coefficients are strongly positive in some years (above 0.44 for technicians in 2009 and managers in 2006 and 2008, Table 2). Moreover, the advanced economies tend to have the lowest relative wages for both technicians and managers. This pattern is consistent with the general perception that skilled workers are often in short supply in low- and middle-income economies. This presents a particularly important problem for MNEs because they often require relatively skilled and sophisticated workforces compared to local plants. Nonetheless, these strong correlations were the exception as correlations were much weaker in the other years examined.

Table 3 also shows that patterns depicted in Table 2 continued to persist in 2011 and illustrates the fact that Japanese wages tended to be the higher than in all major host economies. Not surprisingly, Japanese wages tended to be highest in the greater Tokyo area (Yokohama, Chiba) and in Nagoya than in other areas sampled. However, the Kansai area (Kobe) had the highest wages for technicians in Japan. At the other end of the spectrum, Japanese wages tended to be lowest in Kyushu (Kumamoto) and Tohoku (Yamagata), where living costs are considerably lower than in the larger population centers.

Finally, it should be reemphasized that wage differentials are often accompanied by large productivity differentials, which greatly limit the scope for MNEs to benefit from relatively low wages in developing economies. Unfortunately, it is very difficult, if not impossible to

gather data that estimate productivity and wages consistently in most Asian economies. Thus, it is very difficult to know the actual scope of productivity-adjusted wage differentials, much less estimate their effects on Japanese MNE location choice in Asia.

4. Resource Costs

Tables 4-5 examine patterns in the costs of three types of energy (commercial electricity, gasoline, and fuel oil) and commercial water. Among the major hosts, commercial electricity rates tended to be highest in Singapore and Hong Kong (Table 4). They were also relatively high in India and the Philippines and tended to be lowest in Indonesia and Korea. Correlations to MNE sales were negative and relatively strong 2007-2008 (-0.31 to -0.33), but correlations were weaker in other years and sometimes positive.

Regular gasoline was consistently the cheapest in Indonesia and Malaysia in all years and in China and Singapore in 2006 (Table 4). Low prices reflected substantial effective subsidies of gasoline consumption in several of these economies (Indonesia, Malaysia, and China). At the other end of the scale, prices were consistently highest in Hong Kong and Korea, as well as in Singapore in 2007-2010. Correlations to MNE sales were negative and moderately strong in 2006-2008 (-0.22 to -0.29). Rank correlations were the same sign and stronger during these years (-0.31 to -0.40). However both correlations were much weaker in 2009-2010, probably because the worldwide slowdown in these years led to marked declines in world gasoline prices and in the region's economies where gasoline prices were relatively high and followed world trends. On the other hand, prices changed relatively little in Malaysia and Indonesia, where effective subsidies appear to be the largest, and increased in China as effective subsidies appear to have been gradually reduced. Not surprisingly, correlations between gasoline and light oil (also referred to as fuel oil or gas oil) prices were quite high

and country rankings similar. However, correlations and rank correlations of light oil prices to MNE sales were much weaker than for gasoline prices.

Commercial water prices were relatively high in Singapore, Indonesia, India, and Hong Kong and cheapest in Korea, Taiwan, Vietnam, and Thailand. Given the small levels of water costs (compared to energy or labor, for example), it is probably not surprising that correlations to MNE sales levels were very weak (less than 0.07 in absolute value). Rank correlations were stronger and positive, but probably not very meaningful economically.

Table 5 also shows that marginal, commercial electricity and water prices tended to be relatively high in Japan. However, the water price estimate for Chiba near Tokyo doesn't make much sense, most likely because fixed costs may be relatively large in some locations and the data in the table refer only to marginal costs. Estimates of water costs in Yamagata (Tohoku) seem similarly questionable. Gasoline and light oil prices were also relatively high in Japan, as well as in in Korea and Hong Kong.

In general, the range of electricity energy cost differentials (50-192 percent of Kumamoto levels in 2011, Table 5) was less pronounced than the range of labor cost differentials (e.g, 2.1-123 percent of Kumamoto levels for production workers and 4.2-126 for technicians). Thus, in nominal terms, it appears that the scope for location choice to reduce energy costs is limited compared to the ability to reduce labor costs. However, here again these nominal cost differentials must be adjusted to account for corresponding productivity differentials to be economically meaningful. And it seems likely that electricity productivity varies in a smaller range than labor productivity. Thus, after adjusting for corresponding productivity differentials, electricity costs might actually differ in a wider range than labor costs.

