Wages, Foreign Multinationals, and Local Plants in Thai Manufacturing

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Abstract

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. First, this paper finds evidence of positive wage differentials between MNC plants and local plants for both non-production and production workers after controlling for other plant characteristics. The magnitude of the wage differential is larger for non-production workers than for production workers. The magnitude of the wage differentials for both types of labor are also smaller for large plants and larger for plants that import a majority of their raw materials and parts. Second, this study also finds evidence of a positive correlation between the share of output by MNC plants to total output in an industry and the wage paid by local plants in the same industry.

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1. Introduction

It is common to observe wage differentials between firms or plants. For example, larger firms or plants tend to pay higher wages. There is also some evidence that foreign multinational corporations (MNCs) or plants belonging to MNCs tend to pay higher wages than local firms or plants in host economies, though the literature on wage differentials between MNC plants and local plants is somewhat scarce. The main purpose of this paper is to test for wage differentials between MNC plants and local plants in Thai manufacturing after controlling for other plant characteristics, such as average labor productivity, size, location, trade propensities, and industry affiliation. A second goal of this paper is to see if the presence of MNC plants affects wage levels in local plants.

This paper uses plant level data for the Thai manufacturing sector in 1996 to investigate these questions. The paper is organized as follows. Section 2 surveys the literature on wage differentials and Section 3 explains the methodology used in this study. Section 4 describes some major characteristics of the Thai manufacturing sector and the data used in this study. Section 5 reports the results of regressions analyzing wage differentials between MNC plants and local plants in Thailand as well as the results of regressions analyzing the relationship between the share of foreign plants in total output in an industry and wages paid by local plants in an industry. Some concluding remarks are made in Section 6.

2. A Survey of the Literature

Wage differentials exist in several forms and it is common to divide the causes of wage differentials into demand-side or employer-specific factors affecting the nature of the labor required for a task and supply-side causes such as the type of labor services a worker can provide.[1] Davis and Haltiwanger (1991) and Lipsey and Sjöholm (2001) explain how wage differentials between plants can be caused by labor-market factors and by institutional factors or policy distortions. According to Davis and Haltiwanger (1991), one factor related to labor markets is the fact that different plants may demand different skill mixes. In their terminology, this may result in "sorting by ability". In this case, wage differentials may arise even if markets for each type of labor (or skill) are all perfectly competitive, because the skill level of the each type of labor cannot be distinguished exactly.[2]

There are two factors may affect the skill mix demanded by a plant, technological heterogeneity among plants and differences in demand for the final goods produced by plants.[3] More capital intensive or more technology intensive plants tend to demand more skilled labor. Plants facing greater demand for technology-intensive products tend to demand for skilled labor.[4]

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[1] For example, worker-specific characteristics are often measured in terms of a worker's sex, race, age, educational attainment, skill-level, occupation, and length of their service.

[2] Davis and Haltiwanger (1991) also describe how this can also happen in imperfectly competitive labor markets.

[3] Skill-biased technological change and/or international trade are thought to be the main causes of wage differentials between skilled and unskilled labor in developed countries. See Davis and Haltiwanger (1991), Berman, Bound and Griliches (1994), Doms, Dunne and Troske (1997), Hanson and Harrison (1995).

4 See explanations in Hermash (1993), Adams (1999), and Troske (1999) for details about higher wages of larger firms and plants and for details about the substitutability

International trade may also be an important factor in this respect. Exporting firms or plants may face greater demand for skill-intensive products. For example, results from Bernard and Jensen (1997) indicate that exports are the major cause of wage gaps for skilled and unskilled labor among plants.[5] In a related analysis, Feenstra and Hanson (1996a, 1996b) stress the importance of imports of intermediate goods from the developing countries as the causes of wage gaps between skilled and unskilled labor in the developed countries. They suggest that outsourced production lines are usually intensive in unskilled labor and that this is important reason for differences in the structure of labor demand and wage gaps between skilled and unskilled labor in developed countries. For developing countries, the structure of labor demand and wage gaps may be affected by imports of intermediate goods or capital goods from developed countries, because these goods may embody the latest technologies in developed countries and are often an important source of technology transfer.[6]

Wage differentials between MNC plants and local plants may also arise for the reasons described above. MNCs are usually assumed to operate in imperfectly competitive output markets and often in imperfectly competitive factor markets as well (e.g., Casson 1987; Caves 1996; Dunning 1988, 1993)[7]. Moreover, possession of ownership advantages such as superior production technology is often thought to be a necessary condition for a firm to become a MNC (e.g., Dunning 1988, 1993). Correspondingly,

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and complementarity between various types of labor and various types of capital, or R&D.

5 And Sjöholm's (1999a) results suggest that exporters or importers have relatively high labor productivity levels, and exporters have relatively high labor productivity growth.

6 See Romer (1993) or Coe, Helpman and Hoffmaister (1995).

7 Explanations of Casson (1987), Caves (1996), Dunning (1988,1993), and Markusen (1991) in this paragraph relies on Ramstetter and Matsuoka (2001) and Ramstetter (2001).

MNCs are generally expected to be more skill- or technology-intensive than non-MNCs and demand more skilled-labor than non-MNCs. Others (e.g.,Casson 1987) dispute this view saying that internalization of transactions is the key necessary condition for a firm to become a MNC.[8] However, this view also stresses the strong tendency for internalization to occur when information related to transactions is asymmetrically distributed between sellers and buyers such as transactions involving technology and skilled labor.[9] In any case, there is general agreement among theorists that MNCs will tend to be more technology-intensive than non-MNCs and a large body of empirical research suggesting that MNCs tend to have relatively high R&D-sales ratios and advertising expenditure-sales ratios, and to possess a relatively large number of patents.[10]

Another important factor is that labor markets may be segmented and MNC plants may face different labor markets than local plants face. Lipsey and Sjöholm (2001), suggest three reasons that this might be the case. First, host-country regulations or home country pressures might affect the ability of MNCs to hire or fire certain types of labor. Second, workers may have a preference for locally-owned employers or in some cases foreign-owned employers. Third, foreign-owned firms may seek to minimize employee turnover, because they invest more in training than locally-owned firms, or because they fear the leakage of their technological advantages if employees move to other employers. In addition, if certain labor skills or skill combinations (e.g., the com-

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[8] According to this view ownership advantages are sufficient not necessary conditions for the MNC's existence.

[9] The existence either ownership advantages implies that MNCs have market power while the existence of internalization implies that markets are not as efficient as other alternatives. Both assumptions therefore preclude the existence of perfect competition in at least some markets.

[10] Barro and Sala-i-Martin (1991) and Glass and Saggi (1999) also present theories that MNCs engage R&D with more skilled labor and produce goods with unskilled labor.

bination of foreign language and engineering skills) are in very short supply and MNC presence is relatively large in a developing country, as is the case in Thailand, the high demand for such skills in MNCs could lead to MNC domination of markets for these types of labor.

