Wage Differentials among Local Plants and Foreign Multinationals by Foreign Ownership Share and Nationality in Thai Manufacturing

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Abstract

This paper analyzes two dimensions of wage differentials between plants belonging to foreign multinational corporations (MNCs) and plants belonging to local firms in the Thai manufacturing sector in 1996 and 1998. Wages for local plants are compared with their MNC counterparts disaggregated by foreign ownership share (wholly-foreign plants, majority-foreign plants, and minority-foreign plants), and by nationality (Europe and the United States, Japan, Asia's Newly Industrialized Economies or NIEs, and other countries). From the regression results, the paper first finds evidence of positive wage differentials among MNC plants and local plants for both non-production and production workers after controlling for other plant characteristics. The magnitude of wage differentials is larger for non-production workers than for production workers. Second, the paper finds evidence of positive wage differentials between majority- and minority-foreign MNC plants and local plants. However, a wage differential between wholly-foreign MNC plants and local plants is smaller and less significant than for MNC plants with less foreign ownership share. Third, wage differentials between local plants and plants owned by MNCs from Japan, and European countries or the U.S. are very large, but wage differentials between local plants and plants owned by MNCs from the Asian NIEs countries are less than half the size of differentials between local plants and plants owned by MNCs from developed countries.

Contents

1. Introduction

The main purpose of this paper is to test for wage differentials among local plants and groups of foreign MNC plants in Thai manufacturing after controlling for other characteristics, such as labor productivity, location, and industry affiliation. Wages in local plants are compared with groups of foreign MNC plants distinguished by different foreign ownership share (wholly-foreign plants, majority-foreign plants, and minority-foreign plants), and by nationality of major owner for four nationality groups, plants owned by MNCs from European countries and the United States, Japan, three of Asia's Newly Industrialized Economies (NIEs: Korea, Singapore and Taiwan), and other countries.

Regression results in previous literatures find wage differentials between MNC plants and local plants in several countries even after controlling for other plant characteristics like labor productivities or educational attainments of labor etc. (Aitken, Harrison and Lipsey:1996, Lipsey and Sjöholm:2001, Ramstetter:1994, and Matsuoka: 2001). However, in Thai manufacturing sector, MNC plants don't always exhibit higher labor productivity than local plants, and also regression results for those differentials of labor productivities tend to be insignificant (Ramstetter:2001a, 2001b). This paper basically follows those previous literatures to analyze wage differentials between them, and adds examinations of those wage differentials by foreign ownership share and by nationality.

This paper analyzes these topics using plant level data for the Thai manufacturing sector in 1996 and 1998. Section 2 first reviews the previous literature on wage differentials and Section 3 then compares descriptive indicators of economic performance in local plants and foreign MNC plants by foreign ownership share and by nationality. Section 4 then explains the methodology used in this study and section 5 reports the results of regressions analyzing the wage differentials studied here. Some concluding remarks are offered in Section 6.

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2. Review of the Literature

If the production technology for skills of labor differs across plants, wage differentials among plants may arise because of different skill mixes[1]. The segmentation of labor markets also may affect wage differentials among plants. Barriers to labor mobility can be caused by institutional factors or policy distortions. In addition to these factors, firms may make use of their wage policies to maximize their profits under imperfect labor market. For instance, firms may offer higher wages to employ high quality workers when firms cannot clearly evaluate workers' quality. Or firms might pay higher wages to encourage greater efforts from workers.

Firms or plants belonging to MNCs may pay higher wages than local firms or plants in host economies for the reasons described above. An important reason is because MNCs tend to be more technology-intensive than non-MNCs. Then, some of wage differentials among plants may decrease if skill mix or productivity are considered. However, Aitken, Harrison and Lipsey (1996), Lipsey and Sjöholm (2001), Ramstetter (1994) and Matsuoka (2001) find wage differentials between MNC plants and local plants in Mexico, Venezuela, Indonesia, and Thailand, which can not be explained by several plant characteristics. One possible cause of this result is that MNC plants may have skill-intensive production technology and this may result in wage differentials. Nonetheless, the Lipsey and Sjöholm (2001) study of Indonesian manufacturing indicates that wage differentials still exist after controlling for the educational attainment of workers. In this respect, Takii (2001) provides evidence that productivity spillovers from MNC plants to local plants in Indonesian manufacturing are greater in industries

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[1] Davis and Haltiwanger (1991)

where the wage gap between foreign MNC plants and local plants is relatively small. This may suggest that foreign MNC plants pay relatively high wages because they fear the leakage of technological knowledge that is the source of much of their competitiveness.[2] It may also be that foreign MNC plants may pay relatively high wages as a way of discouraging employee turnover because, for example, foreign MNC plants may invest relatively large amounts in training.[3]

Another possibility to consider here is that wage levels in foreign MNCs may differ depending on the foreign ownership share. For example, Ramachandran (1993) constructs a theoretical model and empirical analysis where parent companies of MNCs tend to transfer more technology to their foreign subsidiaries as the ownership share of the parent company increase.[4] This may lead that higher ownership share of MNC plants have higher productivity, and pay higher wages. Then, some of the wage differentials can be explained by the difference of productivities or other variables indicating technologies. But even after controlling for those factors, wage differentials may vary across the different foreign ownership shares. For example, evidence from Takii (2001) suggests that productivity spillovers in Indonesian manufacturing tend to be smaller in industries and years where the share of workers employed by foreign plants with high-ownership shares is relatively high. Then, Takii (2001) suggests that majority-owned foreign plants might have relatively tight control over the diffusion of their

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[2] Takii(2001) and Lipsey and Sjöholm (2001).

[3] Lipsey and Sjöholm (2001).

[4] However, from regression results, Ramstetter (2001a) finds very little evidence of significant productivity differentials between local plants and foreign plants by owner ship share in Thai manufacturing after controlling for inputs and other plant characteristics. For Indonesian manufacturing, Takii and Ramstetter (2000) find evidence that productivity is highest in majority-foreign plants, followed by minority-foreign plants, and lastly by wholly- or heavily-foreign plants, and also suggests that productivity was actually lower for heavily-foreign plants (90 percent or higher foreign share) than for local plant in some periods. Note that those productivity differentials are the ones those cannot be explained by inputs or other plant characteristics.

technology. If this is the case, unexplained wage differentials between local plants and MNC plants with relatively higher foreign ownership shares might be smaller because they don't have to pay higher wages to prevent technology leakage to local plants.

Similarly, wages of foreign MNC plants may also differ by nationality. For example, MNC plants from developed countries may have more sophisticated technology than foreign MNC plants from developing countries, leading to higher productivity and higher wages in MNC plants from developed economies[5]. In this case again, wage differentials between local plants and MNC plants by nationality might be small or not be observed because productivity difference can explain some of the wage differentials between local plants and MNC plants with different nationality. If there are wage differentials by nationality after controlling for productivity and other plant characteristics, they may be probably related to efforts to retain staff and prevent the leakage of technology. Or those unexplained wage differentials might also vary with nationality because of differences in languages and corporate cultures, because these differences may be related to the segmentation of labor markets.

3. The Data

This study analyzes samples of plant-level data underlying the industrial census for 1996 (National Statistical Office 1999) and the industrial survey for 1998 (National Statistical Office 2001). The original samples underlying the published data (National Statistical Office 1999, 2001), especially the data for 1996, contain numerous duplicates that were identified using a methodology explained by Ramstetter (2001a, pp. 8-10).

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[5] Here again, it is important to note that previous literatures for Thailand (e.g., Ramstetter 1994, 2001b), suggests that productivity differentials between local plants and foreign nationality groups, which cannot be explained by input or other plant characteristics in regression analysis, are generally insignificant statistically and not very consistent across industries or years when they are significant.

