# Foreign Ownership and Energy Efficiency in Thai Manufacturing Plants

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**Abstract**

This paper examines energy efficiency differentials between foreign multinational corporations (MNCs) and local plants in Thai manufacturing using data on medium-large plants from the industrial census for 2006. Both descriptive statistics and results of econometric estimation indicate that MNCs had a moderate tendency to use energy relatively efficiently, especially in food products, plastics, basic metals, and non-metallic mineral products. However, differences in energy intensities between MNCs and local plants were not common, suggesting that both groups of plants generally used energy with similar efficiency.

**Keywords:** ownership, multinational corporations, energy efficiency, Thailand, manufacturing
**JEL Categories:** F23, L60, O53, Q40
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## 1. Introduction

This paper asks whether plants controlled by foreign multinational corporations (MNCs) used energy (defined as electricity and fuel purchased) more efficiently than medium-large, local plants covered by the Thai manufacturing census for 2006. Answering this question is important because energy consumption is a large source of portion of pollution (mainly air pollution) generated by manufacturing plants. Greater energy conservation generally implies increased energy efficiency and is an important way to limit or reduce related pollution. Correspondingly, if foreign MNCs produce efficiently than local plants or firms in host economies as often asserted, they may contribute directly to lower pollution intensity in the host and may also help create spillovers that lead local plants and firms to adopt more energy-saving technologies.

Eskeland and Harrison (2003) is one of the few, recent studies using micro-data to investigate this question in developing economies. One of their main findings (p. 21) was "foreign plants are significantly more energy efficient and use cleaner types of energy" than their local peers in Coˆte d'Ivoire, Mexico, and Venezuela. In a related study of provincial data, He (2006) provides evidence that FDI enterprises produce "with higher [SO2] pollution efficiency", but that stronger environmental regulation has simultaneously, though moderately, deterred FDI among Chinese provinces. Earnhart and Rizal (2006) focus on the effects of financial performance and privatization on environmental performance, but their results also indicate foreign ownership was usually an insignificant determinant of pollution in Czech firms.

The paper first reviews literature related to the energy efficiency of MNCs (Section 2). Second, it describes the database used and compares energy expenditures and energy intensities in MNCs and in local plants (Section 3). It then analyzes whether MNC-local differentials in energy intensities persist after accounting for other factors that may affect these intensities (Section 4). Section 5 concludes and indicates avenues of future research.

## 2. Energy Efficiency, Pollution Havens, and Environmental Impacts of MNCs

There are at least two distinct stands of literature examining the environmental impacts of MNCs in developing economies. One examines location choices of MNCs and investigates the so-called pollution-haven hypothesis, asking whether relatively lax environmental standards in developing economies encourage MNCs to locate "dirty" production in those economies. Although this literature's methodology differs from that used in this paper, it is helpful to review a few key concepts raised by this literature. There is also a substantial literature which examines whether foreign MNCs produce efficiently than local plants in developing economies, which is more directly related to this analysis of how efficiently energy is used.

### 2a. Pollution Havens and Location Choice by MNCs

The pollution haven hypothesis literature is worthy of brief consideration because it helps put this analysis in the context of other literature on MNCs and the environment. The pollution haven hypothesis states that MNCs transfer polluting activities from home economies where environmental regulations are relatively strict to developing economies where corresponding regulations tend to be less stringent. Evidence supporting this pollution-haven hypothesis is generally weak (Dean et al. 2009; Eskeland and Harrison 2003; Kirkpatrick and Shimamoto 2008; Smarzynska and Wei 2001), but there is some evidence consistent with the hypothesis (He 2006; Wagner and Timmons 2008).

These analyses face numerous problems which have yet to be sorted out. First, internationally comparable and meaningful data on location choice by MNCs and the severity of environmental regulations are not easy to obtain. For example, the level of foreign direct investment (FDI) is often used to proxy MNC location choice, but FDI represents only a portion of equity and loans (corporate finance) in recipient affiliates and is often poorly correlated (both over time and across economies) with employment, sales, and other real activities in recipient affiliates (Ramstetter 2012). Measuring the stringency of environmental regulations is also notoriously difficult.

Second, modeling MNC location choice is a rather imprecise art and most of the literature lacks sufficient data to analyze the effects of all potentially important determinants (Ramstetter 2011). For example, Kirkpatrick and Shimamoto (2008) find a positive correlation between Japanese firm presence and host country participation in international environmental agreements, but fail to account for other factors related to good governance (e.g., strong and impartial legal and political institutions, effective economic policy implementation), which are likely to be positively correlated with participation in international environmental agreements. In other words, the analysis omits key institutional determinants of MNC location choice and this omission could easily bias estimates of the effects of environmental regulation.

Even if the pollution-haven hypothesis is true, and foreign direct investment (FDI) or other MNC activities (e.g., employment, sales) tend to be concentrated in pollution-intensive industries and countries with relatively lax environmental regulation, MNC affiliates in developing economies may also be less pollution- or resource-intensive compared to local firms or plants. In other words, even if MNCs exploit pollution havens, they may contribute to more efficient use of resources or reduced pollution in host developing countries, especially if resource-efficient practices in MNCs spillover to local firms.[1]

### 2b. MNCs, Productivity, and Energy Efficiency in Developing Economies

Theoretical analyses have highlighted the role of knowledge-based, intangible assets (terminology from Markusen 1991) in MNCs. The key goals of many theoretical analyses are

[1] For example, Qi et al. (2011) find evidence that the diffusion of ISO 14001 (an international environmental standard) in Chinese provinces is a way of signaling to "foreign customers", but that foreign investors have no significant effect on this diffusion, suggesting little spillover of environmental standards from MNC presence.

to explain why the MNC chooses to invest abroad when it (at least) initially has several cost disadvantages compared to local firms, and why the MNC chooses to spread out production across countries rather than concentrate it in one location. Most observers agree that MNCs tend to possess relatively large amounts of technological knowledge and networks, marketing expertise and networks, especially international ones, and generally have relatively sophisticated and capable management.[2] The first two characteristics are evidenced by relatively high research and development (R&D) propensities (ratios to total sales), relatively large proportions of patent applications and approvals, relatively high advertising-sales ratios, and relatively high dependence on international trade (generally on both exports and imports). Indeed, when asking what makes a firm decide to assume the extra costs of investing in a foreign country (compared to the costs of local firms in the host), Dunning (1988) asserted that a firm must first have "ownership advantages" as would be afforded by possession of relatively large amounts intangible assets, as well as "location advantages" and "internalization advantages" before investing.[3]

The important implication is that, if one accepts the idea that MNCs have relatively large amounts of knowledge-based, intangible assets, MNCs will tend to be relatively efficient producers compared to non-MNCs, at least in some respect. And this relatively high efficiency could involve the MNC becoming more energy efficient and/or polluting less as part of efforts to facilitate increased demand among consumers and minimize production costs related to energy and pollution abatement. Moreover, because MNCs tend to be relatively R&D- and patent-intensive, and because technologies for clean energy and pollution control usually require relatively sophisticated, technological inputs, it is logical to expect that MNCs are relatively efficient producers and consumers of goods and services that

[2] For example, Caves (2007) and Dunning and Lundan (2008) provide thorough literature reviews. The work of Markusen (2002) has also been influential.

[3] Dunning's OLI (ownership-location-internalization) paradigm has been influential, but others (Buckley and Casson 1992, Casson 1987, Rugman 1980, 1985) emphasize that the concept of internalization alone can explain the existence of the MNC and its characteristics.

promote energy efficiency and pollution reduction. For example, evidence from Cole et al. (2006) suggests that Japanese firms with FDI tend to have better environmental performance (pollute less and manage emissions better) than firms without FDI. This is consistent with the notion that MNCs are both better able to and more highly motivated to pollute less than other firms.[4] Although limited, most of the existing literature on energy intensities (see introduction) indicates that MNCs tend to be relatively energy efficient, and thus tend to pollute less, than local counterparts. However, even if MNCs are relatively energy efficient or pollute relatively little, they may still contribute to higher absolute pollution levels if they stimulate substantially higher production levels.