An important fact to keep in mind in the Thai case, is that most local firms are not MNCs in their own right. Thus, comparisons of foreign MNCs and local plants in Thailand, and many other developing economies, are essentially comparisons of MNCs and non-MNCs. Unfortunately, there are very few previous studies of wage differentials between MNCs and local plants in Thailand or other developing economies. For example, Aitken, Harrison and Lipsey (1996) find evidence that MNCs paid higher wages than local plants in manufacturing industries in Venezuela from 1977 to 1989 and in Mexico from 1984 to 1990. The results of Lipsey and Sjöholm (2001) suggest that the MNC plants paid higher wages than local plants in Indonesia's manufacturing industries in 1996, even after controlling for numerous plant characteristics and the educational attainment of workers. Moreover, their results also indicate a positive relationship between the share of MNCs in an industry and the wage levels of local plants. Ramstetter (1994) provides the only known previous estimate of wage differentials in a sample of Thai firms that were promoted by the Thai Board of Investment (BOI) in 1990. The results suggest that MNCs pay higher wages than local firms but that corresponding differences in labor productivity were not statistically significant.[11]

[11] This result is puzzling because wages are expected to be positively correlated with the marginal revenue product of labor (and the average revenue product of labor) across the plants. Note also that the finding of significant wage differentials is accompanied by findings of significant differences in labor productivity for Indonesia (e.g. Okamoto and Sjöholm 2000; Takii and Ramstetter 2000).

3. Methodology

In this study, two questions are examined. First do MNCs pay higher wages than local plants after controlling for plant characteristics? Second, is larger MNC presence in an industry correlated with wage levels in local plants in that industry?

To examine the first question, wage levels are first estimated as a function of plant characteristics and a dummy variable identifying MNCs in equations such as the following:

$$\ln W = a_0 + a_1 * x_1 + a_2 * x_2 + a_3 * x_3 + a_4 * x_4 + a_5 * x_5 + a_6 * x_6 + \sum_{1}^{11} aI_j * xI_j \qquad (1)$$

where

$\ln W$=the logged value of the hourly wages for production workers or for non-production workers in both local plants and MNCs,

x_1=average labor productivity (Productivity) measured as logged value added per hour worked for all types of workers (i.e., the sum of non-production and production workers),

x_2=size measured as the log of all types of workers (Size),

x_3=1 if plant *i* exports 1 percent or more of its production and =0 otherwise (Export dummy),

x_4=1 if plant *i* imports 1 percent or more of its material inputs and =0 otherwise (Import dummy),

x_5=1 if plant *i* is located in the Bangkok vicinity and =0 otherwise (Bangkok vicinity

dummy),[12]

x_6 =1 if foreign ownership share of plant *i* is 1 percent or greater and =0 otherwise (MNC dummy).

xI_j =1 is an industry dummy variable if plant *i* belongs to the jth industry, =0 otherwise (i.e., j=1 to 11).[13]

The magnitude of the coefficient on the MNC dummy (=a_6), indicates the magnitude of the wage differential between MNC plants and local plants in percent after controlling for other plant-specific characteristics of plants (x_1 to x_5)[14]. Average labor productivity (x_1) is used as a proxy for the unobservable differences in labor skills because this dataset contains no information about skill types, abilities, or levels of education attainment for either non-production labor or production labor.[15] A positive sign is expected for this coefficient because plants with relatively more skilled labor are thought to exhibit higher labor productivity and higher average wages. Plant size (x_2) is also thought to be positively correlated with wages because larger plants expected to be more capital intensive, more technology intensive, and may benefit from economies

[12] The Bangkok vicinity is defined to include Bangkok, Samut Prakan, Nonthaburi, Pathum Thani, Nakhon Pathom, and Samut Sakon.

[13] Industry dummies are specified for food, textiles, apparel, leather & footwear, chemicals & products, rubber and plastics, non-metallic mineral products, metal products, general machinery, electric machinery, and motor vehicles. The control industry for which no dummy is specified is other manufacturing, including beverages, tobacco, wood and wood products, paper and paper products, publishing and printing, oil, coke and nuclear etc., basic metals, and other transport equipment.

[14] However, strictly speaking, it is not sufficient to control only for plant characteristics. When examining the wage differentials between plants, wages for the same type of labor should be compared between plants after controlling the characteristics of workers. Data sets that match workers and employers make it possible to examine wage differentials between plants in more strict sense (e.g., Troske 1999).

[15] It should be recognized that this variable might capture other effects, such as unmeasured differences in factor intensities.

of scale. As a result, larger plants are expected to demand more skilled labor than smaller plants. Dummies for exporters (x_3) and importers (x_4) are included to control for the effects of international trade described in the previous section. Plant location is controlled for because wages are known to be higher in Bangkok and the surrounding vicinity than in the rest of the country. Finally, industry dummies are included to account for industry-specific differences in technology. Coefficients on these 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.[16] Estimates are done using the ordinary least squares method with White's heteroscedasticity consistent standard errors to evaluate t-statistics.[17]

The second question, whether the presence of MNCs affects wage levels in local plants, is analyzed with a methodology developed by Lipsey and Sjöholm (2001). In this approach, wages in local plants are viewed as a function of the control variables identified above and the foreign share of output in the industry to which the local plant belongs. The equation is:

$$\ln WD = b_0 + b_1 * x_1 + b_2 * x_2 + b_3 * x_3 + b_4 * x_4 + b_5 * x_5 + b_6 * z \qquad (2)$$

where

ln*WD*=the logged wages per hour for production workers or for non-production workers in local plant *i* in industry *j*.

z =the share of foreign-owned plants (all plants with a foreign ownership share is 1 percent or greater) in the output (=value added + intermediate consumption) of industry j,

[16] 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.

[17] Observations with the top 1/64 and the bottom 1/64 of normalized residuals by OLS are removed from the sample and equations are estimated again without those outliers.

and all other variables are as defined above.

Industries are defined at the 2- or 3-digit level of ISIC revision 3 as presented in National Statistical Office (1999) industry classification for 49 out of a total of 61 industries.[18] This approach is similar to approaches used in the literature on productivity spillovers (see Sjöholm1999b; Takii 2001). The hypothesis is that the presence of MNC plants affects local plants through direct and through increased competition MNCs may bring. In labor markets, for example, the entry of MNCs may increase the demand for all types of labor, leading to an increase of all wage levels for both MNC plants and local plants. This may or may not affect the magnitude of the wage differentials, depending on the relative sizes of the changes induced. The entry of MNC plants may also affect the skill mix demanded by local plants. Technology spillovers from MNC plants to local firms may also reduce technology gaps between MNC plants and local plants. If the coefficient on the MNC share, $b_{6,}$ is positive, then larger presence is associated with higher wages in local plants and the reverse is true if the coefficient is negative.

4. The Thai Manufacturing Sector and the Data

Thailand experienced an unprecedented economic boom beginning in 1987. During this boom, Thailand's manufacturing sector grew very rapidly with real GDP increasing an average of 13 percent annually in real terms in 1986-1996, and by 1996, manufacturing accounted for 28 percent of GDP and 13 percent of employment, up

[18] There are 61 3-digit level industries in National Statistical Office (1999) but industries where the number of plants is less than 20 are combined.

from 24 percent and 8 percent, respectively, a decade earlier (Table 1 and its sources).