In this study, one record from each set of duplicates has been retained in an effort to maximize sample coverage.[6] The comparisons in this study focus exclusively on relatively large plants with output of 25 million baht or greater because comparisons of foreign MNC plants and predominantly local smaller plants are not thought to be meaningful. Note that these samples of large plants include the vast majority of all foreign MNC plants in all ownership and nationality categories. Moreover, value added in large plants accounts almost 95 percent of total value added in both 1996 and 1998.[7] In addition, some records thought to contain implausible data were removed from the sample.[8] The remaining sample consists of 5,122 plants with 1.5 million employees, which were paid an average of 8,677 baht each in compensation per month in 1996, and 2,407 plants with 0.75 million employees, which received an average of 8,717 baht per month in 1998 (Table 1; see also Appendix Table 1). The 1998 sample is much smaller than the 1996 sample because it includes only plants covered by the survey in that year, whereas the 1996 sample is taken from a census conducted in that year.[9]

Table 2 shows the shares of MNC plants in value added for selected industries in this sample.[10] For all manufacturing, MNC plants accounted for 53 percent of total value added in sample plants in 1996 and 61 percent in 1998.[11] In both years, shares of

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[6] Note that this sample differs from the sample in Matsuoka (2001), which removed all duplicate records.

[7] For more details, see Appendix A in Ramstetter (2001a) and Appendix A in Ramstetter (2001b).

[8] First, hourly wages for each type of workers are regressed with intercept and valued added per hourly worked. Then observations with the top and the bottom 1/256 of normalized residuals in both regressions are removed from the sample.

[9] Note that published figures for 1998 (National Statistical Office 2001) are estimates for the entire manufacturing sector, not just compilations from survey data as done here.

[10] Industries are classified for food, textiles, apparel, footwear and leather, chemicals, rubber products, plastics, non-metallic mineral products, fabricated metals, general machinery, electric machinery, and motor vehicles. Other manufacturing includes beverages, tobacco, wood and wood products, paper and paper products, publishing and printing, oil, coke and nuclear etc., basic metals, and other transport equipment.

[11] Foreign shares of value added for all Thai manufacturing, including plants not in-

MNC plants are very large in motor vehicles, electric machinery and general machinery. Compared with 1996, shares of MNC plants were apparently larger in 1998 in apparel, rubber products and non-metallic mineral products, though comparisons across years are rough approximations at best because of differences in coverage.

By ownership share, the group of minority-foreign plants was the largest in all manufacturing.[12] This group was especially large in motor vehicles, fabricated metals, and textiles (Table 2). Shares of majority-foreign plants were relatively large in chemicals and rubber products, and shares of wholly-foreign MNC plants were large in general machinery and electric machinery. By nationality, Japanese plants are the largest, accounting for more than 32-33 percent of manufacturing value added in both years. Japanese shares are especially large in motor vehicles, and the Japanese share of general machinery apparently was much larger in 1998 than in 1996, but it is hard to know how much of this increase results from differences in the samples.[13] The combined shares of European and the U.S. plants were 8-10 percent in manufacturing sector. These shares were large in chemicals, rubber products, and electric machinery in 1996 and apparently rose in apparel and non-metallic mineral products in 1998. The combined share of the three Asian NIEs (Korea, Singapore and Taiwan) was smaller in all manufacturing, 6-8 percent. However the share of this group in electric machinery is large in both years. But its share decreases in footwear and leather, and general machinery in 1998.

Figure 1 shows hourly wages and labor productivities for sample plants by in-

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cluded in these samples, are probably much smaller because there are a large number of excluded plants, which are predominantly local (Ramstetter 2001a, pp. 11-13).
[12] Wholly-foreign MNC plants are defined as plants with foreign ownership shares of 100 percent, majority-foreign MNC plants are plants with foreign ownership shares of 50-99 percent, and minority-foreign MNC plants are plants with foreign ownership shares of 1-49 percent.
[13] See also number of plants in Appendix Table 1.

dustry for non-production and production workers in 1996 and 1998.[14] Compared with

1998, the differentials of wages and labor productivities between local plants and for-

eign MNC plants appear to have increased in 1998, though here again these changes

may result simply from differences in sampling.[15] Thus, it is not clear whether this in-

crease is due to the difference of coverage or the different performance of foreign MNC

and local plants after the economic crisis broke in 1997. Figure 1 also shows that wages

and labor productivities vary across industry. Wages and labor productivities tend to be

low in textiles, rubber products, and plastics, and high in chemicals and motor vehicles.

There is also an apparent correlation between wage levels and labor productivity.[16]

Table 3 compares average of hourly wages (WN for non-production workers,

and WP for production workers) and average product per hour worked (VA/LN for

non-production workers and VA/LP for production workers). Similar comparisons are

also made between local plants and foreign MNC plants distinguished by foreign own-

ership group (Table 4) and nationality (Table 5).   In these tables and in the analysis

below, wages are broadly defined here to include all employee compensation except so-

cial security payments.[17]

In 1996, the mean of hourly wage for non-production workers was 55 baht for

local plants and 71 baht in foreign MNC plants, or 29 percent higher in foreign MNC

plants (Table 3). This differential is much larger than the 15 percent differential in aver-

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[14] Hourly wages are calculated as the total wage bill divided by total hours worked in
each industry. Likewise average labor productivity is calculated as total value added di-
vided by total hours worked in each industry. The number of hours worked is assumed
to be equal to the hours a plant was in operation and is the same for both production and
non-production workers.
[15] Note also that these calculations are on a nominal, not a real, basis.
[16] See also Appendix Table 2 and 3, for mean wages and mean average labor productiv-
ity by industry.
[17] The wage bill is defined to include wages and salaries, overtime, bonuses, and fringe
benefits other than social security.

age labor productivity (1,343 baht versus 1,540 baht). In 1998, this wage differential was 48 percent and the labor productivity differential was 36 percent. Thus, in both years, non-production workers had higher wages and average labor productivities in foreign MNC plants than in local plants, but the wage differentials were more prominent than productivity differentials. For production workers, foreign MNC plants also paid higher wage (9 percent in 1996 and 34 percent in 1998) and had higher average productivity (26 percent in 1996 and 72 percent in 1998).

When the foreign MNC plans are disaggregated by foreign ownership share, which is only possible for 1996, majority-foreign plants tend to pay highest wages for both production and non-production workers, but differentials are not so large among foreign ownership groups (Table 4). Average labor productivity for non-production workers also tended to be higher in foreign ownership groups than in local plants, but all of the differences between foreign ownership groups and local plants are statistically insignificant. For production workers, average labor productivity was highest in major-ity-foreign MNC plants but the difference between this group and local plants was not statistically significant. Average labor productivity was significantly higher in minor-ity-foreign plants than in local plants, but was significantly lower in wholly-foreign MNC plants than in local plants.[18] Nonetheless, it is notable that the pattern of wage differentials is very different than the pattern of average labor productivity differentials when foreign ownership groups are distinguished.

All foreign nationality groups paid higher wages to both non-production and

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[18] One possible reason for the low labor productivity in wholly-foreign MNC plants might be because these plants are concentrated in electric machinery (more than 66 percent of the total value add of wholly-foreign MNC plants in Table 2), an industry where both wage levels and average labor productivity are relatively low. However, there very few significant differences in labor productivity from the regression results after controlling inputs and other plant characteristics at the each industry level (see Ramstetter 2001a, 2001b)

production workers in both years (Table 5). For non-production workers, wages were highest in Japanese plants (36 percent higher than local plants in 1996 and 70 percent in 1998), and plants owned by European and the U.S. firms (55 percent higher than local plants in 1996 and 44 percent in 1998) but lower in plants from the Asian NIEs (9 percent higher than local plants in 1996 and 19 percent in 1998). Labor productivities of MNC plants by nationality are also higher than local plants in both yeas, but they are less significant except Japanese plants in 1996. For production workers wage differentials involving Japanese, European and U.S. plants were smaller than differentials for non-production workers in 1996 (16-20 percent) and 1998 (40-51 percent). Wages for production workers in Asian NIE plants were equal to wages in local plants in 1996, and 11 percent larger in 1998. The labor productivities of both production and non-production workers were also higher in Japanese, European and U.S. plants than in local plants. Those of MNC plants from Asian NIEs and others tend to be larger but insignificant or smaller than local plants. Thus, here again there are differences in patterns of wage differentials and productivity differentials.