The fact that MNCs can move productive resources internationally clearly gives them the opportunity to locate polluting activities where related regulations tend to be relatively lax. This relocation might result in MNCs being less energy efficient or polluting more than local firms, if they are strongly motivated to move polluting activities out of economies with stricter regulations, for example. On the other hand, most developing countries probably implement existing environmental policies more strictly for MNCs and other relatively large firms than for smaller, predominately local firms. Moreover, as indicated above, the existing literature suggests that there is not much evidence supporting the pollution haven hypothesis.

Although the theoretical rationale for expecting MNCs to have relatively high productivity is rather convincing, the empirical evidence on productivity differentials between foreign MNCs and local firms in developing Asian economies (which are predominantly non-MNCs) is ambiguous. For example, studies of productivity differentials between MNCs and non-MNCs in the manufacturing sectors of Malaysia (Oguchi et al 2002, Haji Ahmad 2010), and Thailand (Ramstetter 2004, 2006) suggest that differentials tended to be relatively small and were often statistically insignificant. Other evidence from Malaysia (Menon 1998, Oguchi et al. 2002) indicates that the growth of total factor

[4] Cole et al. (2006) also provide evidence that firms with trade are also more likely to have better environmental performance than firms without trade. Correspondingly, they emphasize that internationalized firms are more likely to have better environmental performance than others.

productivity (TFP) was often less rapid in MNCs than non-MNCs. Evidence for Indonesia (Takii 2004, 2006) and Vietnam (Ramstetter and Phan 2008, 2011) suggests that significant productivity differentials between MNCs and local plants were somewhat more common in the manufacturing industries of these economies, especially when all manufacturing firms or plants are included in the estimation sample and industry effects are captured with intercept dummies. However, differentials often become statistically insignificant when plants are disaggregated by industry (allowing production function slopes, as well as the constant, to vary among manufacturing industries). The only known evidence for China also suggests significant differences in both capital- and labor-productivity in samples of all manufacturing firms (Jefferson and Su 2006).

Previous studies that examine energy intensities usually define the dependent variable as energy used per unit of output, which is consistent with defining production as output and intermediate consumption as an input. For example, Eskeland and Harrison (2003, 16-18) derive their energy demand model from a translog production function, and interpret the dependent variable as the share of energy's factor income in output. Independent variables are other factor inputs (other intermediate consumption, fixed assets, and labor), the quantity of energy used, and factors related to a plant's technological sophistication such as plant vintage and the ratio of R&D expenditures to output or sales. This paper will use a similar approach in Section 4 below.

A study of Indonesian plants in 2002-2006 by Hartono et al. (2011) is the only known study of this nature for Asia's developing economies. They find that local, private plants tended to have significantly higher energy intensities than state-owned enterprises (SOEs, which is the control group in their study), but that MNC-SOE differentials in energy intensities were not significant statistically. In other words, their evidence suggests that MNCs and SOEs use with similar efficiency and that SOEs are more energy efficient than private plants.

## 3. The Data

This study uses the plant-level data for 2006 underlying the Thai industrial census conducted in 2007. Published compilations report that there were 457,968 plants, 26,293 of which had 16 or more workers (Table 1). The plant-level data includes records for all plants with 16 or more workers but only 11 percent of smaller plants reported in published compilations. In other words, published estimates for smaller plants were apparently extrapolated from a relatively small sample (about 5.7 percent of the estimated total), while estimates for plants with more than 16 workers were taken directly from census replies. Very few MNCs (defined as plants with foreign ownership shares of 10 percent or greater) were small plants (141 of 2,657) and small plants accounted for only 0.15-0.16 percent of all workers, paid workers, and output in MNCs. The vast majority of local plants in the dataset were small (47,497 of 71,274) but small plants accounted for only 6.7 percent of all workers, 4.7 percent of paid workers, and 1.5 percent of output in sample local plants.

In other words, small plants are disproportionately local, have unusually large shares of unpaid workers, and relatively low output per worker or paid worker. Small plants also account for disproportionately large shares of minority-foreign MNCs (foreign shares of 10-49 percent), compared to majority-foreign (shares of 50-89 percent) or heavily foreign MNCs (shares of 90-100 percent).[5] Thus, comparisons between all MNCs and all local plants, as well as among MNC ownership groups, could easily be distorted by the fact local plants are predominantly small, while most MNCs are predominantly large. Correspondingly, the analysis below focuses on a sample of medium-large plants, defined as those with 20 or more workers. This focus also has the advantage of removing the vast majority of extreme observations (likely outliers) from the sample and facilitating comparisons with similar studies of Indonesia.[6]

[5] Small plants accounted for 8.9 percent of minority-foreign MNCs, but only 0.3 percent and 0.1 percent, respectively, of majority- and heavily foreign MNCs.

[6] This cutoff is somewhat higher than that used in official NSO compilations (15 or more workers) but is qualitatively similar. Indonesian data only cover plants with 20 or more workers.

In addition to containing a large number of small, local plants that cannot be meaningfully compared to the predominately large MNCs, the census data had records for a number of medium-large plants that reported implausibly small values for key variables. For example, of the 22,934 plants with 20 or more workers, 4,169 plants had output per worker of less than 50,000 baht, value added per worker of less than 10,000 baht, or initial fixed assets per worker of less than 10,000 baht per worker (Table 1). These cutoffs are all less than 3.3% of corresponding averages for all medium and large plants and comparable nation-wide estimates (including small plants) from either the industrial census or alternative sources. They are also substantially smaller than per capita GDP in the country in 2006 (119,634 baht or US$3,158; National Economic Social and Development Board 2011b). Plants with extremely low values of these key variables are also predominantly local (98 percent) and are excluded from the sample to avoid distorting ownership comparisons and reduce the influence of outliers.

Among the remaining 18,765 medium-large plants, there are many apparent duplicates in the data set that need to be eliminated to avoid double counting. For example, if one checks 11 key measures of output, expenses, capital, labor, and the foreign ownership share[7], there were 4,828 duplicate records of all 11 variables. The vast majority of these records (87 percent) had different location information but identical performance information. This suggests that a large number of plants belonging to multiplant firms and operating in different locations reported the identical firm-level information, as in the 1996 census (Ramstetter 2004, 2006).[8] Duplicates were primarily local plants (93 percent) but duplicates accounted for sizeable portions of the MNC samples as well.[9] In order to avoid double counting, maximize sample size, and coverage of large, multiplant firms, which are the

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[7] The variables were: (a) output, (b) sales of goods produced, (c) intermediate consumption, (d) purchase of materials and parts, (e) electricity and fuel costs, (f) initial fixed assets, (g) ending fixed assets, (h) female workers, (i) male workers, (j) female operatives, (k) male operatives, and (l) foreign ownership shares.

[8] Cross checking of duplicates with a data set on large firms compiled from Business On-Line (2008) suggests several cases in which plants recorded firm-level information in large firms.

[9] For example, duplicates accounted for 21 percent of heavily foreign plants with 20 or more workers and 11 percent of minority foreign plants.

focus of this study, the 4,828 duplicates were dropped, leaving one record from each set of duplicates in the data set. This solution, although probably the best feasible, is far from satisfactory because it results in a database that mixes up firm- and plant-level information. Perhaps the most obvious difficulty this causes is the distortion of location information after duplication is eliminated. In economies like Thailand where there are many multi-plant firms, this also complicates the interpretation of compilations from the data because results from plant-level data and those from firm-level data can differ markedly.

After dropping plants with extreme values and duplicates, there were 13,937 plants remaining in the dataset, 14 percent of which were MNCs. MNC shares of workers (31 percent) and output (45 percent), were much larger, reflecting MNCs' tendency to have substantially more workers per plant or output per plant than local plants, even in this sample of medium-large plants (Table 1). Similarly, the fact that MNC shares of value added and fixed assets (42 and 44 percent, respectively) exceeded MNC shares of employment suggests that MNCs had relatively high average labor productivity and capital intensity, than local plants in this sample. On the other hand, the share of MNCs in electricity and fuel expenditures (43 percent) was quite similar to shares of value added and output. In other words, energy intensities, measured as the ratio of electricity and fuel expenditures to gross output or value added, were on average rather similar in MNCs and local plants.