There are several possible ways to measure compensation or wages per employee in Thailand, all of which have important problems. First, in principle, the most comprehensive measure is the ratio of total compensation as reported in the national accounts to total employment from the labor force surveys. This calculation suggests that nominal compensation per employee rose 21 percent annually in 1986-1996 to reach 9,369 baht per month in 1996 (Table 1). One possible reason for the apparent overestimate of growth by this calculation is that the labor force surveys underestimate manufacturing employment or that the national accounts overestimate compensation in manufacturing.[19] Alternative estimates from a sample of employees reporting wages in the labor force surveys suggest much lower compensation per employee in 1996, 6,245 baht, and much lower growth in 1986-1996, 9 percent annually. However, this sample covers only 3.2 million of the 4.3 million employees reported to be in manufacturing by official data. This study analyzes an even smaller sample of plant-level underlying the industrial census for 1996 (National Statistical Office 1999). Published figures from this census covered only 2.4 million employees in 23,677 plants and compensation per employee was 8,108 baht per month in this sample.[20]

Unfortunately, in the plant-level dataset underlying the published data, there are apparently a large number of duplicate records, probably because many plants belonging to multi-plant firms reported the same firm-wide data. Thus, for use in this study,

[19] Ramstetter (1997, pp. 167-169) provides evidence suggesting that official statistics overestimate employment in agriculture and underestimate the shares of other sectors, including manufacturing.

[20] The census database includes information on 32,489 establishments and published compilations cover 23,677 replying plants with 10 or more persons engaged.

all duplicate records are first removed from the sample to avoid double counting.[21] In addition, the published samples contain a lot of small plants and plants that report apparently implausibly small values for many variables. Because comparisons of MNCs are not thought to be meaningful in samples including very small plants, plants reporting less than 20 employees were eliminated from the sample. Plants reporting less than one thousand baht in sales of goods produced, total fixed assets at both the beginning and the end of the year, and machinery fixed assets at the beginning of the year, were also excluded from the sample because these values are thought to be unrealistically small. The remaining sample consists of 8,432 plants, covering 1.4 million employees, which were paid 8,415 baht each in compensation per month (Table 1). Thus, the sample studied below covers only 33 percent of total manufacturing employment that was reported in the labor force survey, but it does account for a markedly larger portion of value added reported in the national accounts, 57 percent. Coverage rates for the industrial census (published figures) vary greatly across industries, however (see Ramstetter 2001, pp. 10-11) and the same can be said for this sample.

Table 2 shows the shares of foreign MNCs in employment, value added and output by industry. For all manufacturing, foreign MNCs accounted for 43 percent of all employment, 54 percent of all value added, and 58 percent of all output.[22] However, there is a very large variation of these shares across industries. Shares were very large in electric machinery and transportation machinery, where MNCs dominate, followed

[21] See Ramstetter (2001, pp. 9-10) for details on how duplicates were identified. Note that this sample differs from the sample in Ramstetter (2001), because all duplicates were removed. In contrast, Ramstetter (2001) retains 1 record from each set of duplicates in an attempt to maximize sample coverage.

[22] Note that these shares refer to this sample only. Shares for all Thai manufacturing, including plants not covered in the industrial census, are probably much smaller as explained by Ramstetter (2001).

by general machinery and textiles. In contrast, shares were much smaller in food, leather and footwear, non-metallic mineral products, and other manufacturing.

Table 3 shows the same shares for all manufacturing plants divided into four groups by plant size, where plant size is measured as the number of total workers (i.e., the sum of non-production workers and production workers) per plant. Large plants (plants with more than 150 total workers) accounted for 86 percent of the all value added and 87 percent of output of the all the plants in this sample. 57 percent of the value added and 63 percent of the output of these large plants originates in MNC plants but MNC shares are smaller in groups of smaller firms. The share of large plants in total workers (77 percent) and the MNC share of total workers in large plants (51 percent) are both smaller than corresponding shares for value added and output.

Table 4 calculates hourly wages for both non-production workers and production workers by industry and owner. In this table and in the analysis below, hourly wages are broadly defined here to include all employee compensation except social security payments.[23] In all manufacturing, the mean of hourly wages for non-production workers was 75 baht in MNC plants and 49 baht in local plants. In other words, the average wage differential between MNCs and local plants for non-production workers was 53 percent in this sample. These differentials were highest in motor vehicles (94 percent), other manufacturing (92 percent), and chemicals (59 percent) and smallest in leather and footwear (3 percent), textiles (9 percent), metal products (17 percent), general machinery (20 percent), apparel (32 percent), electric machinery (36 percent), and rubber

[23] Hours worked are calculated as the number of employees times the number of hours a factory is in operation in the year. Hourly wages are the wage bill (including wages and salaries, overtime, bonuses, and fringe benefits other than social security) divided by the number of hours worked.

and plastics (38 percent). Mean wages for production workers were lower than for production workers, reflecting the relatively low skill levels of these workers. The differential between wages for production workers in MNCs (31 baht) and in local plants (25 baht) was also smaller than for non-production workers, only 25 percent in all manufacturing. Wage differentials for production workers were largest in non-metallic mineral products (61 percent), motor vehicles (48 percent), chemicals (34 percent), and lowest in food (-3 percent), rubber and plastics (-2 percent), leather & footwear (0 percent), and textiles and apparel (5 percent each).

By industry MNCs pay production workers the highest wages in chemicals and motor vehicles, followed by general machinery, non-metallic mineral products, electric machinery, and metal products (Table 4). MNCs also pay the highest wages to non-production workers in chemicals and motor vehicles, followed by other manufacturing, and leather and footwear. Local plants pay production workers the highest wages in chemicals, electric machinery, general machinery, and motor vehicles. For non-production workers, local pay the most in leather and footwear, general machinery, and chemicals. Thus, there is some weak evidence of a wage premium in industries like chemicals and motor vehicles for both types of labor in both ownership groups and it is likely that this premium reflects, at least in part, differences in skill mixes not captured by the distinction between production and non-production workers.

Table 5 shows mean wages for MNCs and local plants in all manufacturing by plant size. For local plants, mean wages for production workers are slightly higher for large plants than for small plants or for two intermediate size groups. Differences are somewhat larger for non-production workers in local plants with wages in medium-large and large plants both greatly exceeding corresponding levels in small and small-medium

plants. For MNC plants, mean wages for both types of labor are highest among medium-large plants. For production workers, wage levels in medium-large MNC plants are followed by small plants, small-medium plants, and finally by large plants. For non-production workers wage levels in other size classes are similar and lower than in medium-large MNC plants. The most important point here is that for each combination of size class and type of labor, wages in MNCs are again higher than for local plants when comparisons are made for all manufacturing industries combined. These differentials (measured in percentage terms) were smaller for large plants than for groups of smaller plants and smaller for production workers than for non-production workers.