4. Wage determination and wage differentials

The previous section focuses on simple comparison of wages and labor productivities in foreign MNC plants and local plants, and they tend to be higher for MNC plants than local plants. But that comparison of wages does not control for other factors that might affect wage determination in each group of plants. Thus, even if higher wages are observed in foreign MNC plants, the higher wages may result from some other factor not related to ownership. This section outlines a regression methodology that can be used to see if wage differentials persist and the effects of some other factors thought to affect wage determination are accounted for. To do this, wage levels are estimated as functions of plant characteristics and dummy variables identify-

timated as functions of plant characteristics and dummy variables identifying MNC plants as follows.[19]

$$\ln W_k = \alpha_{k0} + \alpha_{k1} \cdot \ln(VA/L_k) + \alpha_{k2} \cdot DMNC + \alpha_{k3} \cdot DBK + \sum_{i=1}^{12} \alpha I_{ki} \cdot DI_i \qquad (1)$$

$$\ln W_k = \beta_{k0} + \beta_{k1} \cdot \ln(VA/L_k) + \beta_{k2} \cdot DM100 + \beta_{k3} \cdot DMMJ + \beta_{k4} \cdot DMMN$$

$$+ \beta_{k5} \cdot DBK + \sum_{i=1}^{12} \beta I_{ki} \cdot DI_i \qquad (2)$$

$$\ln W_k = \gamma_{k0} + \gamma_{k1} \cdot \ln(VA/L_k) + \sum_{j} \gamma_{kj} \cdot DM_j + \gamma_{k2} \cdot DBK + \sum_{i=1}^{12} \gamma I_{ki} \cdot DI_i \qquad (3)$$

where

$\ln W_k$=the log of hourly wage, where $k=N$ for non-production workers and $k=P$ for production workers,

$\ln VA/L_k$=labor productivity calculated as the log of value added (VA) divided by hours worked (L_k), where $k=N$ for non-production workers and $k=P$ for production workers,

$DMNC$=1 if foreign ownership share of the plant is 1% or greater and =0 otherwise (MNC dummy),

$DM100$=1 if foreign ownership share is 100 percent and =0 otherwise (wholly-foreign MNC dummy),

$DMMJ$=1 if foreign ownership share is 50-99 percent and =0 otherwise (majority-foreign MNC dummy),

$DMMN$=1 if foreign ownership share is 1-49 percent and =0 otherwise (minority-foreign MNC dummy),

DM_j=1 if the nationality of the foreign ownership of the plant is the j th nationality and =0 otherwise, where $j=ES$ (European countries and the United States), JP (Japan), NS (Asian NIEs: Korea, Singapore and Taiwan), OT (others),

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[19] This is a very restrictive way of dealing with intra-industry differentials, however, because it forces slope coefficients to be identical for all industries. A less restrictive approach would be to estimate separate equations for separate industries.

DBK=1 if plant is located in the Bangkok region and =0 otherwise,

DI$_i$ =1 is the industry dummy variable if the plant belongs to the *i* th industry and =0 otherwise (*i*=1...12).[20, 21]

As it is already mentioned that plants tend to pay higher wage because they have higher productivity, the coefficients on ln(*VA/LN*)and ln(*VA/LP*) are expected to be positive. To control for other plant-specific characteristics, dummy variables for location and industry affiliation are added to all equations. Plants located in the Bangkok region are thought to pay higher wages than plants elsewhere and the coefficient on the Bangkok region dummy variable (*DBK*) is expected to be positive.[22] Coefficients on industry dummies may also reflect plant-specific characteristics other than those explicitly accounted for in these regressions if those characteristics tend to be clustered in specific industries.

In equation (1), the magnitude of the coefficients on the MNC dummy variable (*DMNC*) indicates the magnitude of the wage differential between MNC plants and local plants in percent which cannot explained by labor productivity, location, and industry affiliation. Similarly, in equation (2), the magnitudes of coefficients on dummy variables for foreign ownership groups (*DM100, DMMJ, DMMN*) indicate the magnitude of the wage differentials between those ownership groups and local plants. In

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[20] Industry dummies are specified for food, textiles, apparel, footwear and leather, chemicals, rubber products, plastics, non-metallic mineral products, fabricated metals, general machinery, electric machinery, and motor vehicles. The control industry for which no dummy is specified is other manufacturing.

[21] Furthermore, a dummy variable for the plant with the one record retained from each set of duplicates (*DUP*) is added to all equations in 1996 to reduce the effect from the problem of duplicated data, as mentioned in section 3. Note that the sample in 1998 used in this analysis does not contain these records.

[22] The Bangkok vicinity is defined to include Bangkok, Samut Prakan, Nonthaburi, Pathum Thani, Nakhon Pathom, and Samut Sakon. Plants which have the one of the duplicate records in the original data set are assumed be located outside of the Bangkok area.

equation (3), the magnitudes of the coefficients on dummy variables for nationality groups (*DMES*, *DMJP DMNS, DMOT*) indicate the magnitude of the wage differentials between local plants and the four foreign nationality groups. Estimates are done using the ordinary least squares method with White's heteroscedasticity consistent standard errors to evaluate t-statistics.

5. Results of Econometric Estimation

The results of estimating equations (1) to (3) are reported in Tables 6 to 8. As expected, coefficients of labor productivities of ln(*VA/LN*), ln(*VA/LP*) and location dummy variable (*DBK*) are positive and significant at the 1 percent level or better in all regressions for both non-production and production workers in 1996 and 1998 (Table 6 to Table 8).[23] Thus, there is strong evidence that plants with higher labor productivity tend to pay relatively high wages and that plants in the Bangkok region also pay relatively high wages.

In equation (1), the coefficients on the MNC dummy variable (*DMNC*) are positive and significant at the 1 percent level or better for both non-production workers (0.20) and production workers (0.08) in 1996 (Table 6). This means MNC plants pay wages 20 percent (8 percent) higher for non-production workers (production workers) than local plants after controlling for other plant characteristics. These coefficients are also positive and significant in 1998 (0.28 and 0.12, respectively) but are somewhat larger than in 1996. This result indicates that there exist wage differentials between MNC plants and local plants which cannot be explained with labor productivity or other variables like location or industry affiliations. This wage differential is more than two

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[23] The coefficients of *DUP* are all positive and significant at 1-5 percent level or better. Appendix Table 4 shows the regression results without those duplicated records, and the main results don't change.

times larger for non-production workers than for production workers and larger in 1998 than in 1996.

Regression results for equation (2) are only available for 1996 and indicate that wage differentials differ depending on foreign ownership share (Table 7). There are significant coefficients on the majority- and minority-foreign dummies, which of almost similar magnitude for non-production workers (0.27 and 0.21, respectively). There are also statistically significant, but somewhat smaller coefficients on the majority- and minority-foreign dummy for production workers (0.16 and 0.27, respectively). However, wage differentials between wholly-foreign MNC plants and local plants are rather smaller and less significant than for the MNC plants with less foreign ownership shares.

Results of estimating equation (3) indicate that wage differentials are also related to the nationality of a plant (Table 8). Coefficients on dummy variables for Japanese plants and Asian NIE plants always positive and significant at 1-5 percent level or better. Coefficients on the dummy for European and U.S. plants is also positive and significant in most cases, the equation for production workers in 1996 being the one exception. Coefficients on the dummy for MNC plants from other countries are only significant in equations for non-production workers in both 1996 and 1998. Wage differentials tend to be largest in MNC plants from Japan, Europe and the United States and somewhat smaller in MNC plants from the Asian NIEs. Wage differentials between foreign MNC plants and local plants also appear to be larger for non-production workers than for production workers in all nationality groups.

6. Conclusion and remarks

This paper analyzes the wage differentials between plants belonging to foreign multinational corporations (MNCs) and plants belonging to local firms in the Thai

manufacturing sector. The first major finding of the paper is evidence of positive wage differentials between MNC plants and local plants for both non-production and production labor after controlling the other plant characteristics, including labor productivity, location, and industry affiliation. And also, the magnitude of the wage differential is larger for non-production workers than for production workers. This may suggest that the magnitude of labor market segmentation between MNC plants and local plants is larger in non-production workers than in production workers. Non-production workers tend to have firm-specific knowledge by training or have more chances to get technologies. Then MNC plants may pay higher wages than local plants to prevent from their turnover.