When interpreting the importance of resource cost differentials, it is also important to recall that energy and water are very small components of overall costs, usually amounting to

averages of about 4 percent or less of manufacturing gross output in Japan, Korea, Malaysia, Thailand, and Indonesia for example (Ramstetter 2013). Labor costs are a larger portion of output in Japan and Korea but are a similarly small share in lower wage economies (Thailand and Indonesia). Both of these cost components are much smaller than the costs of raw materials (including parts), which typically amount to one-half in these economies and as much as two thirds in Malaysia.

5. Conclusions

This paper has illustrated labor and resource cost differentials facing Japan' manufacturing MNEs investing Asia. The data show considerable variation in these costs among economies, but the economic implications of these differentials are likely to be limited for three reasons. First, the existing empirical literature strongly suggests that demand-side factors, especially market size, generally are the most robust determinants of MNE location decisions. Recent studies also suggest that MNE agglomeration is a relatively robust determinant. Second, labor and resource costs account for relatively small proportions of production costs compared to raw materials, for example. Third, cost comparisons need to be supplemented by productivity comparisons to understand the true scope of differentials in costs of production factors such as labor and energy. Unfortunately, it is very difficult to perform precise comparisons with existing data. This makes it important to gather more comparable estimates of cost differentials and corresponding productivity differentials in future research.

It is possible that more accurate and comparable data would reveal stronger correlations between resource and labor cost differentials, on the one hand, and MNE location choice on the other hand. These differentials are also clearly important for some MNEs from Japan and elsewhere. However, the existing evidence suggests it is highly unlikely that either labor cost

differentials or resource cost differentials are a major factor in the location decisions of most MNEs.

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Table 1: Sales of Japan's Manufacturing Affiliates, Manufacturing Value Added, and Value Added per Manufacturing Worker in Major Asian Host Economies

Economy	2006	2007	2008	2009	2010
SALES OF JAPAN'S MANUFACTURING AFFILITATES (fiscal years beginning 1 April, US$ billions)					
China	105.64	137.52	157.70	179.27	211.21
Hong Kong	27.48	25.29	23.53	23.88	26.85
Korea	24.63	25.13	21.26	20.86	29.60
Taiwan	21.87	18.82	18.34	18.81	26.64
Indonesia	26.40	31.78	36.79	46.60	51.31
Malaysia	28.21	27.98	25.44	20.41	28.51
Philippines	12.27	12.44	13.74	12.29	14.59
Singapore	28.85	21.08	19.16	19.56	26.18
Thailand	70.48	92.98	90.45	84.43	108.26
Vietnam	5.88	7.91	9.26	10.41	12.01
India	11.60	14.82	14.23	19.32	21.68
MANUFACTURING VALUE ADDED (Japan=100 in current US$)					
China	132.83	165.20	196.38	222.24	223.20
Hong Kong	0.59	0.46	0.42	0.41	0.36
Korea	26.84	29.20	24.35	23.44	25.97
Taiwan	11.55	11.79	10.41	10.02	10.55
Indonesia	11.64	13.29	14.87	15.96	16.50
Malaysia	5.20	5.75	5.94	5.40	5.70
Philippines	3.35	3.86	4.16	4.02	4.02
Singapore	4.30	4.61	3.89	4.17	4.44
Thailand	7.80	9.19	9.36	9.35	10.11
Vietnam	1.50	1.72	1.94	2.19	1.97
India	13.72	-	-	-	21.39
Correlation to MNE sales	0.81	0.82	0.87	0.91	0.90
Rank correlation to MNE sales	0.21	0.58	0.54	0.55	0.58
VALUE ADDED PER WORKER (Japan=100 in current US$)					
China	8.16	9.53	10.93	11.31	10.71
Hong Kong	30.97	26.94	28.06	29.24	29.23
Korea	76.81	84.74	70.30	65.55	67.56
Taiwan	48.28	48.33	41.25	38.54	38.64
Indonesia	11.37	12.52	13.55	13.34	12.51
Malaysia	29.00	33.87	34.93	32.09	30.29
Philippines	12.73	14.71	16.27	14.90	13.91
Singapore	165.61	176.37	142.51	152.32	159.86
Thailand	16.46	19.06	19.64	18.67	19.81
Vietnam	2.26	2.42	2.55	2.54	2.06
India	2.30	-	-	-	2.93
Correlation to MNE sales	-0.10	-0.26	-0.29	-0.27	-0.20
Rank correlation to MNE sales	0.35	-0.05	-0.05	-0.06	0.15

Note: Correlations for 2007-2009 exclude India and 2006 data for India are proxied with data for 2005 because data for India's manufacturing are not available for 2006-2009.

Source: Asian Development Bank (various years); METI (various years).