When analyzing pollution related issues, it is important to recognize that 15 of the 21 industries identified in Table 2 accounted for an average of 92 percent of electricity and fuel expenditures by Thailand's medium-large manufacturing plants in 2006.[10] These 15 industries include some of the largest in Thai manufacturing, and large size is one reason for large absolute levels energy consumption. In addition, if one calculates energy intensities as the ratio of expenditures on electricity and fuel output, they tended to be larger in the 15 large energy using industries than in the

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[10] In this paper, most of these industries (10 of the 15) are defined at the 2-digit level of the International Standard Industrial Classification (ISIC), three (beverages, rubber, and plastics) are 3-digit categories, one (food) is a combination of 3-digit categories, and the final one (electronics-related machinery) is a combination of four closely related 2-digit categories.

overall manufacturing sample for all ownership groups except heavily-foreign MNCs (Table 3).[11] The primary reason that these industries have relatively high energy intensities is related to the variation of energy requirements in production processes among industries. This paper focuses on the analysis of the large energy using industries because they are likely to be the largest source of energy-related degradation or pollution in Thai manufacturing. The largest energy using industries in absolute terms were electronics-related machinery (15 percent of the total for sample plants), food (10 percent), textiles (9 percent), non-metallic mineral products (8 percent), and chemicals and non-electric machinery (7 percent each; Table 2).

MNC shares of electricity and fuel expenditures in these 15 industries combined were slightly higher than the average for all manufacturing (45 percent), but very similar to shares of output in the 15 industries (44 percent; Appendix Table 2b). MNC shares were largest (61-88 percent) in the four machinery industries (non-electric machinery, electronics-related machinery, motor vehicles, and other transport equipment). However, MNC ownership patterns differed markedly among industries. Wholly-foreign MNCs were relatively large in electronics-related machinery and motor vehicles, majority-foreign MNCs relatively large in other transport equipment, and minority-foreign MNCs relatively large in non-electric machinery. Some MNC groups also had relatively large shares of fuel and electricity expenditures, as well as varied ownership patterns in paper (wholly-foreign MNCs being largest) and rubber (minority-foreign MNCs being largest). These differences in ownership patterns are potentially important if ownership shares are related to technology choice and related energy requirements.

If one compares energy intensities among ownership groups, there is little evidence of a strong relationship between ownership shares and energy intensities. If one averages mean intensities across all 15 large energy consuming industries, wholly-foreign and majority-foreign MNCs do have lower intensities than local plants or minority-foreign MNCs, but the differential is small, only 0.01

[11] Local plant intensities are not shown in the Table but can be calculated from the table (means of 5.2 percent for the 15 large energy users and 4.8 percent for the small energy users).

percentage points below local plant levels for minority-foreign MNCs and 0.23-0.27 percentage points lower in majority-foreign and wholly-foreign MNCs. At the industry level, differentials between wholly-foreign MNCs and local plants were usually negative (11 of 15 industries) but relatively large, negative differentials of less than -1 percentage point were observed in only five of the 15 industries; similarly large positive differentials were observed in three industries. For minority- and majority-foreign plants, relatively large positive differentials were equally as common as relatively large negative differentials (4 industries each for minority-foreign plants and 6 each for majority-foreign plants). In short, the simple comparisons in Table 3 suggest that MNC-local differentials in energy intensities were generally rather small and their direction was not very consistent among these 15 industries. However, these comparisons may mask important plant-level differences and fail to adequately reflect the influences of variation in other factor inputs and technological characteristics among sample plants.

## 4. Energy Intensities and Ownership after Accounting for Scale and Factor Usage

This section attempts to examine the relationship between ownership and energy intensities after accounting for the effects of other factor use and technical characteristics of plants by estimating a model similar to that in Eskeland and Harrison (2003). The models are derived by differentiating "a translog approximation to a production function" (p. 16) with respect to the energy input in question and interpreted as "inverse input demands" (p. 16). As a result, energy intensities are a function of the logs of other factor inputs (other intermediate consumption [mainly materials and parts], fixed assets, and labor), the log of the quantity of electricity (a proxy for the quantity of energy corresponding to the energy intensity being estimated), and factors related to a plant's technological sophistication. Unfortunately, the Thai data do not include information on the quantity of energy consumed so this variable must be omitted.[12] In the Thai data, there are two potentially important

[12] If energy prices were equal for all plants, the value variable could be used instead, but assuming this is unrealistic because prices vary among plants depending on energy mix, quantities consumed,

indicators of technological sophistication, the ratio of research and development (R&D) expenditures to gross output and the number of years in operation or plant vintage.[13] Plant vintage is a complicated indicator, however, and can also reflect the effects of changing economic policies, for example, as well as changes in technology over time. The effect of plant ownership is then captured by adding dummy variables that identify various groups of MNCs (i.e., local plants are used as the reference group). The resulting model is:

$$EP_i=a0+a1(LE_i)+a2(LK_i)+a3(LM_i)+a4(RD_i)+a5(YR_i)+a6(DF_i) \quad (1)$$

where
$DF_i$=a dummy equal to 1 if plant i is an MNC, 0 otherwise
$EP_i$=energy (fuel and electricity) intensity in plant i (percent)
$LE_i$=natural log of the number of workers in plant i
$LK_i$= natural log of the fixed assets less depreciation at yearend in plant i (baht)
$LM_i$=natural log intermediate consumption excluding fuel and electricity in plant i (baht)
$RD_i$=ratio of R&D expenditures to gross output in plant i (percent)
$YR_i$=years of operation for plant i (percent)

If the coefficient *a6* is negative, for example, it would mean that MNCs had significantly lower energy intensities after accounting for the influences of other factor usage and the two indicators of technological sophistication (R&D intensities and plant vintage). In the Thai case, it is also possible to investigate whether the degree of foreign ownership affects MNC-local differentials by estimating the following equation:

$$EP_i=b0+b1(LE_i)+b2(LK_i)+b3(LM_i)+b4(RD_i)+b5(YR_i)+b6(DF1_i)+b7(DF5_i)+b8(DF9_i) \quad (2)$$

where
$DF1_i$=a dummy equal to 1 if plant i is a minority-foreign (10-49%) MNC, 0 otherwise
$DF5_i$=a dummy equal to 1 if plant i is a majority-foreign (50-89%) MNC, 0 otherwise
$DF9_i$=a dummy equal to 1 if plant i is a majority-foreign (90-100%) MNC, 0 otherwise

Because all slope coefficients are likely to differ across the 15 industries (reflecting the heterogeneity of energy requirements among them), the emphasis is on analysis of regressions

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and the timing of consumption (especially important for electricity and piped gas prices).
[13] In addition, Eskeland and Harrison (2003) also include machinery imports as indicators of plant sophistication, but they are not available from this data set.

performed at the industry level. These results are then compared to regressions for all major polluting industries combined. However, these 15 industries are rather aggregate, generally being defined at the 2-digit level. Thus, industry effects are further accounted for by comparing estimates including 3- and 4-digit industry dummies as feasible for each sample.[14] Because the census has two alternative measures of capital, the initial stock and the ending one, both measures are tried as a robustness check, though the initial measure is probably best because it minimizes the chances of simultaneity issues becoming problematic.[15] There are thus four specifications estimated for each equation in each sample, using alternative definitions of industry dummies and fixed assets. As explained above, removal of duplicates has the unfortunate consequence of making the use of location dummies meaningless so we cannot control for the effect of plant location accurately when using these data. All estimates use robust standard errors to account for potential heteroscedasticity.

Table 4 first presents results of estimating equations (1) and (2) in samples of all 15 large energy consuming industries combined (11,322 plants), showing all slope coefficients, a goodness of fit measure ($R^2$), sample size, and tests of the hypothesis that coefficients on all MNC ownership dummies are identical. In both equations, coefficients on 4 of the 5 control variables are highly significant at the 1 percent level. These estimates suggest that labor and capital (positive signs) complement fuel and electricity in the production process, while intermediate consumption other than fuel or electricity (a negative sign) is a substitute for it. Older plants also tend to have higher energy intensities, which is consistent with the notion that newer plants are generally more energy efficient. However, R&D does not have a significant effect, suggesting that R&D investments have yet to have much effect on energy efficiency in Thai plants. More generally, the fit of both equations

[14] As noted above, three of the 15 industries (beverages, rubber, and plastics) are 3-digit categories making the use of 3-digit dummies meaningless. In addition, 4-digit definitions are identical to 3-digit definitions in apparel, plastics and motor vehicles in these industries. To facilitate meaningful estimates with ownership dummies present, a few 4-digit categories had to be combined when defining industries dummies (1551, 1552, and 1553 in beverages and 3511 and3512 in other transport equipment).