The second, by foreign ownership share, the magnitude of the wage differential between majority- and minority-foreign MNC plants and local plants are larger than for wholly-foreign MNC plants and local plants. As far as a wage differential between local plants and wholly-foreign MNC plants is smaller and less significant than for MNC plants with less foreign ownership share, some of the reason may be due to that they might have more power to control for technology diffusion as Takii(2001) mentioned. But this interpretation is not applicable to the results in the case of majority ownership share against minority ownership share.

The third, wage differentials between local plants and MNC plants from Japan, and EU countries or the U.S. are very large, but its differentials for MNC plants from Asian NIEs countries are less than half the size of differentials between local plants and foreign MNC plants from developed countries. This partly may be due to the relationship between nationality of MNC plants and industry specific characteristics. Asian NIEs countries tend to go into industries with low wages like textiles, electric machineries and so on.

These findings are certainly plausible but there is still a lot of research that needs to be done before they can be accepted. First, the industry dimension should be scrutinized more thoroughly by running regressions at the industry level. Because wholly-foreign MNC plants or MNC plants from Asian NIEs countries tend to be in some specific industries. Second, simultaneous problem might occur as far as wages reflect workers' skills, education attainment or efforts. Third problem is presented by the fact that outputs and factor inputs are usually determined simultaneously. There is clearly a limit to the ability to deal with problems like these in the context of this data set but these problems do need more investigation in future research.

However, in the final analysis, it should be emphasized this paper has shown the major results summarized to be rather robust in a variety of specifications and samples. Thus, the major findings of positive wage differentials between MNC plants and local plants and may well survive further scrutiny. In the Thai context, the finding of positive wage differentials is of particular interest because it is consistent with previous results for Thailand but contrasts markedly with the evidences of the regression results that labor productivity differentials between MNC plants and local plants were generally insignificant in Thailand after controlling other explanatory variables. The combination of these two findings is of great interest because it implies that wage differentials result from imperfections in labor markets among foreign MNC plants and local plants.

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Table 1: Economic indicators for Thai manufacturing in 1996 and 1998 (units as noted)

Indicator	NESDB, National Accounts, or NSO, Labor Force Surveys, samples of all employees	NSO, Labor Force Surveys, samples of employees reporting wages	NSO, industrial survey, published estimates	NSO, industrial census, this sample
1996				
Value added, million current baht	1,303,417	NA	998,144	765,742
Total workers, number	4,334,200	3,206,500	2,431,584	1,491,383
Monthly compensation per employee, current baht	9,369	5,016	8,108	8,677
1998				
Value added, million current baht	1,362,990	NA	653,238	385,696
Total workers, number	4,189,300	3,204,700	2,008,374	746,877
Monthly compensation per employee, current baht	10,435	5,938	8,217	8,717

a-For labor force data, compensation includes bonuses, overtime, other income, cash benefits, and payments in k
(e.g, food, clothing, housing, transportation);
for industrial census data, compensation includes wages, overtime, bonuses, cash benefits, and payments in kind
Sources) National Economic and Social Development Board (2001);
National Statistical Office (1996,1998, 1999,2001)

Table 2: Value added in foreign MNCs as a share ot total value added in each industry

	All plants (Million baht)		MNC(%)		By Foreign Ownership Share						By Nationality							
					100%		Majority		Minority		EU&US		Japan		NIES		Others	
		(%)	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
1996																		
Mg Manufacturing (Output>=25Mil. of baht)	765,742	100.0	53.4	100.0	11.3	100.0	9.7	100.0	32.4	100.0	8.2	100.0	32.7	100.0	6.3	100.0	6.2	100.0
I1 Food	52,297	6.8	25.5	3.3	1.7	1.0	4.2	3.0	19.7	4.1	4.2	3.5	9.8	2.1	4.0	4.3	7.5	8.2
I2 Textiles	31,319	4.1	57.1	4.4	1.6	0.6	7.0	3.0	48.5	6.1	1.5	0.8	32.0	4.0	11.0	7.1	12.5	8.2
I3 Apparel	17,300	2.3	37.4	1.6	1.0	0.2	1.7	0.4	34.7	2.4	1.9	0.5	13.4	0.9	7.4	2.6	14.6	5.3
I4 Footwear & leather	9,052	1.2	27.2	0.6	2.7	0.3	10.0	1.2	14.5	0.5	3.7	0.5	8.1	0.3	11.7	2.2	3.7	0.7
I5 Chemicals & products	50,665	6.6	59.8	7.4	11.1	6.5	25.9	17.7	22.8	4.7	17.5	14.2	30.5	6.2	5.5	5.8	6.3	6.6
I6 Rubbers	31,542	4.1	47.0	3.6	4.2	1.5	24.7	10.5	18.1	2.3	18.5	9.3	10.6	1.3	10.1	6.6	7.8	5.1
I7 Plastics	18,011	2.4	38.4	1.7	7.2	1.5	9.6	2.3	21.6	1.6	0.3	0.1	20.0	1.4	4.1	1.5	14.0	5.3
I8 Non-metallic mineral products	31,507	4.1	30.4	2.3	1.0	0.4	7.1	3.0	22.3	2.8	5.8	2.9	6.0	0.8	12.1	7.8	6.5	4.3
I9 Fabricated metals	25,435	3.3	63.9	4.0	8.4	2.5	6.8	2.3	48.7	5.0	2.6	1.1	32.5	3.3	12.2	6.4	16.5	8.8
I10 General machinery	31,042	4.1	75.3	5.7	34.9	12.5	12.7	5.3	27.7	3.5	2.4	1.2	59.2	7.3	10.2	6.5	3.4	2.2
I11 Electric machinery	105,219	13.7	89.6	23.1	54.8	66.5	14.7	20.9	20.1	8.5	15.4	25.9	48.9	20.6	18.5	40.1	6.9	15.2
I12 Motor vehicles	128,286	16.8	90.1	28.3	1.2	1.8	7.5	13.0	81.4	42.1	0.3	0.6	88.5	45.4	0.1	0.2	1.3	3.4
I13 Other manufacturings	234,066	30.6	24.7	14.1	1.8	4.8	5.5	17.3	17.4	16.4	10.5	39.4	6.9	6.4	1.8	8.8	5.5	26.7
1998																		
Mg Manufacturing (Output>=25Mil. of baht)	385,696	100.0	61.4	100.0	-	-	-	-	-	-	10.4	100.0	33.4	100.0	7.8	100.0	9.8	100.0
I1 Food	32,645	8.5	28.0	3.9	-	-	-	-	-	-	4.8	3.9	14.3	3.6	2.6	2.8	6.4	5.5
I2 Textiles	18,921	4.9	45.5	3.6	-	-	-	-	-	-	7.0	3.3	14.9	2.2	11.6	7.2	12.1	6.1
I3 Apparel	10,168	2.6	67.0	2.9	-	-	-	-	-	-	23.1	5.9	6.5	0.5	7.3	2.5	30.1	8.1
I4 Footwear & leather	11,104	2.9	12.9	0.6	-	-	-	-	-	-	2.3	0.6	1.2	0.1	3.9	1.4	5.4	1.6
I5 Chemicals & products	24,643	6.4	56.5	5.9	-	-	-	-	-	-	24.9	15.4	19.5	3.7	6.2	5.0	6.0	3.9
I6 Rubbers	17,342	4.5	62.2	4.6	-	-	-	-	-	-	21.0	9.1	22.8	3.1	11.2	6.4	7.1	3.3
I7 Plastics	8,869	2.3	39.1	1.5	-	-	-	-	-	-	2.1	0.5	19.5	1.3	9.8	2.9	7.7	1.8
I8 Non-metallic mineral products	29,244	7.6	60.3	7.5	-	-	-	-	-	-	24.3	17.8	26.0	5.9	5.2	5.0	4.8	3.8
I9 Fabricated metals	11,250	2.9	53.6	2.5	-	-	-	-	-	-	0.5	0.1	37.3	3.3	10.6	3.9	5.3	1.6
I10 General machinery	31,218	8.1	93.8	12.4	-	-	-	-	-	-	2.5	1.9	82.7	20.0	3.3	3.4	5.4	4.5
I11 Electric machinery	56,388	14.6	93.1	22.2	-	-	-	-	-	-	18.1	25.6	46.3	20.3	22.9	42.7	5.8	8.7
I12 Motor vehicles	34,715	9.0	95.3	14.0	-	-	-	-	-	-	0.2	0.2	94.2	25.4	0.7	0.8	0.2	0.2
I13 Other manufacturings	99,190	25.7	44.3	18.6	-	-	-	-	-	-	6.4	15.8	13.7	10.6	4.9	15.9	19.4	51.0

Notes:) a=percentage of industry value added; industry share of total manufacturing for that ownership group.
Source) Compilations from plant-level data underlying National Statistical Office (1999, 2001).