Table 2: Manufacturing Labor Costs in Major Asian Host Economies (capital cities) and Correlations to Japanese MNE Sales in Asian Host Economies

Economy	2006	2007	2008	2009	2010
MINIMUM WAGES (US$/month)					
China	72	81	101	117	117
Hong Kong	0	0	0	0	0
Korea	598	659	803	581	731
Taiwan	474	483	536	518	543
Indonesia	71	89	103	131	122
Malaysia	0	0	0	0	0
Philippines	121	137	174	173	163
Singapore	0	0	0	0	0
Thailand	110	126	147	146	157
Vietnam	39	44	62	71	75
India	69	73	95	80	91
Correlation to MNE sales	-0.11	-0.11	-0.13	-0.10	-0.08
Rank correlation to MNE sales	-0.13	-0.02	-0.02	0.01	0.22
PRODUCTION WORKER WAGES (US$/month)					
China	124	174	366	420	379
Hong Kong	1,600	1,412	692	1,157	1,306
Korea	1,479	1,632	2,165	1,676	1,220
Taiwan	1,194	1,042	1,174	1,181	888
Indonesia	131	178	198	236	148
Malaysia	205	221	412	393	257
Philippines	182	283	327	357	296
Singapore	530	663	1,283	1,761	967
Thailand	146	164	310	490	231
Vietnam	122	143	97	132	104
India	172	246	257	233	196
Correlation to MNE sales	-0.20	-0.29	-0.22	-0.22	-0.20
Rank correlation to MNE sales	0.04	-0.20	0.11	0.27	0.16
TECHNICIAN WAGES (US$/month)					
China	347	254	620	1,323	701
Hong Kong	2,220	2,303	1,898	2,313	1,880
Korea	1,976	2,227	2,888	2,162	1,675
Taiwan	1,767	1,420	1,621	1,536	1,152
Indonesia	270	311	302	382	294
Malaysia	790	820	635	1,017	745
Philippines	279	359	509	403	392
Singapore	1,668	1,840	1,996	3,586	1,997
Thailand	316	383	489	859	540
Vietnam	293	363	142	373	287
India	401	597	253	568	463
Correlation to MNE sales	-0.20	-0.34	-0.21	-0.07	-0.18
Rank correlation to MNE sales	0.15	-0.17	0.19	0.27	0.20

Table 2 (continued)

Economy	2006	2007	2008	2009	2010
MANAGER WAGES (US$/month)					
China	1,053	680	1,914	1,867	1,199
Hong Kong	3,699	3,597	3,798	3,715	3,197
Korea	2,414	3,392	3,385	3,028	2,437
Taiwan	2,740	2,089	2,418	2,584	1,774
Indonesia	618	548	861	953	812
Malaysia	1,643	1,638	1,850	1,912	1,485
Philippines	649	843	1,151	1,041	1,013
Singapore	2,993	3,048	3,904	4,583	3,357
Thailand	584	684	1,596	2,119	1,342
Vietnam	556	728	512	885	822
India	978	1,190	821	1,305	1,116
Correlation: MNE sales amount	-0.14	-0.35	-0.06	-0.10	-0.21
Correlation: MNE sales rank	0.27	-0.30	0.29	0.25	0.12
RELATIVE WAGES, TECHNICIANS/PRODUCTION WORKERS (ratio)					
China	2.80	1.46	1.69	3.15	1.85
Hong Kong	1.39	1.63	2.74	2.00	1.44
Korea	1.34	1.36	1.33	1.29	1.37
Taiwan	1.48	1.36	1.38	1.30	1.30
Indonesia	2.06	1.75	1.53	1.62	1.99
Malaysia	3.85	3.71	1.54	2.59	2.90
Philippines	1.53	1.27	1.55	1.13	1.33
Singapore	3.15	2.78	1.56	2.04	2.07
Thailand	2.16	2.34	1.57	1.75	2.34
Vietnam	2.41	2.54	1.46	2.84	2.76
India	2.33	2.43	0.98	2.43	2.36
Correlation to MNE sales	0.24	-0.15	0.12	0.45	0.00
Rank correlation to MNE sales	0.33	0.05	0.54	0.14	-0.07
RELATIVE WAGES, MANAGERS/PRODUCTION WORKERS (ratio)					
China	8.49	3.92	5.23	4.44	3.16
Hong Kong	2.31	2.55	5.49	3.21	2.45
Korea	1.63	2.08	1.56	1.81	2.00
Taiwan	2.30	2.00	2.06	2.19	2.00
Indonesia	4.72	3.09	4.35	4.03	5.49
Malaysia	8.01	7.41	4.48	4.87	5.79
Philippines	3.57	2.97	3.52	2.91	3.43
Singapore	5.65	4.60	3.04	2.60	3.47
Thailand	4.00	4.17	5.14	4.33	5.82
Vietnam	4.58	5.11	5.26	6.73	7.91
India	5.69	4.84	3.19	5.59	5.69
Correlation to MNE sales	0.46	0.03	0.44	0.13	-0.09
Rank correlation to MNE sales	0.35	-0.05	0.28	-0.03	-0.16