[15] We were unable to find adequate instruments for capital, labor, and other intermediate consumption. Correspondingly, simultaneity remains a potential problem in these cross section estimates.

(1) and (2) was rather poor with $R^2$ of only 0.10 when 3-digit industry dummies are used and 0.14-0.15 when 4-digit dummies are used.

Coefficients on all foreign ownership dummies are negative and largest for wholly-foreign plants followed by majority-foreign plants, a result which is consistent with the pattern observed in the descriptive data above (Tables 3, 4). The coefficients on the wholly-foreign dummies in the 4-digit specifications were the only significant ones at the standard five percent significant level (when initial capital was used) or weakly significant at the 10 percent level (when yearend capital was used). Moreover, the null hypothesis that all foreign ownership dummies are equal cannot be rejected, suggesting that equation (1) is the better specification in all estimates. These results indicate that there were no significant differences between energy intensities of MNCs and local plants, after accounting for the influences of factor demands, R&D, and vintage.

However, as emphasized above, regressions that combine a wide variety of manufacturing industries, although common, are a blunt tool that often fail to adequately account for interindustry differences. This is especially here because energy intensities often vary in a large range among industries (Table 3), largely for technological reasons. Table 5 thus presents the MNC-local energy intensity differentials obtained by estimating equations (1) and (2) in each of the 15 large energy consuming industries separately. Not surprisingly, these differentials (and other slope coefficients; see Appendix Table 5 for details) differ greatly among industries. When significant or weakly significant, coefficients on foreign ownership dummies were negative in all but one case, the positive and highly significant coefficient on wholly foreign MNCs in beverages. Notably, there is only one wholly-foreign plant in this industry (Appendix Table 2c), so it is difficult to attach much meaning to this result.

On the other hand, there is fairly strong evidence of negative and significant coefficients for all MNC plants in food products, plastics, basic metals, and for heavily-foreign and majority-foreign plants in non-metallic mineral products (Table 5). There is also a weak indication that the negative differentials were concentrated in minority-foreign MNCs in food and plastics, and in minority- and majority-foreign MNCs in basic metals. However, in these cases, the null hypothesis that all MNCs had the same coefficient could not be rejected. Similarly, there was weak evidence of a negative and significant differential involving heavily-foreign MNCs in paper products and non-electric machinery, but here again the null hypothesis that all MNCs had the same, in these cases insignificant, differentials could not be rejected.

In short, this exercise provides some weak support for the notion that MNCs may tend to have lower energy intensities and thus be more energy efficient than local plants in Thai manufacturing. This is true in food products, plastics, basic metals, and non-metallic mineral products, and maybe in paper products and non-electric machinery as well. However, the models do not fit the data very well (in most individual industries the fit was even poorer than in the aggregate sample) and the most prominent result is the inability to find significant MNC-local differentials in energy intensity in most of the industries examined.

**5. Conclusions**

This paper has examined whether foreign MNCs used energy more efficiently than their local counterparts in a sample of medium-large plants in Thai manufacturing in 2006. A literature review highlighted the fact that foreign MNCs are generally assumed to have relatively sophisticated and advanced technology compared to local plants in developing economies like Thailand. This creates the possibility that MNCs might use inputs like energy relatively efficiently. However, related empirical evidence regarding MNC-local productivity differentials is mixed for Thailand and other Southeast Asian economies.

The results of this exercise need to be interpreted with caution for at least three reasons. First, as emphasized at several points throughout the paper, these data contain numerous duplicates, including duplicates for several plants belonging to the large firms (MNCs and local). In order to avoid throwing away too much information on these firms, we have chosen to retain one from each set of duplicates. However, this makes the dataset a combination of firm-level (for plants retained from sets of duplicates) and plant-level (for other plants) information, complicating the interpretation of any analytical results. Second, the data cover only one year and the cross section analysis is not able to adequately account for potential simultaneity. Third, there is also a potentially important omitted variable problem because the data do not contain information on the quantity of energy used.

On the other hand, both descriptive statistics and results of econometric estimation are consistent with this mixed picture and suggest that the relationship between MNC ownership and energy intensities was relatively weak. The strongest correlations suggested MNCs had relatively low energy intensities in food products, plastics, basic metals, and non-metallic mineral products.[16] However, results for most industries indicated that MNC-local differentials in energy intensities were not significantly different in most of the 15 industries examined. In other words, these results suggest that MNCs and local plants usually responded to Thai energy policies and prices, among other factors affecting energy intensities, rather similarly.

Although this key finding seems plausible, it is also important to investigate these and related relationships further. For example, it would be interesting to modify these basic models to incorporate the influences of plant research on energy saving and/or waste management. More generally, the effect of foreign ownership might be different for MNCs engaged in any R&D in Thailand than for MNCs not engaged in R&D, and this could be tested. Finally, as explained in the introduction, it is also important to see if MNC presence affects energy intensities in local plants, that is whether MNCs are a source of energy efficiency spillovers to local plants. We leave these topics for future research.

[16] There was also a strong positive differential for a single, heavily-foreign MNC in beverages, though it is difficult to attach much meaning to this result.

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Table 1: Key Indicators for Thai Manufacturing

| Sample | Number of plants | Thousands | | Values in billion baht | | | |
|---|---|---|---|---|---|---|---|
| | | Workers | Paid workers | Fixed assets (avg.) | Elec-tricity, fuel | Output | Value added |
| Published industrial census estimates (National Statistical Office 2009) | | | | | | | |
| All plants | 457,968 | 4,460.3 | 3,819.0 | 3,183.2 | 317.7 | 7,304.5 | 1,758.8 |
| 1-15 workers | 431,675 | 983.4 | 396.1 | 300.6 | 10.7 | 262.4 | 91.1 |
| 16+ workers | 26,293 | 3,476.9 | 3,422.9 | 2,882.6 | 307.0 | 7,042.2 | 1,667.7 |
| All plants in database underlying National Statistical Office (2009) | | | | | | | |
| All plants | 73,931 | 3,726.4 | 3,591.5 | 2,972.9 | 311.6 | 7,146.6 | 1,716.6 |
| 1-15 workers | 47,638 | 249.5 | 168.7 | 90.3 | 4.6 | 104.4 | 44.2 |
| 16+ workers | 26,293 | 3,476.9 | 3,422.9 | 2,882.6 | 307.0 | 7,042.2 | 1,672.5 |
| 20+ workers | 22,934 | 3,418.6 | 3,371.0 | 2,859.4 | 305.0 | 7,001.2 | 1,661.7 |
| Sample plants | 13,937 | 2,518.3 | 2,509.0 | 2,403.0 | 252.5 | 5,854.6 | 1,378.5 |
| Local plants in database (foreign shares 0-9%) | | | | | | | |
| All plants | 71,274 | 2,782.5 | 2,648.9 | 1,764.9 | 188.7 | 4,093.3 | 1,007.1 |
| 1-15 workers | 47,497 | 248.0 | 167.2 | 88.8 | 4.5 | 99.4 | 43.3 |
| 16+ workers | 23,777 | 2,534.5 | 2,481.7 | 1,676.1 | 184.2 | 3,993.9 | 963.8 |
| 20+ workers | 20,503 | 2,477.7 | 2,431.3 | 1,654.5 | 182.4 | 3,956.4 | 953.6 |
| Sample plants | 11,950 | 1,726.6 | 1,718.2 | 1,355.4 | 144.1 | 3,227.4 | 794.2 |
| Minority-foreign plants in database (foreign shares 10-49%) | | | | | | | |
| All plants | 1,220 | 304.9 | 304.6 | 381.2 | 42.0 | 992.4 | 166.3 |
| 1-15 workers | 97 | 1.0 | 1.0 | 0.6 | 0.1 | 2.0 | 0.5 |
| 16+ workers | 1,123 | 303.9 | 303.6 | 380.5 | 41.9 | 990.4 | 165.8 |
| 20+ workers | 1,063 | 302.9 | 302.6 | 379.6 | 41.8 | 988.6 | 165.6 |
| Sample plants | 909 | 263.1 | 262.9 | 353.0 | 37.3 | 908.3 | 149.4 |
| Majority-foreign plants in database (foreign shares 50-89%) | | | | | | | |
| All plants | 440 | 178.1 | 178.0 | 270.4 | 27.9 | 495.7 | 95.7 |
| 1-15 workers | 20 | 0.2 | 0.2 | 0.2 | 0.0 | 0.7 | 0.1 |
| 16+ workers | 420 | 177.9 | 177.8 | 270.2 | 27.9 | 495.0 | 95.6 |
| 20+ workers | 409 | 177.7 | 177.6 | 269.9 | 27.8 | 494.0 | 95.5 |
| Sample plants | 355 | 156.3 | 156.2 | 225.6 | 25.4 | 451.3 | 87.6 |
| Heavily-foreign plants in database (foreign shares 90-100%) | | | | | | | |
| All plants | 997 | 460.8 | 460.1 | 556.5 | 53.0 | 1,565.2 | 447.6 |
| 1-15 workers | 24 | 0.3 | 0.3 | 0.7 | 0.0 | 2.2 | 0.3 |
| 16+ workers | 973 | 460.6 | 459.8 | 555.8 | 53.0 | 1,563.0 | 447.2 |
| 20+ workers | 959 | 460.3 | 459.6 | 555.3 | 52.9 | 1,562.2 | 447.1 |
| Sample plants | 723 | 372.2 | 371.8 | 469.0 | 45.7 | 1,267.6 | 347.2 |
| Alternative estimates for Thai manufacturing | | | | | | | |
| See notes | - | 5,504.1 | - | 6,114.2 | - | 8,313.2 | 2,812.5 |