Fig 1 Hourly wages and average labor productivity by industry
Non-production workers

Production workers

Source) Compilations from plant-level data underlying National Statistical Office (1999, 2001).

Table 3: Economic performance in local plants and foreign MNC plants

			Local plants	MNC plants	
			Mean(A)	Mean(B)	B/A
1996					
Non-production workers					
WN	(Baht per hour)		**55**	**71**	**1.29 *****
		S.D.	57	76	
VA/LN	(Baht per hour)		**1,343**	**1,540**	**1.15 ***
		S.D.	4,132	4,308	
Production workers					
WP	(Baht per hour)		**21**	**23**	**1.09 *****
		S.D.	15	17	
VA/LP	(Baht per hour)		**205**	**259**	**1.26 ***
		S.D.	592	1,221	
1998					
Non-production workers					
WN	(Baht per hour)		**54**	**81**	**1.48 *****
		S.D.	45	66	
VA/LN	(Baht per hour)		**1,305**	**1,771**	**1.36 *****
		S.D.	3,276	4,212	
Production workers					
WP	(Baht per hour)		**28**	**37**	**1.34 *****
		S.D.	18	28	
VA/LP	(Baht per hour)		**186**	**319**	**1.72 *****
		S.D.	336	543	

Source) Compilations from plant-level data underlying National Statistical Office (1999, 2001).

Notes) Welch's test is used to considere heteroscedasticity; E=number of workers,

EN=number of non-production workers, EP=number of production workers,

LN=hours worked by non-production workers, LP=hours worked by production workers,

VA=value added.

***=significant at the 1 percent level, ** =significant at the 5 percent level,

and *=significant at the 10 percent level.

Table 4: Economic performance in local plants and foreign MNC's by foreign ownership share

Number of plants	Local plants Mean(A)	Wholly-foreign MNC plants Mean(B)	B/A	Majority-foreign MNC plants Mean(C)	C/A	Minority-foreign MNC plants Mean(D)	D/A
1996							
Non-production workers							
WN (Baht per hour)	**55**	**71**	**1.29 *****	**74**	**1.35 *****	**70**	**1.28 *****
S.D.	57	83		73		75	
VA/LN (Baht per hour)	**1,343**	**1,571**	**1.17**	**1,714**	**1.28**	**1,474**	**1.10**
S.D.	4,132	3,304		5,585		4,064	
Production workers							
WP (Baht per hour)	**21**	**23**	**1.08 ***	**25**	**1.16 *****	**23**	**1.07 *****
S.D.	15	20		20		16	
VA/LP (Baht per hour)	**205**	**165**	**0.80 ****	**378**	**1.84**	**245**	**1.19 ****
S.D.	592	315		2,541		481	

Source) Compilations from plant-level data underlying National Statistical Office (1999, 2001).

Notes) Welch's test is used to considere heteroscedasticity; E=number of workers, EN=number of non-production workers, EP=number

of production workers, LN=hours worked by non-production workers, LP=hours worked by production workers,

VA=value added.

***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.

Table 5: Economic performance in local plants and foreign MNC plants by nationality

	Local plants	European & U.S. MNC plants		Japanese MNC plants		Asian NIEs' MNC plants		Other MNC plants	
	Mean(A)	Mean(B)	B/A	Mean(C)	C/A	Mean(D)	D/A	Mean(E)	E/A
1996									
Non-production workers									
WN (Baht per hour)	**55**	**85**	**1.55 *****	**75**	**1.36 *****	**60**	**1.09 ****	**67**	**1.22 *****
S.D.	57	98		78		56		76	
VA/LN (Baht per hour)	**1,343**	**1,571**	**1.17**	**1,691**	**1.26 ****	**1,578**	**1.18**	**1,113**	**0.83**
S.D.	4,132	4,640		4,546		4,345		3,281	
Production workers									
WP (Baht per hour)	**21**	**26**	**1.20 *****	**25**	**1.16 *****	**21**	**1.00**	**21**	**0.98**
S.D.	15	21		18		14		18	
VA/LP (Baht per hour)	**205**	**363**	**1.77 *****	**321**	**1.56 ***	**166**	**0.81 ***	**166**	**0.81 ****
S.D.	592	853		1,791		455		275	
1998									
Non-production workers									
WN (Baht per hour)	**54**	**78**	**1.44 *****	**93**	**1.70 *****	**65**	**1.19 *****	**73**	**1.34 *****
S.D.	45	56		75		48		64	
VA/LN (Baht per hour)	**1,305**	**2,204**	**1.69 ***	**1,519**	**1.16 ***	**1,834**	**1.41 ***	**2,043**	**1.57 ***
S.D.	3,276	6,201		1,985		4,500		6,088	
Production workers									
WP (Baht per hour)	**28**	**39**	**1.40 *****	**42**	**1.51 *****	**31**	**1.11 ****	**33**	**1.19 *****
S.D.	18	27		31		21		24	
VA/LP (Baht per hour)	**186**	**417**	**2.25 *****	**348**	**1.87 *****	**220**	**1.18**	**313**	**1.69 *****
S.D.	336	528		611		392		530	

Source) Compilations from plant-level data underlying National Statistical Office (1999, 2001).

Notes) Welch's test is used to considere heteroscedasticity; E=number of workers, EN=number of non-production workers, EP=number

of production workers, LN=hours worked by non-production workers, LP=hours worked by production workers,

VA=value added.

***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.

Table 6: Regressions explaining wage determination in manufacturing plants, equation (1)
(Dependent variable (Y) is the log of the hourly wage)

	1996				1998			
	log(WN)		log(WP)		log(WN)		log(WP)	
	Coef.	Tstat.	Coef.	Tstat.	Coef.	Tstat.	Coef.	Tstat.
C	2.28	33.83 ***	2.00	49.21 ***	2.15	23.60 ***	1.76	29.60 ***
log(VA/LN)	0.19	19.28 ***	-	- -	0.23	16.64 ***	-	- -
log(VA/LP)	-	- -	0.16	20.70 ***	-	- -	0.28	24.54 ***
DMNC	0.20	7.64 ***	0.08	4.12 ***	0.28	8.21 ***	0.12	4.68 ***
DBK	0.37	13.46 ***	0.27	13.22 ***	0.24	7.77 ***	0.15	6.38 ***
Food	-0.08	-1.70 *	-0.14	-4.06 ***	-0.18	-3.42 ***	-0.15	-3.93 ***
Textiles	-0.32	-6.66 ***	-0.24	-6.93 ***	-0.34	-4.83 ***	-0.20	-4.34 ***
Apparel	0.06	1.43	0.12	3.93 ***	-0.04	-0.43	0.06	1.06
Footwear and leather	0.23	3.33 ***	0.17	2.96 ***	0.06	0.75	0.09	1.80 *
Chemicals	0.21	4.51 ***	-0.05	-1.23	0.12	1.98 **	-0.02	-0.49
Rubber products	-0.26	-4.30 ***	-0.28	-6.31 ***	-0.09	-1.28	-0.15	-3.03 ***
Plastics	-0.23	-4.67 ***	-0.26	-6.94 ***	-0.21	-2.56 **	-0.17	-2.99 ***
Non-metallic mineral products	0.02	0.33	0.06	1.58	0.10	1.62	0.11	2.37 **
Fabricated metals	0.07	1.44	0.14	4.31 ***	0.13	2.15 **	0.18	3.98 ***
General machinery	0.10	1.73 *	0.21	5.36 ***	0.23	3.16 ***	0.25	5.30 ***
Electric machinery	0.01	0.17	0.00	-0.10	0.01	0.19	0.08	1.79 *
Motor vehicles	0.11	1.65 *	0.28	6.88 ***	0.41	4.69 ***	0.34	4.95 ***
DUP	0.27	8.12 ***	0.21	8.46 ***	-	- -	-	- -
Adj.R2/Obs.	0.16	5,122	0.20	5,122	0.21	2,407	0.36	2,407
White test	239.36	0.00	233.32	0.00	80.52	0.01	109.26	0.00
Mean & S.D. of Y	3.72	0.86	2.87	0.66	3.83	0.82	3.22	0.65

Notes) T-statistics are calculated using White's heteroscedasticity-consistent standard errors.