A similar pattern is observed when wages are classified by trade propensity and ownership (Table 6). For each trade propensity class and each type of labor in all manufacturing, mean wages of MNC plants are higher than in local plants. Moreover, the percentage differential is larger for non-production workers than for production workers in all comparisons in the table. Mean wages were also higher for both ownership groups and both types of labor in plants importing the majority (50 percent or more) of their raw materials and parts than in plants importing only half or less of their raw materials and parts, though these differentials were much larger for non-production workers than for production workers. Wages are also higher for non-production workers in local plants that export a majority of their output, but this differential was very small for production workers. MNC plants that exported the majority of their output paid lower wages than MNC plants that exported less than half of their output, with the gap being largest for production workers.

5. Results of Econometric Estimation

Tables 7-8 show the results for estimating equation (1) for non-production and production workers, respectively. In both tables the results of estimating four specifications are reported to illustrate the sensitivity of the results to various specifications. As expected, coefficients on control variables (average labor productivity, size, dummies for plants with large trade propensities, and the dummy variable for plants located in Bangkok and the surrounding area) are all positive and significant at the 5 percent level or better in all regressions explaining wages of non-production workers (Table 7). In other words, wages for non-production workers tended to be higher in plants with higher average labor productivity, a larger number of employees, positive exports, positive imports, and for plants located in the Bangkok vicinity. Results obtained from estimates of production worker wages are similar with two exceptions (Table 8). First, in specification (3), which includes dummies for plants engaged in international trade but excludes the size variable, the coefficient on the dummy for exporting plants is very small and insignificant, but this coefficient becomes larger and significantly positive when the size variable is included. Second, in specification (2) and (4), which include the size variable, the coefficient on the size variable is negative and significant, not positive as expected. Although inconsistent with the theoretical explanation offered above, this result is not inconsistent with the descriptive statistics in Table 5, which suggest that production workers earn relatively low wages in large MNCs compared to smaller MNCs and that wages are only slightly higher in large local plants than in smaller local plants.[24]

[24] There are two important statistical problems that could also be related to this result.

In this context, the most important result is that the sign and significance levels of the coefficients on the MNC dummy variable are not affected by the inclusion or exclusion of various control variables. Namely, the coefficients on the MNC dummy are positive and significant in all specifications for both production and non-production workers. However, the size of the coefficient on the MNC dummy is affected. For non-production workers the coefficient is 0.26 in specification (1), which excludes the size variable and the dummy variables for plants engaged in international trade (Table 7). Adding the dummy variables for plants engaged in international trade in specification (3) greatly reduces this coefficient to 0.15. Further addition of the size variable in specification (4) reduces the coefficient a little more to 0.14. This result suggests that MNC plants pay non-production workers roughly 14 percent more than local plants, after the effects of all control variables in equation (1) are accounted for.

For production workers, wage differentials between MNCs and local plants are relatively small but the control variables have a different effect on differentials for this type of labor, largely because of the negative relationship between size and wages for non-production workers (Table 8). The maximum differential is 0.11, which is observed in specification (2) including the size variable but excluding dummy variables for plants engaged in international trade. Conversely, the minimum differential is the 0.06 in specification (3), which excludes the size variable but includes the dummy variables for plants engaged in international trade. If all control variables are included as

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First, multicollinearity, especially between value added per worker and size could be a problem. Second, the fact that size is measured in terms of total number employed could create simultaneity with the dependent variables, which include the number of production employees or non-production employees in their denominators. However, the result does not change much if output is used to measure size. Further regressions below attempt to illuminate other dimensions of this relationship.

in specification (4), the coefficient is 0.08, which suggests that MNC plants pay production workers roughly 8 percent more than local plants. These results suggest that the differential for production workers is only a little more than half of the corresponding differential for non-production workers. This finding may result from a greater similarity in the mix of skills between MNCs and local plants for production workers than for non-production workers or it may result from the greater segmentation of markets for non-production workers compared to production workers.

As indicated above, the sign of the coefficient on the size variable was not of the expected sign for production workers and the descriptive statistics in Table 5 also indicate that the relationship between wages and plant size is not a strong as indicated by previous literature. Moreover, there is some indication that the unexpected results for the size variable are related to results for dummies indicating international trade status. In order to further investigate these relationships, equation (1) was estimated for four size groups and four trade-propensity groups, and the results are reported in Tables 9-12 below.

There are three important results obtained from regressions by size group. First, the results indicate that wage differentials between MNCs and local plants decrease with plant-size. For non-production workers, the coefficients on the MNC dummy were 0.27 in small plants, 0.23 in small-medium plants, 0.17 in medium-large plants, and 0.08 in large plants (Table 9). These results thus indicate that the wage differential for non-production workers was much smaller in large plants compared to all groups of smaller plants, for example only 8 percent in large plants but 27 percent in small plants. For production workers, corresponding coefficients on the MNC dummy were 0.13 in small and medium-large plants, 0.11 in small-medium plants, and 0.04 but

statistically insignificant in large plants (Table 10). These results thus suggest that differentials for production workers were similar in all groups of smaller plants, 11-13 percent, but that the differential is essentially zero (i.e., statistically insignificant) in large plants, 4 percent. The second important result is that wage differentials are larger for all size groups of nonproduction workers compared to production workers. The third important result is the observation of a significantly negative relationship between plant size and wages for both types of labor in large plants and for production workers in small plants. Thus, the negative relationship between plant size and wages appears to be more common than the results in Tables 7-8 suggest.

In view of the results suggesting a strong negative relationship between wages and size, regressions that distinguish plants by trade propensity only include plants with 60 or more employees. It is also important to note that the sample is divided into plants that have export or import propensities of 50-100 percent or 0-49 percent, respectively, and that this distinction is different than the one used when specifying the dummy variables for trade propensities in equation (1), which distinguishes plants engaged in international trade from those not involved in international trade. All of the intercepts are positive, significant, and larger in the groups of plants with trade propensities of 50 percent or greater, indicating that plants heavily engaged international trade paid higher wages (Tables 11-12). All coefficients on the MNC dummy were positive and significant in these equations, indicating positive wage differentials here as well. However, for wages of non-production workers the coefficient on the MNC dummy is only slightly larger for plants exporting the majority of their output, 0.14, than for plants exporting less than half of their output, 0.12 and the corresponding coefficient for wages of production workers was actually smaller for plants exporting a majority of their out-

put, 0.07 compared to 0.09. In marked contrast, the coefficients on the MNC dummy were much larger for large importers than for small importers, 0.21 versus 0.12 for non-production workers and 0.13 versus 0.06 for production workers. Thus, the magnitude of wage differentials between MNC and local plants is not affected much by export orientation but it is affected a lot by import orientation. This might suggest that MNC plants may tend to import raw materials and parts that embody relatively sophisticated technologies, thereby increasing the demand for relatively skilled labor in both the production and non-production worker groups.