Notes: For industrial census data, fixed assets are averages of initial and ending stocks; for alternative estimates: employment is the average of labor force survey estimates for quarters 1-4 (National Statistical Office 2011); value added and gross output (total income) are from national accounts data (National Economic and Social Development Board 2008); fixed assets (gross capital stock at replacement value) from capital stock estimates (National Economic and Social Development Board 2011a); samples include one plant from each set of duplicates and exclude plants with unreasonably low output, value added, or fixed assets per worker (see text for details).

Table 2: Fuel and Electricity Expenditures (total in billion baht, MNC shares in percent)

| Industry | Total | MNCs shares by ownership group 10%+ | 10-49% | 50-89% | 90%+ |
|---|---|---|---|---|---|
| Manufacturing | 252.536 | 43 | 15 | 10 | 18 |
| Large Energy Users | 232.751 | 45 | 15 | 11 | 19 |
| Food products | 24.753 | 13 | 7 | 4 | 2 |
| Beverages | 3.325 | 38 | 31 | 4 | 3 |
| Textiles | 21.990 | 21 | 5 | 13 | 3 |
| Apparel | 6.000 | 25 | 13 | 4 | 8 |
| Paper products | 12.104 | 45 | 17 | 1 | 26 |
| Chemicals | 18.698 | 28 | 14 | 8 | 6 |
| Rubber products | 7.325 | 47 | 24 | 5 | 18 |
| Plastics | 8.828 | 31 | 10 | 6 | 15 |
| Non-metallic mineral products | 20.796 | 8 | 6 | 1 | 1 |
| Basic metals | 12.251 | 41 | 29 | 4 | 9 |
| Metal products | 10.212 | 38 | 12 | 3 | 23 |
| Non-electric machinery | 16.525 | 62 | 43 | 4 | 15 |
| Electronics-related machinery | 38.187 | 84 | 12 | 8 | 64 |
| Motor vehicles | 16.618 | 61 | 13 | 16 | 32 |
| Other transport equipment | 15.138 | 88 | 13 | 74 | 1 |
| Small Energy Users | 19.785 | 23 | 17 | 2 | 4 |
| Tobacco | 1.514 | 2 | 2 | 0 | 0 |
| Leather, footwear | 2.222 | 7 | 4 | 1 | 2 |
| Wood products | 2.790 | 8 | 3 | 4 | 1 |
| Publishing | 2.670 | 14 | 10 | 2 | 3 |
| Petroleum products | 4.218 | 44 | 44 | 0 | 0 |
| Miscellaneous & recycling | 6.371 | 31 | 18 | 5 | 9 |

Note: Data refer to the cost of fuel and electricity used in production processes.

Source: Compilations from data underlying National Statistical Office (2009).

Table 3: Fuel and Electricity Intensities in MNCs by Foreign Share (percent of gross output) and MNC-local differentials (percentage points)

| Industry | MNC Intensities | | | MNC-local differentials | | |
|---|---|---|---|---|---|---|
| | 10-49% | 50-89% | 90%+ | 10-49% | 50-89% | 90%+ |
| Manufacturing (21-industry mean) | 4.80 | 4.98 | 5.23 | -0.438 | -0.258 | -0.008 |
| Large Energy Users (15-industry mean) | 5.39 | 5.16 | 5.13 | -0.013 | -0.236 | -0.274 |
| Food products | 4.79 | 5.96 | 4.54 | -2.790 | -1.622 | -3.035 |
| Beverages | 4.55 | 3.17 | 9.59 | -1.931 | -3.314 | 3.107 |
| Textiles | 7.86 | 8.27 | 6.20 | 1.090 | 1.500 | -0.575 |
| Apparel | 4.13 | 7.25 | 4.22 | -0.260 | 2.858 | -0.173 |
| Paper products | 5.76 | 6.32 | 3.27 | 1.467 | 2.030 | -1.014 |
| Chemicals | 4.05 | 5.49 | 4.38 | -0.499 | 0.940 | -0.174 |
| Rubber products | 5.35 | 3.15 | 3.95 | 0.842 | -1.352 | -0.550 |
| Plastics | 4.28 | 4.24 | 5.16 | -1.773 | -1.813 | -0.893 |
| Non-metallic mineral products | 10.43 | 3.35 | 4.99 | 2.566 | -4.512 | -2.877 |
| Basic metals | 4.48 | 3.45 | 4.77 | -1.746 | -2.777 | -1.458 |
| Metal products | 4.88 | 5.78 | 5.87 | 0.213 | 1.118 | 1.209 |
| Non-electric machinery | 4.69 | 5.76 | 3.41 | 0.137 | 1.207 | -1.151 |
| Electronics-related machinery | 5.63 | 4.08 | 4.54 | 1.224 | -0.326 | 0.129 |
| Motor vehicles | 4.79 | 4.11 | 4.15 | 0.450 | -0.225 | -0.191 |
| Other transport equipment | 5.15 | 7.07 | 7.86 | 0.822 | 2.749 | 3.538 |
| Small Energy Users (6-industry mean) | 3.33 | 4.42 | 5.61 | -1.500 | -0.404 | 0.784 |

Note: Data refer to the cost of fuel and electricity used in production processes.

Source: Compilations from data underlying National Statistical Office (2009).

Table 4: Slope Coefficients from Estimates of MNE-Local Differentials in Energy Intentisty, 15 Large Energy Using Industries Combined

| Independent variable, $R^2$, industry | 3-digit industry dummies | | 4-digit industry dummies | |
|---|---|---|---|---|
| | Initial Capital | Ending Capital | Initial Capital | Ending Capital |
| 15 LARGE ENERGY USING INDUSTRIES COMBINED, Equation (1), 11,322 observations | | | | |
| $LE_i$ | 0.4613 a | 0.5928 a | 0.4978 a | 0.6206 a |
| $LK_i$ | 0.9403 a | 0.7276 a | 0.8504 a | 0.6566 a |
| $LM_i$ | -1.1829 a | -1.1106 a | -1.0703 a | -1.0065 a |
| $RD_i$ | -0.2208 | -0.2073 | -0.3092 | -0.2970 |
| $YR_i$ | 0.0350 a | 0.0369 a | 0.0367 a | 0.0383 a |
| $DF_i$ | -0.1184 | -0.0491 | -0.2540 | -0.1898 |
| $R^2$ | 0.10 | 0.10 | 0.15 | 0.14 |
| 15 LARGE ENERGY USING INDUSTRIES COMBINED, Equation (2), 11,322 observations | | | | |
| $LE_{it}$ | 0.4633 a | 0.5951 a | 0.5000 a | 0.6233 a |
| $LK_{it}$ | 0.9442 a | 0.7309 a | 0.8552 a | 0.6606 a |
| $LM_{it}$ | -1.1808 a | -1.1083 a | -1.0673 a | -1.0033 a |
| $RD_i$ | -0.2226 | -0.2079 | -0.3100 | -0.2968 |
| $YR_i$ | 0.0344 a | 0.0363 a | 0.0360 a | 0.0376 a |
| $DF1_i$ | -0.0451 | 0.0149 | -0.1666 | -0.1129 |
| $DF5_i$ | -0.1249 | -0.1044 | -0.3364 | -0.3078 |
| $DF9_i$ | -0.3999 | -0.2959 | -0.5770 b | -0.4819 c |
| Test: $DF1_i = DF5_i = DF9_i$ | 0.55 | 0.40 | 0.69 | 0.55 |
| $R^2$ | 0.10 | 0.10 | 0.15 | 0.14 |