LN=hours worked by non-production workers, LP=hours worked by production workers, VA=value added.

***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.

Table 7: Regressions explaining wage determination in manufacturing plants, equation (2)
(Dependent variable (Y) is the log of the hourly wage)

	1996				
	log(WN)			log(WP)	
	Coef.	Tstat.		Coef.	Tstat.
C	2.28	33.80 ***		2.00	49.01 ***
log(VA/LN)	0.19	19.35 ***		-	-	-
log(VA/LP)	-	-	-	0.16	20.71 ***
DM100	0.10	1.63		0.10	2.41 **
DMMJ	0.27	5.06 ***		0.16	4.27 ***
DMMN	0.21	6.78 ***		0.27	13.27 ***
DBK	0.37	13.43 ***		0.21	8.47 ***
Food	-0.08	-1.73 *		-0.14	-4.03 ***
Textiles	-0.32	-6.69 ***		-0.24	-6.90 ***
Apparel	0.06	1.42		0.12	3.96 ***
Footwear and leather	0.23	3.34 ***		0.16	2.89 ***
Chemicals	0.21	4.51 ***		-0.05	-1.28
Rubber products	-0.26	-4.29 ***		-0.28	-6.29 ***
Plastics	-0.23	-4.63 ***		-0.27	-7.00 ***
Non-metallic mineral products	0.01	0.30		0.06	1.60
Fabricated metals	0.07	1.48		0.14	4.28 ***
General machinery	0.10	1.78 *		0.21	5.31 ***
Electric machinery	0.02	0.44		-0.02	-0.41
Motor vehicles	0.10	1.57		0.28	6.88 ***
DUP	0.27	8.08 ***		0.05	2.32 **
Adj.R2/Obs.	0.16	5,122		0.20	5,122
White test	279.51	0.00		259.61	0.00
Mean & S.D. of Y	3.72	0.86		2.87	0.66

Notes) T-statistics are calculated using White's heteroscedasticity-consistent standard errors.

LN=hours worked by non-production workers, LP=hours worked by production workers, VA=value added

***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.

Table 8: Regressions explaining wage determination in manufacturing plants, equation (3)
(Dependent variable (Y) is the log of the hourly wage)

	1996				1998			
	log(WN)		log(WP)		log(WN)		log(WP)	
	Coef.	Tstat.	Coef.	Tstat.	Coef.	Tstat.	Coef.	Tstat.
C	2.28	33.75 ***	2.00	49.37 ***	2.15	23.73 ***	1.77	29.66 ***
log(VA/LN)	0.19	19.26 ***	-	- -	0.22	16.57 ***	-	- -
log(VA/LP)	-	- -	0.16	20.67 ***	-	- -	0.28	24.35 ***
DMES	0.34	5.52 ***	0.08	1.47	0.29	3.95 ***	0.12	2.17 **
DMJP	0.23	5.67 ***	0.14	5.09 ***	0.39	8.14 ***	0.16	4.94 ***
DMNS	0.12	2.73 ***	0.07	2.27 **	0.15	2.85 ***	0.08	1.97 **
DMOT	0.17	3.11 ***	-0.01	-0.30	0.21	2.83 ***	0.05	1.00
DBK	0.37	13.48 ***	0.27	13.37 ***	0.25	8.02 ***	0.15	6.52 ***
Food	-0.08	-1.66 *	-0.14	-4.14 ***	-0.18	-3.28 ***	-0.15	-3.87 ***
Textiles	-0.31	-6.54 ***	-0.24	-6.98 ***	-0.34	-4.81 ***	-0.20	-4.34 ***
Apparel	0.06	1.50	0.12	3.92 ***	-0.04	-0.46	0.06	1.05
Footwear and leather	0.23	3.43 ***	0.17	2.92 ***	0.07	0.85	0.09	1.85 *
Chemicals	0.20	4.44 ***	-0.05	-1.28	0.12	1.97 **	-0.02	-0.47
Rubber products	-0.25	-4.14 ***	-0.27	-6.10 ***	-0.07	-1.12	-0.14	-2.92 ***
Plastics	-0.22	-4.56 ***	-0.27	-7.04 ***	-0.22	-2.59 ***	-0.17	-3.01 ***
Non-metallic mineral products	0.02	0.35	0.06	1.55	0.10	1.64	0.11	2.39 **
Fabricated metals	0.07	1.55	0.14	4.24 ***	0.12	2.00 **	0.18	3.87 ***
General machinery	0.10	1.74 *	0.21	5.13 ***	0.20	2.84 ***	0.24	5.12 ***
Electric machinery	0.01	0.18	-0.02	-0.42	0.01	0.09	0.07	1.68 *
Motor vehicles	0.10	1.54	0.26	6.46 ***	0.35	4.09 ***	0.31	4.53 ***
DUP	0.27	8.15 ***	0.21	8.46 ***	-	- -	-	- -
Adj.R2/Obs.	0.16	5,122	0.20	5,122	0.22	2,407	0.36	2,407
White test	293.96	0.00	299.45	0.00	127.47	0.03	146.41	0.00
Mean & S.D. of Y	3.72	0.86	2.87	0.66	3.83	0.82	3.22	0.65

Notes) T-statistics are calculated using White's heteroscedasticity-consistent standard errors.

LN=hours worked by non-production workers, LP=hours worked by production workers, VA=value added

***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.

Appendix Table 1: Number of plants

	All plants	MNC plants							
			Foreign Ownership Share			Nationality			
			100%	Majority	Minority	EU&US	Japan	Asian NIES	Others
1996									
Mg Manufacturing (Output>=25Mil. of baht)	5,122	1,428	245	294	889	213	583	377	255
I1 Food	342	85	8	16	61	14	33	27	11
I2 Textiles	342	105	7	18	80	9	41	35	20
I3 Apparel	345	70	6	11	53	6	26	14	24
I4 Footwear and leather	123	28	7	9	12	4	8	14	2
I5 Chemicals	359	127	21	27	79	30	46	28	23
I6 Rubber products	205	66	11	12	43	6	16	15	29
I7 Plastics	309	83	15	18	50	3	40	22	18
I8 Non-metallic mineral products	365	48	2	9	37	13	14	18	3
I9 Fabricated metals	345	95	18	19	58	10	37	33	15
I10 General machinery	243	80	17	15	48	7	46	19	8
I11 Electric machinery	355	224	84	61	79	28	114	61	21
I12 Motor vehicles	186	69	3	18	48	5	56	4	4
I13 Other manufacturings	1,603	348	46	61	241	78	106	87	77
1998									
Mg Manufacturing (Output>=25Mil. of baht)	2,407	797	-	-	-	107	367	200	123
I1 Food	221	53	-	-	-	6	19	20	8
I2 Textiles	158	47	-	-	-	7	17	14	9
I3 Apparel	62	25	-	-	-	2	11	3	9
I4 Footwear and leather	99	15	-	-	-	2	3	7	3
I5 Chemicals	188	77	-	-	-	14	29	18	16
I6 Rubber products	134	39	-	-	-	7	9	10	13
I7 Plastics	102	45	-	-	-	2	22	14	7
I8 Non-metallic mineral products	173	33	-	-	-	11	11	8	3
I9 Fabricated metals	150	43	-	-	-	1	27	12	3
I10 General machinery	122	63	-	-	-	8	40	7	8
I11 Electric machinery	190	133	-	-	-	11	69	41	12
I12 Motor vehicles	75	48	-	-	-	2	41	3	2
I13 Other manufacturings	733	176	-	-	-	34	69	43	30

Source) Compilations from plant-level data underlying National Statistical Office (1999, 2001).