Finally, Tables 13 and 14 report the results of estimating equation (2) in an attempt ascertain how greater MNC presence in an industry is related to wage levels of local plants in that industry. The control variables are the same as in equation (1) and the results obtained are very similar (Tables 13-14). Average labor productivity, positive import propensities, and location in the Bangkok area, are all positively correlated with wage levels for both types of labor. Positive export propensities and plant size are also positively correlated with wage levels for non-production workers but this is not necessarily the case for production workers. Moreover, in all but one case, the non-production wage equation specification (3), which excludes the size variable but includes the trade propensity variables, coefficients on the MNC share of output are positive and significant at the 5 percent level or better.[25] These results are similar to results for Indonesia in Lipsey and Sjoholm (2001), and suggest a positive correlation between MNC presence in an industry and the wages of the local plants in that industry. Interestingly, these results suggest a larger wage spillover for production workers than

[25] Even in the one exception the coefficient on the MNC share is still positive and weakly significant at the 10 percent level.

for non-production workers. As indicated above, this finding could result from high demand for labor resulting from large MNC presence or from differences in the skills demanded by MNCs and local plants. This finding could also be a result of productivity spillovers from MNC plants to local plants such as those documented by Takii (2001), which would in turn be expected to reduce the magnitude of technological heterogeneity between MNC plants and local plants.

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 average labor productivity, size, trade propensities, and industry affiliation. The findings also suggest that the magnitude of wage differentials is (1) larger for non-production workers than for production workers, (2) larger within groups of relatively small plants than within a group of larger plants, and (3) larger within the group of plants with large import propensities (50 percent or more) than within the group of plants with small import propensities (49 percent or less). However, the magnitude of wage differentials is similar in the group of plants with low export propensities and in the group of plants with large export propensities. The results with respect to trade propensities suggest that MNC plants may import materials or intermediate goods that embody new technology and require more skilled labor than local plants but that MNC plants and local plants may

face similar product markets both in domestic and international markets, resulting in similar labor demands in MNCs and local plants.

The second major finding is that wages in local plants are relatively high in industries where MNC shares of industrial output are relatively large. There are at least two possible reasons for these positive wage spillovers. First, relatively large MNC presence may stimulate the demand for all labor skills in an industry, thereby leading to higher wages. Second, larger MNC presence may be associated with relatively large technology transfer or productivity spillovers to local plants that lead to increased demand for skilled labor relative to unskilled labor, and therefore to higher wages.

These findings are certainly plausible but there is still a lot of research that needs to be done before they can be accepted. First, it is possible to extend the analysis to 1998 and this would be of great interest given the large effects the economic crisis imparted on Thailand in this year. Second, the industry dimension should be scrutinized more thoroughly by running regressions such as equation (1) at the industry level. These regressions may suggest that slope dummies are also necessary in equation (2) as well. Third, specification issues need to be addressed more thoroughly. For example, in this context, it would be interesting to explore the use of the capital-labor ratio instead of the average labor productivity in a manner that follows Lipsey and Sjoholm (2001). Fourth, there are several important simultaneity issues raised by the specification of equations (1) and (2). In view of the perverse sign on size, one important correlation of possible concern is between the dependent variables (wages per hours worked) and the employment-based measure of size used in this study but using a value-based measure of size (output) instead does not seem to affect the results much. Another is the possibility of correlations among independent variables. For example,

several studies view average labor productivity as a function of ownership and another group of studies suggests that trade propensities are a function of ownership. Still another 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 MNCs and local plants and positive wage spillovers from MNCs to local plants 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 mounting evidence that labor productivity differentials between MNCs and local plants were generally insignificant in Thailand. The combination of these two findings is of great interest because it implies that wage differentials result from imperfections in output and/or factor markets, not from differences in labor productivity.

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Table 1: Economic indicators for Thai manufacturing in 1996 and 1986-1996 (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, 1987 industrial survey or 1997 industrial census, published estimates	NSO, 1997 industrial census, this sample
1996				
Value added, million current baht	1,303,417	NA	998,144	748,255
Total workers, number	4,334,200	3,206,500	2,431,584	1,444,827
Monthly compensation per employee, current baht	9,369	6,245	8,108	8,415
Value added, % of all industries	28.20	NA	NA	NA
Total workers, % of all industries	13.45	33.16	NA	NA
1986-1996 (average annual percentage changes)				
Value added, 1988 baht	12.79	NA	NA	NA
Value added, current baht	17.02	NA	17.23	NA
Total workers, number	7.68	9.14	10.32	NA
Monthly compensation per employee, current baht	21.45	9.23	NA	NA
GDP deflator for all industries, index	5.10	NA	NA	NA
GDP deflator for manufacturing, index	3.75	NA	NA	NA

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

Table 2: Shares of MNC plants by industry

	Number of plants		Value Added (million baht)		Output (million baht)		Total workers	
Industry	All plants	MNC plants	All plants	MNC share (%)	All plants	MNC share (%)	All plants	MNC share (%)
Manufacturing	8,432	1,444	748,255	53.5	2,388,891	58.4	1,444,827	42.9
Food	470	82	49,507	24.0	162,480	30.3	144,174	35.4
Textiles	548	102	27,415	63.1	111,935	65.8	115,252	43.7
Apparel	607	82	17,162	35.6	58,051	38.0	115,360	32.4
Leather & footwear	216	30	8,081	20.9	21,669	27.5	41,030	28.7
Chemicals & products	402	108	38,244	71.4	115,464	59.0	51,807	33.5
Rubber & plastics	690	153	45,965	44.7	165,054	42.8	115,401	39.6
Non-metalic mineral products	824	51	27,042	28.6	78,478	40.0	76,280	22.7
Metal products	653	94	25,141	61.4	89,456	60.9	72,842	37.6
General Machinery	379	87	29,629	75.2	114,978	75.6	81,136	66.1
Electric Machinery	421	216	99,065	90.3	336,515	90.3	181,987	83.6
Motor Vehicles	375	72	124,991	91.4	402,366	91.5	68,117	64.2
Other manufacturing	2,847	367	256,010	25.8	732,444	35.7	381,441	29.3

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

Table 3: Shares of MNC plants in manufacturing by plant size

	Number of plants		Value Added (million baht)		Output (million baht)		Total workers	
Size	All plants	MNC plants	All plants	MNC share (%)	All plants	MNC share (%)	All plants	MNC share (%)
Small plants (30 workers or less)	2,415	92	15,516	4.7	40,227	6.2	56,498	4.0
Small-medium plants (31-60 workers)	2,214	210	25,312	14.5	87,119	19.0	95,998	9.7
Medium-large plants (61-150 workers)	1,812	386	65,053	41.9	194,856	37.3	174,768	22.3
Large plants (151 workers or more)	1,991	756	642,374	57.3	2,066,689	63.1	1,117,563	50.9

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

Table 4: Hourly wages by industry, and owner (Baht)

Industry	number of plants	Non-production workers				Production workers			
		Local plants		MNC plants		Local plants		MNC plants	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Manufacturing	8,432	49	69	75	115	24	28	31	37
Food	470	42	46	61	76	20	19	19	12
Textiles	548	43	54	46	51	19	13	20	16
Apparel	607	57	102	75	76	25	26	26	11
Leather & footwear	216	78	211	81	77	27	17	27	17
Chemicals & products	402	63	80	101	173	32	30	43	37
Rubber & plastics	690	40	38	55	88	19	14	19	20
Non-metalic mineral products	824	44	61	63	62	22	44	36	34
Metal products	653	55	51	64	56	27	19	34	27
General Machinery	379	64	110	76	68	31	24	37	27
Electric Machinery	421	55	43	74	97	32	26	35	73
Motor Vehicles	375	46	45	88	86	29	16	43	32
Other manufacturing	2,847	45	46	87	162	24	30	31	24