Notes: a=signficant at the 1% level, b=significant at the 5% level, c=significant at the 10% level (all p-values based on robust standard errors); estimated equations also include 3- and 4-digit industry dummies as indicated and relevant (see explanation in the text); for samples sizes and precise p-values, see Appendix Table 4.

Table 5: Estimates of MNE-Local Energy Intentisty Differentials by Industry

| Industry, independent variable | 3-digit industry dummies: Initial Capital | 3-digit industry dummies: Ending Capital | 4-digit industry dummies: Initial Capital | 4-digit industry dummies: Ending Capital |
|---|---|---|---|---|
| FOOD PRODUCTS (1,986 observations; $R^2$=0.18~0.24) | | | | |
| EQ(1): $DF_i$ | -1.4398 a | -1.4446 a | -1.3652 b | -1.3545 b |
| EQ(2): $DF1_i$ | -1.6102 a | -1.6279 a | -1.4859 b | -1.4912 b |
| EQ(2): $DF5_i$ | -0.3804 | -0.2941 | -0.3198 | -0.2144 |
| EQ(2): $DF9_i$ | -2.2476 | -2.2706 | -2.8037 | -2.8043 |
| Test: $DF1_i=DF5_i=DF9_i$ | 0.85 | 0.97 | 0.77 | 0.85 |
| BEVERAGES (165 observations; $R^2$=0.08~0.11) | | | | |
| EQ(1): $DF_i$ | 0.8745 | 0.8874 | 0.3938 | 0.4171 |
| EQ(2): $DF1_i$ | 0.4128 | 0.4243 | -0.1720 | -0.1476 |
| EQ(2): $DF5_i$ | -0.1544 | -0.0833 | -1.6681 | -1.5492 |
| EQ(2): $DF9_i$ | 6.6527 a | 6.5698 a | 8.6188 a | 8.4734 a |
| Test: $DF1_i=DF5_i=DF9_i$ | 7.44 a | 7.62 a | 13.64 a | 13.80 a |
| TEXTILES (955 observations; $R^2$=0.09~0.11) | | | | |
| EQ(1): $DF_i$ | 0.4227 | 0.4582 | 0.4664 | 0.5002 |
| EQ(2): $DF1_i$ | 0.7537 | 0.8041 | 0.8285 | 0.8710 |
| EQ(2): $DF5_i$ | -0.1932 | -0.1884 | -0.3026 | -0.2847 |
| EQ(2): $DF9_i$ | -0.7258 | -0.6791 | -0.3692 | -0.3347 |
| Test: $DF1_i=DF5_i=DF9_i$ | 0.60 | 0.61 | 0.51 | 0.52 |
| APPAREL (895 observations; $R^2$=0.02~0.03) | | | | |
| EQ(1): $DF_i$ | 0.0812 | 0.0826 | 4-digit & 3 digit categories are identical | |
| EQ(2): $DF1_i$ | -0.3349 | -0.3240 | | |
| EQ(2): $DF5_i$ | 2.6852 | 2.7205 | | |
| EQ(2): $DF9_i$ | -0.7744 | -0.8419 | | |
| Test: $DF1_i=DF5_i=DF9_i$ | 0.55 | 0.58 | | |
| PAPER PRODUCTS (485 observations; $R^2$=0.09~0.12) | | | | |
| EQ(1): $DF_i$ | 0.3004 | 0.1865 | 0.1984 | 0.0909 |
| EQ(2): $DF1_i$ | 0.4486 | 0.3547 | 0.4400 | 0.3538 |
| EQ(2): $DF5_i$ | 1.9320 | 1.7137 | 1.2367 | 1.0163 |
| EQ(2): $DF9_i$ | -2.5586 b | -2.7334 b | -2.8082 a | -2.9755 a |
| Test: $DF1_i=DF5_i=DF9_i$ | 2.10 | 2.16 | 2.47 c | 2.57 c |
| CHEMICALS (869 observations; $R^2$=0.05~0.08) | | | | |
| EQ(1): $DF_i$ | 0.0309 | 0.2202 | -0.0090 | 0.1766 |
| EQ(2): $DF1_i$ | -0.4698 | -0.3087 | -0.5046 | -0.3549 |
| EQ(2): $DF5_i$ | 0.8156 | 0.9705 | 0.6199 | 0.7809 |
| EQ(2): $DF9_i$ | -0.0946 | 0.1819 | -0.0367 | 0.2432 |
| Test: $DF1_i=DF5_i=DF9_i$ | 0.73 | 0.67 | 0.50 | 0.50 |

Table 5 (continued)

| Independent variable, $R^2$, industry | 3-digit industry dummies | | 4-digit industry dummies | |
|---|---|---|---|---|
| | Initial Capital | Ending Capital | Initial Capital | Ending Capital |
| RUBBER PRODUCTS (332 observations; $R^2$=0.11~0.12) | | | | |
| EQ(1): $DF_i$ | -0.2387 | -0.0389 | -0.2252 | -0.0498 |
| EQ(2): $DF1_i$ | 0.2527 | 0.6034 | 0.2726 | 0.5942 |
| EQ(2): $DF5_i$ | -1.1319 | -1.0104 | -1.1543 | -1.0655 |
| EQ(2): $DF9_i$ | -0.6618 | -0.6260 | -0.6524 | -0.6386 |
| Test: $DF1_i=DF5_i=DF9_i$ | 0.70 | 1.06 | 0.72 | 1.08 |
| PLASTICS (1,004 observations; $R^2$=0.02~0.02) | | | | |
| EQ(1): $DF_i$ | -1.2293 a | -1.1693 b | 4-digit & 3 digit categories are identical | |
| EQ(2): $DF1_i$ | -1.5300 a | -1.4812 a | | |
| EQ(2): $DF5_i$ | -1.6988 | -1.7087 | | |
| EQ(2): $DF9_i$ | -0.5985 | -0.5069 | | |
| Test: $DF1_i=DF5_i=DF9_i$ | 0.64 | 0.73 | | |
| NON-METALLIC MINERAL PRODUCTS (891 observations; $R^2$=0.07~0.18) | | | | |
| EQ(1): $DF_i$ | -0.4826 | -0.5597 | -1.8312 | -1.9290 |
| EQ(2): $DF1_i$ | 1.6611 | 1.5573 | 0.4241 | 0.3072 a |
| EQ(2): $DF5_i$ | -4.6616 a | -4.7169 a | -6.5921 a | -6.6297 a |
| EQ(2): $DF9_i$ | -4.2353 a | -4.2412 a | -5.7983 a | -5.8740 a |
| Test: $DF1_i=DF5_i=DF9_i$ | 7.02 a | 6.84 a | 6.24 a | 5.97 a |
| BASIC METALS (372 observations; $R^2$=0.05~0.06) | | | | |
| EQ(1): $DF_i$ | -1.5818 b | -1.5938 b | -1.6360 b | -1.6486 b |
| EQ(2): $DF1_i$ | -1.6794 c | -1.6687 c | -1.7483 c | -1.7360 c |
| EQ(2): $DF5_i$ | -2.4218 c | -2.5911 c | -2.6246 b | -2.8091 b |
| EQ(2): $DF9_i$ | -1.1011 | -1.1080 | -1.1094 | -1.1166 |
| Test: $DF1_i=DF5_i=DF9_i$ | 0.37 | 0.46 | 0.57 | 0.70 |
| METAL PRODUCTS (1,239 observations; $R^2$=0.03~0.04) | | | | |
| EQ(1): $DF_i$ | 0.4597 | 0.4903 | 0.3858 | 0.4199 |
| EQ(2): $DF1_i$ | -0.0507 | -0.0488 | -0.0601 | -0.0573 |
| EQ(2): $DF5_i$ | 0.7464 | 0.7591 | 0.6170 | 0.6351 |
| EQ(2): $DF9_i$ | 0.5146 | 0.5933 | 0.3862 | 0.4735 |
| Test: $DF1_i=DF5_i=DF9_i$ | 0.17 | 0.20 | 0.11 | 0.13 |
| NON-ELECTRIC MACHINERY (784 observations; R2=0.04~0.11) | | | | |
| EQ(1): $DF_i$ | -0.2983 | -0.0376 | -0.6074 | -0.3436 |
| EQ(2): $DF1_i$ | 0.1999 | 0.3805 | -0.2504 | -0.0617 |
| EQ(2): $DF5_i$ | 0.6646 | 0.9378 | 0.5483 | 0.8603 |
| EQ(2): $DF9_i$ | -1.5138 c | -1.2248 | -1.8474 b | -1.5798 c |
| Test: $DF1_i=DF5_i=DF9_i$ | 2.09 | 1.93 | 2.31 | 2.25 |