Appendix Table 2: Wage and average labor productivity for non-production workers

		WN			VA/LN			K/LN		
		Local plan Mean(A)	MNC Mean(B)	B/A	Local plan Mean(A)	MNC Mean(B)	B/A	Local plan Mean(A)	MNC Mean(B)	B/A
1996										
Mg	Manufacturing	**55**	**71**	**1.3** ***	**1,343**	**1,540**	**1.1** *	**574**	**966**	**1.7** ***
	(S.D.)	57	76		4,132	4,308		1,910	3,496	
I1	Food	**45**	**60**	**1.3** **	**1,855**	**1,720**	**0.9**	**631**	**659**	**1.0** **
	(S.D.)	44	72		8,036	3,967		3,566	2,115	
I2	Textiles	**41**	**52**	**1.3** **	**709**	**1,527**	**2.2** **	**700**	**1,685**	**2.4** **
	(S.D.)	49	61		1,577	4,490		1,351	3,945	
I3	Apparel	**57**	**80**	**1.4** ***	**875**	**1,512**	**1.7**	**199**	**336**	**1.7** ***
	(S.D.)	53	74		1,126	4,714		330	700	
I4	Footwear and leather	**66**	**94**	**1.4** *	**1,118**	**1,539**	**1.4**	**325**	**382**	**1.2** **
	(S.D.)	56	86		1,756	2,431		488	421	
I5	Chemicals	**69**	**79**	**1.2** *	**880**	**1,160**	**1.3**	**497**	**1,188**	**2.4** **
	(S.D.)	63	75		2,029	2,352		1,479	2,416	
I6	Rubber products	**43**	**38**	**0.9**	**1,870**	**2,660**	**1.4**	**507**	**905**	**1.8** **
	(S.D.)	43	34		4,363	10,177		864	2,982	
I7	Plastics	**42**	**58**	**1.4** **	**771**	**652**	**0.8**	**612**	**574**	**0.9** **
	(S.D.)	45	67		1,460	1,072		1,540	559	
I8	Non-metallic mineral products	**54**	**69**	**1.3** *	**1,578**	**1,647**	**1.0**	**712**	**1,398**	**2.0** **
	(S.D.)	63	61		3,495	4,344		1,084	3,597	
I9	Fabricated metals	**62**	**69**	**1.1**	**1,224**	**1,485**	**1.2**	**401**	**867**	**2.2** **
	(S.D.)	49	69		2,298	2,876		664	1,197	
I10	General machinery	**69**	**78**	**1.1**	**1,518**	**1,489**	**1.0**	**784**	**1,006**	**1.3** **
	(S.D.)	93	71		3,643	2,587		3,609	2,036	
I11	Electric machinery	**59**	**69**	**1.2** *	**1,038**	**1,416**	**1.4** **	**346**	**699**	**2.0**
	(S.D.)	47	71		1,501	2,682		783	957	
I12	Motor vehicles	**66**	**94**	**1.4** **	**1,447**	**3,797**	**2.6** **	**472**	**1,673**	**3.5** **
	(S.D.)	64	88		2,022	8,890		1,244	4,995	
I13	Other manufacturings	**55**	**79**	**1.4** ***	**1,572**	**1,289**	**0.8**	**661**	**1,013**	**1.5** ***
	(S.D.)	55	90		5,104	3,450		2,122	5,609	
1998										
Mg	Manufacturing	**54**	**81**	**1.5** ***	**1,305**	**1,771**	**1.4** ***	**830**	**1,471**	**1.8** ***
	(S.D.)	45	66		3,276	4,212		4,799	8,986	
I1	Food	**43**	**58**	**1.4** **	**1,479**	**1,685**	**1.1**	**486**	**427**	**0.9** **
	(S.D.)	36	43		3,347	2,096		723	414	
I2	Textiles	**46**	**59**	**1.3**	**1,296**	**1,495**	**1.2**	**679**	**4,623**	**6.8** **
	(S.D.)	47	61		2,011	2,773		933	22,349	
I3	Apparel	**56**	**76**	**1.4** **	**1,634**	**4,236**	**2.6**	**309**	**1,157**	**3.7** **
	(S.D.)	44	40		2,243	11,833		377	3,983	
I4	Footwear and leather	**65**	**68**	**1.0**	**1,594**	**1,099**	**0.7** *	**401**	**234**	**0.6** **
	(S.D.)	49	42		2,095	1,066		482	258	
I5	Chemicals	**66**	**88**	**1.3** **	**960**	**1,164**	**1.2**	**1,448**	**1,543**	**1.1** **
	(S.D.)	61	70		1,482	1,313		5,946	3,679	
I6	Rubber products	**49**	**60**	**1.2** *	**965**	**2,452**	**2.5** *	**444**	**1,239**	**2.8** **
	(S.D.)	34	44		1,027	5,781		664	2,758	
I7	Plastics	**40**	**76**	**1.9** ***	**1,945**	**951**	**0.5** *	**886**	**717**	**0.8** **
	(S.D.)	31	78		5,571	1,033		1,852	1,097	
I8	Non-metallic mineral products	**50**	**91**	**1.8** ***	**931**	**4,106**	**4.4** *	**807**	**7,638**	**9.5** **
	(S.D.)	39	59		1,386	10,858		1,302	33,766	
I9	Fabricated metals	**64**	**81**	**1.3** **	**1,211**	**1,644**	**1.4**	**603**	**944**	**1.6** **
	(S.D.)	45	54		2,238	2,466		1,149	1,059	
I10	General machinery	**72**	**97**	**1.3** **	**988**	**1,854**	**1.9** ***	**466**	**1,048**	**2.2**
	(S.D.)	50	83		981	1,996		697	1,267	
I11	Electric machinery	**62**	**81**	**1.3** **	**1,416**	**2,155**	**1.5** *	**841**	**919**	**1.1**
	(S.D.)	48	72		2,824	4,683		2,526	1,605	
I12	Motor vehicles	**65**	**119**	**1.8** ***	**1,161**	**1,337**	**1.2**	**685**	**1,480**	**2.2**
	(S.D.)	47	61		1,126	1,195		757	2,048	
I13	Other manufacturings	**54**	**80**	**1.5** ***	**1,391**	**1,293**	**0.9**	**1,095**	**844**	**0.8** **
	(S.D.)	45	64		4,427	2,379		7,563	1,525	

Source) Compilations from plant-level data underlying National Statistical Office (1999, 2001).

Notes) Welch's test is used to considere heteroscedasticity.