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

Table 5: Hourly wages in manufacturing by owner, and plant size (Baht)

Size	number of plants	Non-production workers				Production workers			
		Local plants		MNC plants		Local plants		MNC plants	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Small plants (30 workers or less)	2,415	42	75	73	74	23	18	33	20
Small-medium plants (31-60 workers)	2,214	46	44	74	77	25	22	31	24
Medium-large plants (61-150 workers)	1,812	55	85	80	115	25	34	35	58
Large plants (151 workers or more)	1,991	56	69	72	127	26	40	28	26

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

Table 6: Hourly wages in manufacturing by owner and trade propensity (Baht)

Trade Propensity	number of plants	Non-production workers				Production workers			
		Local plants		MNC plants		Local plants		MNC plants	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Export propensity<50%	6,669	47	65	76	118	24	26	36	49
Export propensity>=50%	1,763	59	87	74	113	25	36	26	22
Import propensity<50%	6,603	46	65	65	76	24	27	29	25
Import propensity>=50%	1,829	60	85	85	146	29	30	32	46

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

Table 7: Wage differentials for non-production labor between MNC plants and local plants (All plants)
Dependent variable(Y) : Log of hourly wage for non-production workers

	(1)		(2)		(3)		(4)	
	Coef.	**T stat.**	**Coef.**	**T stat.**	**Coef.**	**T stat.**	**Coef.**	**T stat.**
C	3.45	173.52 ***	3.26	82.07 ***	3.37	161.08 ***	3.28	81.57 ***
Productivity	0.20	25.21 ***	0.21	25.87 ***	0.20	24.93 ***	0.20	24.94 ***
Size			0.05	5.55 ***			0.02	2.67 ***
Export dummy					0.13	6.33 ***	0.11	5.03 ***
Import dummy					0.12	6.51 ***	0.12	6.21 ***
Bangkok vicinity dummy	0.39	21.15 ***	0.39	21.18 ***	0.38	20.37 ***	0.38	20.10 ***
MNC dummy	0.26	10.92 ***	0.21	8.53 ***	0.15	5.99 ***	0.14	5.37 ***
Industry dummies								
Food	0.01	0.21	-0.01	-0.34	-0.01	-0.14	-0.02	-0.41
Textiles	-0.17	-4.90 ***	-0.18	-5.11 ***	-0.17	-4.81 ***	-0.17	-4.88 ***
Apparel	0.07	1.95 *	0.06	1.66 *	0.03	0.95	0.04	1.07
Leather & footwear	0.24	4.58 ***	0.24	4.48 ***	0.20	3.78 ***	0.20	3.85 ***
Chemicals & products	0.11	2.86 ***	0.12	2.90 ***	0.06	1.57	0.07	1.70 *
Rubber & plastics	-0.14	-4.50 ***	-0.15	-4.82 ***	-0.17	-5.29 ***	-0.16	-5.24 ***
Non-metallic mineral products	0.02	0.69	0.03	0.93	0.07	1.98 **	0.06	1.83 *
Metal products	0.12	3.61 ***	0.12	3.85 ***	0.11	3.43 ***	0.12	0.36
General Machinery	0.08	2.01 **	0.08	2.03 **	0.07	1.74 *	0.07	1.80 *
Electric Machinery	0.09	2.23 **	0.07	1.69 *	0.04	1.00	0.03	0.85
Motor Vehicles	-0.03	-0.82	-0.03	-0.67	-0.03	-0.72	-0.03	-0.65
Adj.R2 / Obs.	0.21	6,924	0.21	6,924	0.22	6,924	0.22	6,924
White test	191.66	0.00	232.74	0.00	257.69	0.00	306.17	0.00
Mean of Y	3.58		3.58		3.58		3.58	
Standard deviation of Y	0.77		0.78		0.77		0.77	

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

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

Table 8: Wage differentials for production labor between MNC plants and local plants (All plants)
Dependent variable(Y) : Log of hourly wage for production workers

	(1)		(2)		(3)		(4)	
	Coef.	**T stat.**	**Coef.**	**T stat.**	**Coef.**	**T stat.**	**Coef.**	**T stat.**
C	2.98	211.16 ***	3.07	115.41 ***	2.96	200.62 ***	3.09	113.44 ***
Productivity	0.26	39.42 ***	0.26	39.50 ***	0.26	39.21 ***	0.25	39.17 ***
Size			-0.02	-3.96 ***			-0.04	-5.87 ***
Export dummy					0.00	0.28	0.04	2.28 **
Import dummy					0.07	5.24 ***	0.08	6.25 ***
Bangkok vicinity dummy	0.36	28.06 ***	0.36	28.09 ***	0.34	26.65 ***	0.34	26.54 ***
MNC dummy	0.08	5.08 ***	0.11	6.19 ***	0.06	3.10 ***	0.08	4.12 ***
Industry dummies								
Food	-0.09	-3.33 ***	-0.08	-2.89 ***	-0.09	-3.19 ***	-0.07	-2.59 ***
Textiles	-0.20	-7.80 ***	-0.19	-7.69 ***	-0.19	-7.70 ***	-0.19	-7.70 ***
Apparel	0.03	1.46	0.04	1.70 *	0.03	1.58	0.04	1.72 *
Leather & footwear	0.09	2.62 ***	0.09	2.54 **	0.08	2.40 **	0.07	1.95 *
Chemicals & products	0.12	3.99 ***	0.12	4.03 ***	0.11	3.69 ***	0.11	3.56 ***
Rubber & plastics	-0.24	-10.35 ***	-0.24	-10.11 ***	-0.24	-10.33 ***	-0.24	-10.32 ***
Non-metallic mineral products	0.00	0.02	0.00	-0.13	0.01	0.37	0.01	0.40
Metal products	0.12	5.52 ***	0.11	5.29 ***	0.12	5.40 ***	0.11	5.12 ***
General Machinery	0.20	7.71 ***	0.21	7.76 ***	0.20	7.49 ***	0.20	7.35 ***
Electric Machinery	0.05	1.65 *	0.06	2.00 **	0.03	1.08	0.04	1.39
Motor Vehicles	0.19	7.00 ***	0.19	7.03 ***	0.19	6.96 ***	0.19	6.92 ***
Adj.R2 / Obs.	0.38	8,170	0.37	8,170	0.38	8,170	0.38	8,170
White test	689.49	0.00	687.40	0.00	699.95	0.00	708.42	
Mean of Y	2.98		2.98		2.98		0.30	
Standard deviation of Y	0.66		0.66		0.66		0.66	

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

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

Table 9: Wage differentials for non-production labor between MNC plant and local plants by plant size
Dependent variable(Y) : Log of hourly wage for non-production workers