Table 5 (continued)

| Independent variable, $R^2$, industry | 3-digit industry dummies | | 4-digit industry dummies | |
|---|---|---|---|---|
| | Initial Capital | Ending Capital | Initial Capital | Ending Capital |
| ELECTRONICS-RELATED MACHINERY (817 observations; $R^2$=0.05~0.06) | | | | |
| EQ(1): $DF_i$ | 0.7142 | 0.6748 | 0.7063 | 0.6676 |
| EQ(2): $DF1_i$ | 1.2761 | 1.2382 | 1.2725 | 1.2346 |
| EQ(2): $DF5_i$ | -0.0203 | -0.0625 | -0.0262 | -0.0685 |
| EQ(2): $DF9_i$ | 0.6396 | 0.5984 | 0.6280 | 0.5880 |
| Test: $DF1_i = DF5_i = DF9_i$ | 0.66 | 0.66 | 0.66 | 0.66 |
| MOTOR VEHICLES (449 observations; R2=0.04~0.04) | | | | |
| EQ(1): $DF_i$ | -0.2301 | -0.2131 | 4-digit & 3 digit categories are identical | |
| EQ(2): $DF1_i$ | 0.1608 | 0.1813 | | |
| EQ(2): $DF5_i$ | -0.6712 | -0.6945 | | |
| EQ(2): $DF9_i$ | -0.4642 | -0.4354 | | |
| Test: $DF1_i = DF5_i = DF9_i$ | 0.23 | 0.24 | | |
| OTHER TRANSPORT MACHINERY (159 observations; R2=0.09~0.11) | | | | |
| EQ(1): $DF_i$ | 0.9792 | 1.1007 | 0.9859 | 1.1046 |
| EQ(2): $DF1_i$ | -0.1272 | -0.0242 | -0.1159 | -0.0215 |
| EQ(2): $DF5_i$ | 1.7636 | 1.9931 | 1.7499 | 1.9951 |
| EQ(2): $DF9_i$ | 3.9577 | 4.2463 | 3.9634 | 4.2507 |
| Test: $DF1_i = DF5_i = DF9_i$ | 0.58 | 0.66 | 0.58 | 0.66 |

Notes: a=signficant at the 1% level, b=significant at the 5% level, c=significant at the 10% level (all p-values based on robust standard errors); estimated equations also include 3- and 4-digit industry dummies as indicated and relevant (see explanation in the text); for samples sizes and precise p-values, see Appendix Table 5.

Appendix Table 1: Sampling Details from the Database on Thai Manufacturing Plants

| | | Thousands | | Values in billion baht | | | |
|---|---|---|---|---|---|---|---|
| Sample | Number of plants | Workers | Paid workers | Fixed assets (avg.) | Elec-tricity, fuel | Output | Value added |
| All plants in database underlying National Statistical Office (2009) | | | | | | | |
| All plants | 73,931 | 3,726.4 | 3,591.5 | 2,972.9 | 311.6 | 7,146.6 | 1,716.6 |
| 16+ workers | 26,293 | 3,476.9 | 3,422.9 | 2,882.6 | 307.0 | 7,042.2 | 1,672.5 |
| 20+ workers | 22,934 | 3,418.6 | 3,371.0 | 2,859.4 | 305.0 | 7,001.2 | 1,661.7 |
| Extreme values | 4,169 | 292.2 | 256.9 | 64.2 | 7.4 | 147.6 | 25.5 |
| Duplicates eliminated | 4,828 | 608.2 | 605.1 | 392.3 | 45.1 | 999.0 | 257.7 |
| 20+ workers, sample | 13,937 | 2,518.3 | 2,509.0 | 2,403.0 | 252.5 | 5,854.6 | 1,378.5 |
| Local plants (foreign shares 0-9%) | | | | | | | |
| All plants | 71,274 | 2,782.5 | 2,648.9 | 1,764.9 | 188.7 | 4,093.3 | 1,007.1 |
| 16+ workers | 23,777 | 2,534.5 | 2,481.7 | 1,676.1 | 184.2 | 3,993.9 | 963.8 |
| 20+ workers | 20,503 | 2,477.7 | 2,431.3 | 1,654.5 | 182.4 | 3,956.4 | 953.6 |
| Extreme values | 4,080 | 254.7 | 219.4 | 30.3 | 4.1 | 82.4 | 15.0 |
| Duplicates eliminated | 4,473 | 496.4 | 493.7 | 268.9 | 34.1 | 646.6 | 144.4 |
| 20+ workers, sample | 11,950 | 1,726.6 | 1,718.2 | 1,355.4 | 144.1 | 3,227.4 | 794.2 |
| Minority-foreign plants in database (foreign shares 10-49%) | | | | | | | |
| All plants | 1,220 | 304.9 | 304.6 | 381.2 | 42.0 | 992.4 | 166.3 |
| 16+ workers | 1,123 | 303.9 | 303.6 | 380.5 | 41.9 | 990.4 | 165.8 |
| 20+ workers | 1,063 | 302.9 | 302.6 | 379.6 | 41.8 | 988.6 | 165.6 |
| Extreme values | 33 | 19.4 | 19.4 | 4.5 | 1.5 | 38.1 | 6.6 |
| Duplicates eliminated | 121 | 20.3 | 20.3 | 22.1 | 3.0 | 42.2 | 9.6 |
| Sample plants | 909 | 263.1 | 262.9 | 353.0 | 37.3 | 908.3 | 149.4 |
| Majority-foreign plants in database (foreign shares 50-89%) | | | | | | | |
| All plants | 440 | 178.1 | 178.0 | 270.4 | 27.9 | 495.7 | 95.7 |
| 16+ workers | 420 | 177.9 | 177.8 | 270.2 | 27.9 | 495.0 | 95.6 |
| 20+ workers | 409 | 177.7 | 177.6 | 269.9 | 27.8 | 494.0 | 95.5 |
| Extreme values | 17 | 3.3 | 3.3 | 25.7 | 0.2 | 8.2 | 0.8 |
| Duplicates eliminated | 37 | 18.1 | 18.1 | 18.6 | 2.2 | 34.5 | 7.0 |
| Sample plants | 355 | 156.3 | 156.2 | 225.6 | 25.4 | 451.3 | 87.6 |
| Heavily-foreign plants in database (foreign shares 90-100%) | | | | | | | |
| All plants | 997 | 460.8 | 460.1 | 556.5 | 53.0 | 1,565.2 | 447.6 |
| 16+ workers | 973 | 460.6 | 459.8 | 555.8 | 53.0 | 1,563.0 | 447.2 |
| 20+ workers | 959 | 460.3 | 459.6 | 555.3 | 52.9 | 1,562.2 | 447.1 |
| Extreme values | 39 | 14.8 | 14.8 | 3.7 | 1.6 | 18.9 | 3.1 |
| Duplicates eliminated | 197 | 73.3 | 73.0 | 82.7 | 5.7 | 275.7 | 96.8 |
| Sample plants | 723 | 372.2 | 371.8 | 469.0 | 45.7 | 1,267.6 | 347.2 |

Notes: Fixed assets are averages of initial and ending stocks; extreme values indicates plants are value added or fixed assets per worker of less than 10,000 baht or output per worker of less than 50,000 baht; duplicates eliminated are n-1 plants from each set of plants with identical (a) output, (b) sales of goods produced, (c) intermediate consumption, (d) purchase of materials and parts, (e) electricity and fuel costs, (f) initial fixed assets, (g) ending fixed assets, (h) female workers, (i) male workers, (j) female operatives, (k) male operatives, and (l) foreign ownership shares.