Source: JETRO (various years) surveys as of 2006.11, 2008.01, 2009.01, 2010.01, 2011.01; METI (various years) surveys for fiscal years beginning April 2006-2010.

Table 3: Manufacturing labor costs in Major Asian Cities, January 2012 (Kumamoto=100)

City	Mean nominal wages (US$) and social insurance (employer+employees, % of wages) levels					Relative wages versus production workers	
	Minimum wages	Production workers	Technical workers	Managers	Social insurance burden	Technical workers	Managers
Jakarta	11.3	6.5	10.0	18.9	34.9	153.3	291.1
Batam	10.4	na	6.8	7.8	34.9	na	na
Phnom Penh	3.7	2.6	4.9	12.6	2.4	192.5	494.4
Singapore	0.0	40.0	57.2	81.8	109.4	143.2	204.6
Bangkok	10.1	8.9	15.4	29.8	30.4	173.5	334.6
Cebu	10.4	6.1	8.2	15.8	46.9	134.5	259.9
Manila	11.4	10.1	9.7	20.3	46.2	96.0	201.1
Danang	5.7	6.2	6.0	7.6	95.8	96.7	122.3
Hanoi	6.4	3.5	7.1	13.6	95.8	207.1	392.8
Ho Chi Minh City	6.4	4.0	6.9	13.4	95.8	170.3	331.1
Kuala Lumpur	0.0	10.7	23.4	36.6	69.9	218.9	342.3
Yangoon	na	2.1	4.2	11.0	13.5	200.3	518.8
Vientiene	5.3	3.7	5.2	6.9	27.4	143.3	187.5
Seoul	47.7	52.8	51.9	58.5	104.2	98.4	110.9
Taipei	42.1	31.4	32.9	39.8	43.6	105.0	127.0
Guangdong	14.0	10.9	15.6	24.7	194.1	142.9	226.0
Shanghai	13.8	13.7	17.9	26.1	188.5	131.3	191.1
Dalien	11.3	9.8	13.0	19.2	222.1	132.3	195.8
Tsingtao	11.0	7.8	10.5	14.6	180.7	134.7	186.6
Beijing	13.5	16.7	19.6	27.8	205.5	117.2	165.9
Hong Kong	43.1	43.0	47.7	63.5	30.4	110.8	147.6
Kumamoto	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Kobe	114.2	112.5	125.7	117.1	100.0	111.8	104.1
Chiba	115.6	115.6	125.3	128.8	100.0	108.3	111.3
Nagoya	116.0	118.3	114.5	124.5	100.0	96.7	105.2
Yamagata	100.0	94.2	100.4	117.3	100.0	106.6	124.6
Yokohama	129.2	122.9	120.6	129.1	100.0	98.1	105.0

Source: JETRO (2012) survey as of 2012.01

Table 4: Resource Costs in Major Asian Host Economies (capital cities) and Correlations to Japanese MNE Sales in Asian Host Economies