	Small plants			Small-medium plants			Medium-large plants			Large plants		
	Coef.	T stat.		Coef.	T stat.		Coef.	T stat.		Coef.	T stat.	
C	2.34	6.28	***	2.92	10.32	***	3.44	10.86	***	4.01	27.19	***
Productivity	0.17	10.79	***	0.24	14.80	***	0.21	12.80	***	0.19	11.81	***
Size	0.24	2.04	**	0.12	1.66	*	0.03	0.41		-0.08	-3.08	***
Export dummy	0.16	2.67	***	0.05	1.29		0.10	2.45	**	0.12	2.79	***
Import dummy	0.11	3.00	***	0.14	4.09	***	0.05	1.20		0.11	2.51	**
Bangkok vicinity dummy	0.56	14.87	***	0.37	10.55	***	0.34	8.72	***	0.25	6.56	***
MNC dummy	0.27	3.36	***	0.23	3.84	***	0.17	3.43	***	0.08	2.01	**
Industry dummies												
Food	0.09	1.12		-0.03	-0.47		-0.16	-1.87	*	-0.01	-0.12	
Textiles	0.06	0.82		-0.05	-0.83		-0.27	-3.63	***	-0.41	-5.61	***
Apparel	-0.08	-0.89		0.06	0.92		-0.11	-1.65		0.12	1.99	**
Leather & footwear	0.08	0.97		0.20	1.83	*	0.42	3.39	***	0.16	1.61	
Chemicals & products	0.25	2.89	***	0.14	2.00	**	-0.09	-1.21		-0.04	-0.47	
Rubber & plastics	-0.08	-1.29		-0.10	-1.79	*	-0.23	-3.76	***	-0.28	-4.33	***
Non-metallic mineral products	0.13	2.26	**	0.08	1.46		0.01	0.20		0.06	0.73	
Metal products	0.21	3.81	***	0.14	2.49	**	0.06	0.85		-0.01	-0.11	
General Machinery	-0.01	-0.08		0.17	2.60	**	-0.02	-0.21		0.06	0.68	
Electric Machinery	0.05	0.48		0.13	1.65	*	0.04	0.52		-0.03	-0.45	
Motor Vehicles	0.03	0.42		0.03	0.44		0.14	1.35		-0.16	-1.69	
Adj.R2 / Obs.	0.26	1,600.00		0.26	1,861.00		0.20	1,634.00		0.18	1,833.00	
White test	106.87	0.30		169.07	0.00		118.57	0.10		177.56	0.00	
Mean of Y	3.40	0.00		3.56	0.00		3.68	0.00		3.69	0.00	
Standard deviation of Y	0.76	0.00		0.74	0.00		0.78	0.00		0.81	0.00	

Notes) T-statistics are calculated using White's heteroscedasticity-consistent standard errors.
***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.

Table 10: Wage differentials for non-production labor between MNC plant and local plants by plant size
Dependent variable(Y) : Log of hourly wage for production workers

	Small plants			Small-medium plants			Medium-large plants			Large plants		
	Coef.	T stat.		Coef.	T stat.		Coef.	T stat.		Coef.	T stat.	
C	3.49	20.63	***	3.20	15.96	***	3.31	15.28	***	3.15	29.41	***
Productivity	0.27	21.31	***	0.25	22.03	***	0.23	18.11	***	0.27	18.54	***
Size	-0.18	-3.44	***	-0.07	-1.26		-0.07	-1.55		-0.04	-2.08	**
Export dummy	0.04	0.95		0.05	1.86	*	0.00	0.01		0.04	1.15	
Import dummy	0.09	3.74	***	0.08	3.67	***	0.06	2.01	**	0.12	3.68	***
Bangkok vicinity dummy	0.40	16.33	***	0.36	15.01	***	0.29	9.70	***	0.29	10.40	***
MNC dummy	0.13	2.37	**	0.11	2.73	***	0.13	3.60	***	0.04	1.26	
Industry dummies												
Food	-0.09	-1.40		-0.04	-0.72		-0.09	-1.40		-0.12	-2.40	**
Textiles	-0.03	-0.68		-0.19	-4.21	***	-0.24	-4.25	***	-0.30	-5.79	***
Apparel	-0.02	-0.53		0.03	0.74		0.05	1.10		0.09	2.22	**
Leather & footwear	0.03	0.44		0.01	0.22		0.16	1.75	*	0.00	0.03	
Chemicals & products	0.26	3.67	***	0.07	1.48		0.08	1.37		0.05	0.80	
Rubber & plastics	-0.16	-3.31	***	-0.20	-4.32	***	-0.26	-5.75	***	-0.36	-7.10	***
Non-metallic mineral products	0.04	1.14		-0.03	-0.66		0.04	0.87		0.05	0.74	
Metal products	0.14	4.02	***	0.10	2.78	***	0.07	1.47		0.16	2.51	**
General Machinery	0.16	3.94	***	0.15	3.29	***	0.24	3.95	***	0.23	3.38	***
Electric Machinery	0.20	3.60	***	0.17	3.16	***	0.06	0.96		-0.13	-2.34	**
Motor Vehicles	0.23	5.00	***	0.18	3.89	***	0.16	2.22	**	0.16	2.22	**
Adj.R2 / Obs.	0.41	2,341.00		0.40	2,146.00		0.33	1,756.00		0.39	1,929.00	
White test	316.22	0.00		175.22	0.00		150.84	0.00		286.62	0.00	
Mean of Y	2.94			3.00			3.02			2.97		
Standard deviation of Y	0.67			0.62			0.64			0.73		

Notes) T-statistics are calculated using White's heteroscedasticity-consistent standard errors.
***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.
Small plants have 30 workers or less, small-medium plants have 31-60 employees, medium-large plants have 61-150 employees, and large plants have 150 employees or more.

Table 11: The wage differentials for production workers by trade propensities for plants with 60 or more employees
Dependent variable(Y) : Log of hourly wage for non-production workers