***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.

Appendix Table 3: Wage and average labor productivity for production workers

		WN			VA/LN		
		Local plants Mean(A)	MNC Mean(B)	B/A	Local plants Mean(A)	MNC Mean(B)	B/A
1996							
Mg	Manufacturing	**21**	**23**	**1.09** ***	**205**	**259**	**1.3** *
	(S.D.)	15	17		592	1,221	
I1	Food	**16**	**18**	**1.1**	**199**	**136**	**0.7**
	(S.D.)	10	12		870	354	
I2	Textiles	**16**	**16**	**1.0**	**80**	**116**	**1.4** *
	(S.D.)	12	10		145	209	
I3	Apparel	**21**	**24**	**1.1** ***	**85**	**81**	**1.0**
	(S.D.)	10	9		96	101	
I4	Footwear and leather	**24**	**27**	**1.2**	**122**	**85**	**0.7**
	(S.D.)	14	14		196	128	
I5	Chemicals	**22**	**26**	**1.1** *	**230**	**789**	**3.4** *
	(S.D.)	17	18		438	3,789	
I6	Rubber products	**15**	**14**	**0.9**	**233**	**381**	**1.6**
	(S.D.)	10	12		667	1,440	
I7	Plastics	**16**	**18**	**1.1**	**86**	**107**	**1.2**
	(S.D.)	11	15		115	158	
I8	Non-metallic mineral products	**22**	**27**	**1.3** *	**212**	**195**	**0.9**
	(S.D.)	15	24		337	256	
I9	Fabricated metals	**25**	**26**	**1.0**	**163**	**294**	**1.8** ***
	(S.D.)	16	20		242	410	
I10	General machinery	**28**	**27**	**1.0**	**175**	**226**	**1.3** *
	(S.D.)	18	16		228	256	
I11	Electric machinery	**24**	**23**	**0.9**	**209**	**190**	**0.9**
	(S.D.)	16	19		322	407	
I12	Motor vehicles	**28**	**36**	**1.3** **	**213**	**555**	**2.6** ***
	(S.D.)	13	25		280	568	
I13	Other manufacturings	**22**	**24**	**1.1** **	**286**	**192**	**0.7** ***
	(S.D.)	17	17		838	285	
1998							
Mg	Manufacturing	**28**	**37**	**1.3** ***	**186**	**319**	**1.7** ***
	(S.D.)	18	28		336	543	
I1	Food	**21**	**23**	**1.1**	**131**	**170**	**1.3**
	(S.D.)	11	12		140	306	
I2	Textiles	**21**	**23**	**1.1**	**97**	**126**	**1.3** *
	(S.D.)	14	14		104	103	
I3	Apparel	**22**	**33**	**1.5** ***	**76**	**154**	**2.0** **
	(S.D.)	9	14		79	185	
I4	Footwear and leather	**29**	**37**	**1.3**	**160**	**116**	**0.7** **
	(S.D.)	13	25		166	62	
I5	Chemicals	**33**	**47**	**1.4** ***	**255**	**625**	**2.4** ***
	(S.D.)	27	33		275	739	
I6	Rubber products	**22**	**27**	**1.2**	**117**	**231**	**2.0** **
	(S.D.)	13	25		100	381	
I7	Plastics	**24**	**26**	**1.1**	**145**	**118**	**0.8**
	(S.D.)	21	21		192	124	
I8	Non-metallic mineral products	**28**	**51**	**1.8** ***	**184**	**424**	**2.3** ***
	(S.D.)	16	34		202	464	
I9	Fabricated metals	**35**	**42**	**1.2** **	**195**	**295**	**1.5** **
	(S.D.)	21	25		253	319	
I10	General machinery	**35**	**54**	**1.5** ***	**204**	**438**	**2.1** ***
	(S.D.)	16	40		171	626	
I11	Electric machinery	**33**	**37**	**1.1** *	**164**	**295**	**1.8** ***
	(S.D.)	19	27		134	543	
I12	Motor vehicles	**47**	**50**	**1.1**	**204**	**501**	**2.5** **
	(S.D.)	28	23		196	986	
I13	Other manufacturings	**28**	**35**	**1.2** ***	**230**	**307**	**1.3** **
	(S.D.)	18	25		506	501	

Source) Compilations from plant-level data underlying National Statistical Office (1999, 2001).

Notes) Welch's test is used to considere heteroscedasticity.

***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.

Appendix Table 4: Regressions explaining wage determination in 1997 (sample without the duplicated records)
(Dependent variable (Y) is the log of the hourly wage)

	log(WN)						log(WP)					
	Eq.(1)		Eq.(2)		Eq.(3)		Eq.(1)		Eq.(2)		Eq.(3)	
	Coef.	Tstat.	Coef.	Tstat.	Coef.	Tstat.	Coef.	Tstat.	Coef.	Tstat.	Coef.	Tstat.
C	2.33	31.79 ***	2.33	31.77 ***	2.33	31.73 ***	2.03	46.08 ***	2.03	45.89 ***	2.03	46.23 ***
log(VA/LN)	0.18	16.95 ***	0.18	17.04 ***	0.18	16.93 ***	-	- -	-	- -	-	- -
log(VA/LP)	-	- -	-	- -	-	- -	0.15	18.12 ***	0.15	18.14 ***	0.15	18.09 ***
DMNC	0.21	6.85 ***	-	- -	-	- -	0.08	3.75 ***	-	- -	-	- -
DM100	-	- -	0.11	1.56	-	- -	-	- -	0.12	2.62 ***	-	- -
DMMJ	-	- -	0.27	4.49 ***	-	- -	-	- -	0.16	3.78 ***	-	- -
DMMN	-	- -	0.21	6.12 ***	-	- -	-	- -	0.27	12.95 ***	-	- -
DMES	-	- -	-	- -	0.33	4.74 ***	-	- -	-	- -	0.05	0.82
DMJP	-	- -	-	- -	0.23	4.96 ***	-	- -	-	- -	0.16	5.19 ***
DMNS	-	- -	-	- -	0.12	2.61 ***	-	- -	-	- -	0.08	2.40 **
DMOT	-	- -	-	- -	0.18	3.02 ***	-	- -	-	- -	-0.03	-0.52
DBK	0.37	13.23 ***	0.37	13.20 ***	0.37	13.22 ***	0.27	12.88 ***	0.05	2.02 **	0.27	13.09 ***
Food	-0.08	-1.62	-0.09	-1.63	-0.08	-1.59	-0.15	-3.85 ***	-0.15	-3.79 ***	-0.15	-3.93 ***
Textiles	-0.33	-6.04 ***	-0.33	-6.06 ***	-0.32	-5.93 ***	-0.25	-6.18 ***	-0.24	-6.15 ***	-0.25	-6.30 ***
Apparel	0.04	0.86	0.04	0.85	0.04	0.93	0.10	2.98 ***	0.10	2.98 ***	0.10	2.93 ***
Footwear and leather	0.27	3.27 ***	0.27	3.28 ***	0.28	3.36 ***	0.15	2.26 **	0.15	2.17 **	0.15	2.20 **
Chemicals	0.18	3.56 ***	0.19	3.56 ***	0.18	3.55 ***	-0.03	-0.85	-0.04	-0.89	-0.04	-0.87
Rubber products	-0.31	-4.82 ***	-0.31	-4.82 ***	-0.31	-4.70 ***	-0.30	-6.22 ***	-0.30	-6.22 ***	-0.29	-6.00 ***
Plastics	-0.22	-3.85 ***	-0.22	-3.82 ***	-0.21	-3.76 ***	-0.26	-5.99 ***	-0.26	-6.04 ***	-0.27	-6.18 ***
Non-metallic mineral products	0.01	0.23	0.01	0.19	0.01	0.24	0.05	1.16	0.05	1.18	0.05	1.11
Fabricated metals	0.05	0.95	0.05	0.95	0.05	1.01	0.16	4.31 ***	0.15	4.28 ***	0.15	4.18 ***
General machinery	0.10	1.44	0.10	1.46	0.09	1.42	0.25	5.94 ***	0.25	5.90 ***	0.24	5.57 ***
Electric machinery	0.00	0.06	0.02	0.30	0.00	0.05	-0.01	-0.31	-0.03	-0.70	-0.03	-0.72
Motor vehicles	0.06	0.86	0.06	0.77	0.06	0.75	0.28	5.93 ***	0.28	5.94 ***	0.25	5.36 ***
Adj.R2/Obs.	0.16	4,162	0.16	4,162	0.16	4,162	0.20	4,162	0.20	4,162	0.21	4,162
White test	202.30	0.00	249.71	0.00	253.84	0.00	187.97	0.00	220.00	0.00	251.27	0.00
Mean & S.D. of Y	3.71	0.87	3.71	0.87	3.71	0.87	2.87	0.67	2.87	0.67	2.87	0.67

Notes) T-statistics are calculated using White's heteroscedasticity-consistent standard errors.

LN=hours worked by non-production workers, LP=hours worked by production workers, VA=value added

***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.