Economy	2006	2007	2008	2009	2010
COMMERCIAL ELECTRICITY, MARGINAL COST (US$/kwh)					
China	0.075	0.065	0.070	0.080	0.080
Hong Kong	0.145	0.120	0.129	0.125	0.129
Korea	0.050	0.060	0.060	0.040	0.050
Taiwan	0.055	0.060	0.065	0.080	0.087
Indonesia	0.040	0.050	0.090	0.040	0.050
Malaysia	0.050	0.050	0.070	0.080	0.080
Philippines	0.110	0.100	0.130	0.070	0.095
Singapore	0.098	0.124	0.142	0.148	0.161
Thailand	0.042	0.047	0.080	0.100	0.110
Vietnam	0.055	0.053	0.074	0.066	0.061
India	0.090	0.110	0.130	0.110	0.100
Correlation to MNE sales	-0.15	-0.31	-0.33	-0.04	-0.07
Rank correlation to MNE sales	-0.18	-0.36	-0.26	0.13	-0.18
REGULAR GASOLINE COST (US$/liter)					
China	0.530	0.650	0.740	0.800	0.980
Hong Kong	1.660	1.710	1.900	1.620	1.810
Korea	1.410	1.510	1.750	0.950	1.660
Taiwan	0.749	0.800	0.965	0.700	0.976
Indonesia	0.450	0.490	0.480	0.400	0.500
Malaysia	0.430	0.530	0.590	0.500	0.540
Philippines	0.670	0.750	1.100	0.680	0.940
Singapore	0.580	1.050	1.390	1.064	1.309
Thailand	0.610	0.690	0.980	0.610	1.100
Vietnam	0.600	0.670	0.810	0.650	0.914
India	0.950	1.050	1.110	0.830	0.980
Correlation to MNE sales	-0.22	-0.26	-0.29	-0.10	-0.09
Rank correlation to MNE sales	-0.40	-0.36	-0.31	-0.03	0.15
LIGHT OIL COST (US$/liter)					
China	0.500	0.610	0.680	0.790	0.970
Hong Kong	1.040	1.120	1.220	1.060	1.160
Korea	1.100	1.260	1.550	0.930	1.470
Taiwan	0.605	0.685	0.850	0.580	0.870
Indonesia	0.430	0.470	0.460	0.400	0.500
Malaysia	0.340	0.430	0.490	0.470	0.510
Philippines	0.590	0.670	0.950	0.680	0.740
Singapore	0.650	0.840	1.066	0.830	0.946
Thailand	0.540	0.640	0.900	0.540	0.870
Vietnam	0.470	0.530	0.640	0.650	0.828
India	0.670	0.720	0.780	0.630	0.720
Correlation to MNE sales	-0.17	-0.17	-0.20	0.01	0.08
Rank correlation to MNE sales	-0.16	-0.25	-0.16	-0.02	0.24

Table 4 (continued)

Economy	2006	2007	2008	2009	2010
COMMERCIAL WATER, MARGINAL COST (US$/)					
China	0.690	0.700	0.800	0.800	0.900
Hong Kong	1.000	1.000	1.000	1.000	1.000
Korea	0.040	0.050	0.050	0.050	0.050
Taiwan	0.275	0.030	0.300	0.290	0.305
Indonesia	0.980	1.200	1.340	1.230	1.400
Malaysia	0.480	0.490	0.590	0.530	0.570
Philippines	0.445	0.510	0.645	1.260	1.655
Singapore	1.250	1.361	1.484	1.391	1.499
Thailand	0.375	0.425	0.385	0.360	0.385
Vietnam	0.280	0.280	0.375	0.292	0.390
India	1.065	1.075	1.250	0.700	1.205
Correlation to MNE sales	0.01	-0.01	-0.03	0.02	-0.07
Rank correlation to MNE sales	0.27	0.18	0.16	0.10	-0.31

Source: JETRO (various years) surveys as of 2006.11, 2008.01, 2009.01, 2010.01, 2011.01; METI (various years) surveys for fiscal years beginning April 2006-2010.

Table 5: Resource Costs in Major Asian Cities, January 2012
(Kumamoto=100)

City	Commercial electricity (marginal)	Gasoline	Light oil	Commercial water (marginal)
Jakarta	66.7	39.4	51.7	39.5
Batam	91.7	39.4	51.7	32.9
Phnom Penh	180.0	70.4	80.7	8.8
Singapore	181.3	90.5	84.3	46.5
Bangkok	116.7	68.2	64.7	11.7
Cebu	191.7	75.4	80.0	20.8
Manila	125.0	69.8	72.0	52.8
Danang	54.7	55.3	64.7	11.3
Hanoi	54.7	55.3	64.7	13.0
Ho Chi Minh City	54.7	55.3	64.7	11.3
Kuala Lumpur	75.0	33.5	38.0	19.9
Yangoon	100.0	58.1	76.7	25.4
Vientiene	57.1	75.3	79.3	5.0
Seoul	50.0	104.5	113.3	2.0
Taipei	75.0	58.1	63.3	9.2
Guangdong	91.7	62.6	72.7	19.6
Shanghai	120.8	67.0	78.0	9.2
Dalien	116.7	62.6	81.3	22.8
Tsingtao	108.3	64.2	80.7	18.3
Beijing	108.3	67.0	79.3	28.3
Hong Kong	109.6	115.1	103.3	28.9
Kumamoto	100.0	100.0	100.0	100.0
Kobe	125.0	102.8	111.3	106.1
Chiba	129.2	101.1	108.0	8.7
Nagoya	120.8	103.4	106.7	116.6
Yamagata	108.3	103.4	111.3	48.3
Yokohama	129.2	102.2	106.7	125.0

Source: JETRO (2012) survey as of 2012.01.