	Export Prop.<50%			Export Prop.>=50%			Import Prop.<50%			Import Prop.>=50%		
	Coef.	T stat.		Coef.	T stat.		Coef.	T stat.		Coef.	T stat.	
C	3.70	36.38	***	4.10	28.77	***	3.60	37.53	***	4.21	27.73	***
Productivity	0.22	16.27	***	0.14	6.72	***	0.20	14.62	***	0.20	8.47	***
Size	-0.02	-1.18		-0.05	-2.13	**	0.00	0.04		-0.08	-2.90	***
Bangkok vicinity dummy	0.30	8.71	***	0.34	7.56	***	0.31	9.87	***	0.29	5.49	***
MNC dummy	0.12	2.92	***	0.14	2.91	***	0.12	3.04	***	0.21	4.06	***
Industry dummies												
Food	-0.15	-2.09	**	-0.09	-1.13		0.01	0.15		-0.35	-1.92	*
Textiles	-0.32	-5.45	***	-0.38	-3.61	***	-0.31	-4.94	***	-0.41	-3.91	***
Apparel	0.08	1.18		-0.14	-2.22	**	0.01	0.26		0.24	2.55	**
Leather & footwear	0.19	1.54		0.24	2.54	**	0.29	2.64	***	0.26	2.31	**
Chemicals & products	0.10	1.64		-0.46	-3.14	***	0.11	1.56		-0.27	-2.90	***
Rubber & plastics	-0.14	-2.45	**	-0.45	-6.11	***	-0.20	-3.97	***	-0.28	-2.63	***
Non-metallic mineral products	0.09	1.49		-0.22	-1.34		0.06	0.97		-0.44	-2.28	**
Metal products	0.11	1.89	*	-0.14	-1.12		0.07	1.17		-0.11	-1.16	
General Machinery	0.19	2.80	***	-0.35	-2.82	***	0.02	0.25		-0.03	-0.29	
Electric Machinery	0.15	1.99	**	-0.17	-2.12	**	0.08	0.96		-0.09	-1.16	
Motor Vehicles	0.00	-0.04		0.02	0.12		-0.10	-1.02		0.00	0.02	
Adj.R2 / Obs.	0.21	2,225		0.14	1,242		0.17	2,418		0.18	1,051	
White test	95.09	0.01		97.34	0.01		127.44	0.00		84.93	0.07	
Mean of Y	3.64			3.76			3.62			3.82		
Standard deviation of Y	0.79			0.80			0.77			0.85		

Notes) T-statistics are calculated using White's heteroscedasticity-consistent standard errors.
***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.

Table 12: The wage differentials for production labor by trade propensities for plants with 60 or more employees
Dependent variable(Y) : Log of hourly wage for production workers

	Export Prop.<50%			Export Prop.>=50%			Import Prop.<50%			Import Prop.>=50%		
	Coef.	T stat.		Coef.	T stat.		Coef.	T stat.		Coef.	T stat.	
C	3.12	39.33	***	3.29	38.17	***	3.10	43.30	***	3.33	31.54	***
Productivity	0.29	22.42	***	0.20	13.43	***	0.28	22.18	***	0.21	13.25	***
Size	-0.03	-2.24	**	-0.03	-1.79	*	-0.02	-1.43		-0.05	-2.90	***
Bangkok vicinity dummy	0.34	12.44	***	0.25	8.45	***	0.34	13.77	***	0.26	7.47	***
MNC dummy	0.09	2.68	***	0.07	2.36	**	0.06	2.33	**	0.13	3.62	***
Industry dummies												
Food	-0.04	-0.65		-0.29	-5.67	***	-0.08	-1.85	*	-0.26	-2.09	**
Textiles	-0.22	-4.70	***	-0.37	-5.52	***	-0.21	-4.66	***	-0.45	-6.48	***
Apparel	0.16	3.72	***	-0.06	-1.52		0.06	1.60		0.13	2.31	**
Leather & footwear	0.12	1.31		0.03	0.39		0.06	0.75		0.14	1.64	
Chemicals & products	0.17	3.50	***	-0.28	-2.77	***	0.13	2.44	**	-0.01	-0.11	
Rubber & plastics	-0.19	-4.33	***	-0.51	-10.31	***	-0.30	-7.86	***	-0.25	-3.80	***
Non-metallic mineral products	0.09	1.99	**	-0.22	-3.37	***	0.03	0.63		0.10	0.92	
Metal products	0.20	4.46	***	-0.15	-1.53		0.15	3.15	***	0.01	0.14	
General Machinery	0.34	6.08	***	0.01	0.13		0.23	3.73	***	0.26	3.90	***
Electric Machinery	0.04	0.74		-0.21	-3.80	***	-0.01	-0.14		-0.10	-1.81	*
Motor Vehicles	0.24	4.13	***	-0.02	-0.19		0.16	2.61	***	0.15	1.66	*
Adj.R2 / Obs.	0.40	2,370		0.31	1,315		0.38	2,590		0.30	1,097	
White test	271.31	0.00		130.36	0.00		322.13	0.00		108.36	0.00	
Mean of Y	3.00			2.97			2.95			3.10		
Standard deviation of Y	0.74			0.60			0.70			0.65		

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

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

Table 13: The effect of MNC plants on wage for non-production labor of local plants
Dependent variable(Y) : Log of hourly wage for non-production labor (Local Plants)

	(1)		(2)		(3)		(4)	
	Coef.	**T stat.**	**Coef.**	**T stat.**	**Coef.**	**T stat.**	**Coef.**	**T stat.**
C	3.40	134.69 ***	3.05	67.34 ***	3.34	127.54 ***	3.11	67.44 ***
Productivity	0.21	23.38 ***	0.21	23.78 ***	0.21	23.07 ***	0.21	23.74 ***
Size			0.08	9.14 ***			0.06	5.72 ***
Export dummy					0.12	5.56 ***	0.07	2.93 ***
Import dummy					0.13	6.64 ***	0.11	5.81 ***
Bangkok vicinity dummy	0.42	21.69 ***	0.41	21.20 ***	0.39	19.68 ***	0.38	19.66 ***
MNC Share (Output)	0.11	2.23 **	0.13	2.54 **	0.09	1.79 *	0.10	2.00 **
Adj.R2 / Obs.	0.19	5,590	0.20	5,590	0.20	5,590	0.21	5,590
White test	97.57	0.00	109.51	0.00	127.28	0.00	136.66	
Mean of Y	3.53		3.53		3.53		3.53	
Standard deviation of Y	0.74		0.74		0.74		0.75	

Notes) T-statistics are calculated using White's heteroscedasticity-consistent standard errors.
***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.

Table 14 : The effect of MNC plants on wage for production labor of local plants
Dependent variable(Y) : Log of hourly wage for production labor (Local Plants)

	(1)		(2)		(3)		(4)	
	Coef.	**T stat.**	**Coef.**	**T stat.**	**Coef.**	**T stat.**	**Coef.**	**T stat.**
C	2.87	153.55 ***	2.94	90.90 ***	2.86	149.93 ***	2.98	88.65 ***
Productivity	0.28	37.10 ***	0.28	37.01 ***	0.28	36.96 ***	0.27	36.75 ***
Size			-0.02	-2.73 ***			-0.03	-4.20 ***
Export dummy					-0.02	-1.51	0.00	0.21
Import dummy					0.08	6.09 ***	0.09	6.67 ***
Bangkok vicinity dummy	0.36	26.42 ***	0.36	26.57 ***	0.34	24.59 ***	0.34	24.57 ***
MNC Share (Output)	0.30	8.11 ***	0.30	8.20 ***	0.28	7.57 ***	0.27	7.48 ***
Adj.R2 / Obs.	0.36	6,770	0.36	6,770	0.36	6,770	0.36	6,770
White test	595.28	0.00	615.69	0.00	590.02	0.00	573.82	0.00
Mean of Y	2.95		2.95		2.95		2.95	
Standard deviation of Y	0.65		0.65		0.65		0.65	

Notes) T-statistics are calculated using White's heteroscedasticity-consistent standard errors.
***=significant at the 1 percent level, ** =significant at the 5 percent level, and *=significant at the 10 percent level.