Appendix Table 2a: Fuel and Electricity Expenditures in Sample Plants (billion baht)

| Industry | Total | Local | MNCs by foreign share | | |
|---|---|---|---|---|---|
| | | | 10-49% | 50-89% | 90%+ |
| Manufacturing | 252.536 | 144.129 | 37.303 | 25.415 | 45.689 |
| Large Energy Users | 232.751 | 128.982 | 33.870 | 24.951 | 44.949 |
| Food products | 24.753 | 21.560 | 1.673 | 0.911 | 0.609 |
| Beverages | 3.325 | 2.067 | 1.026 | 0.141 | 0.090 |
| Textiles | 21.990 | 17.409 | 1.059 | 2.958 | 0.564 |
| Apparel | 6.000 | 4.524 | 0.758 | 0.215 | 0.503 |
| Paper products | 12.104 | 6.713 | 2.099 | 0.135 | 3.157 |
| Chemicals | 18.698 | 13.467 | 2.551 | 1.531 | 1.149 |
| Rubber products | 7.325 | 3.871 | 1.753 | 0.347 | 1.354 |
| Plastics | 8.828 | 6.066 | 0.921 | 0.561 | 1.281 |
| Non-metallic mineral products | 20.796 | 19.162 | 1.201 | 0.136 | 0.298 |
| Basic metals | 12.251 | 7.182 | 3.552 | 0.462 | 1.055 |
| Metal products | 10.212 | 6.363 | 1.193 | 0.276 | 2.380 |
| Non-electric machinery | 16.525 | 6.302 | 7.113 | 0.614 | 2.496 |
| Electronics-related machinery | 38.187 | 5.949 | 4.773 | 2.947 | 24.518 |
| Motor vehicles | 16.618 | 6.521 | 2.165 | 2.591 | 5.342 |
| Other transport equipment | 15.138 | 1.825 | 2.033 | 11.127 | 0.152 |
| Small Energy Users | 19.785 | 15.147 | 3.433 | 0.465 | 0.740 |
| Tobacco | 1.514 | 1.488 | 0.026 | 0.000 | 0.000 |
| Leather, footwear | 2.222 | 2.056 | 0.093 | 0.020 | 0.052 |
| Wood products | 2.790 | 2.554 | 0.096 | 0.109 | 0.031 |
| Publishing | 2.670 | 2.295 | 0.257 | 0.042 | 0.076 |
| Petroleum products | 4.218 | 2.382 | 1.836 | 0.000 | 0.000 |
| Miscellaneous & recycling | 6.371 | 4.373 | 1.124 | 0.293 | 0.581 |

Note: Data refer to the cost of fuel and electricity used in production processes.

Source: Compilations from data underlying National Statistical Office (2009).

Appendix Table 2b: Gross Output in Sample Plants (billion baht)

| Industry | Total | Local | MNCs by foreign share 10-49% | 50-89% | 90%+ |
|---|---|---|---|---|---|
| Manufacturing | 5,854.59 | 3,227.44 | 908.28 | 451.29 | 1,267.59 |
| Large Energy Users | 5,126.00 | 2,875.04 | 580.93 | 437.26 | 1,232.77 |
| Food products | 728.23 | 637.51 | 46.40 | 15.25 | 29.06 |
| Beverages | 161.43 | 129.74 | 26.03 | 4.72 | 0.93 |
| Textiles | 221.87 | 173.23 | 11.58 | 30.12 | 6.94 |
| Apparel | 137.84 | 102.90 | 24.02 | 1.76 | 9.17 |
| Paper products | 150.39 | 92.78 | 24.11 | 2.45 | 31.04 |
| Chemicals | 431.31 | 281.65 | 52.20 | 30.23 | 67.23 |
| Rubber products | 224.79 | 129.23 | 34.66 | 18.89 | 42.02 |
| Plastics | 165.79 | 109.98 | 18.96 | 10.45 | 26.39 |
| Non-metallic mineral products | 183.41 | 165.65 | 8.79 | 3.13 | 5.84 |
| Basic metals | 243.61 | 147.04 | 39.74 | 24.42 | 32.42 |
| Metal products | 249.52 | 150.44 | 35.46 | 7.02 | 56.61 |
| Non-electric machinery | 335.47 | 146.07 | 74.68 | 33.15 | 81.57 |
| Electronics-related machinery | 1,038.37 | 316.30 | 79.36 | 90.76 | 551.94 |
| Motor vehicles | 708.61 | 260.41 | 73.70 | 83.84 | 290.66 |
| Other transport equipment | 145.34 | 32.09 | 31.23 | 81.07 | 0.94 |
| Small Energy Users | 728.60 | 352.40 | 327.35 | 14.04 | 34.82 |
| Tobacco | 44.25 | 42.65 | 1.60 | 0.00 | 0.00 |
| Leather, footwear | 52.08 | 47.00 | 2.40 | 0.92 | 1.77 |
| Wood products | 51.93 | 47.83 | 2.87 | 0.89 | 0.34 |
| Publishing | 61.37 | 49.54 | 9.90 | 0.26 | 1.67 |
| Petroleum products | 362.03 | 72.07 | 286.13 | 3.83 | 0.00 |
| Miscellaneous & recycling | 156.94 | 93.30 | 24.46 | 8.13 | 31.04 |

Source: Compilations from data underlying National Statistical Office (2009).

Appendix Table 2c: Number of Sample Plants by Industry (paper's classification)

| Industry | Total | Local | MNCs by foreign share 10-49% | 50-89% | 90%+ |
|---|---|---|---|---|---|
| Manufacturing | 13,937 | 11,950 | 909 | 355 | 723 |
| Large Energy Users | 11,333 | 9,625 | 760 | 316 | 632 |
| Food products | 1,987 | 1,859 | 81 | 21 | 26 |
| Beverages | 167 | 156 | 8 | 2 | 1 |
| Textiles | 956 | 857 | 56 | 27 | 16 |
| Apparel | 896 | 830 | 45 | 10 | 11 |
| Paper products | 485 | 431 | 36 | 7 | 11 |
| Chemicals | 870 | 718 | 72 | 30 | 50 |
| Rubber products | 332 | 252 | 37 | 15 | 28 |
| Plastics | 1,005 | 836 | 69 | 31 | 69 |
| Non-metallic mineral products | 892 | 831 | 39 | 9 | 13 |
| Basic metals | 372 | 308 | 35 | 6 | 23 |
| Metal products | 1,241 | 1,063 | 93 | 26 | 59 |
| Non-electric machinery | 705 | 550 | 61 | 34 | 60 |
| Electronics-related machinery | 817 | 494 | 79 | 53 | 191 |
| Motor vehicles | 449 | 303 | 36 | 39 | 71 |
| Other transport equipment | 159 | 137 | 13 | 6 | 3 |
| Small Energy Users | 2,604 | 2,325 | 149 | 39 | 91 |
| Tobacco | 29 | 28 | 1 | 0 | 0 |
| Leather, footwear | 344 | 306 | 23 | 7 | 8 |
| Wood products | 544 | 527 | 11 | 3 | 3 |
| Publishing | 529 | 505 | 14 | 2 | 8 |
| Petroleum products | 60 | 55 | 4 | 1 | 0 |
| Miscellaneous & recycling | 1,098 | 904 | 96 | 26 | 72 |

Source: Compilations from data underlying National Statistical Office (2009).

Appendix Table 2d: Number of Sample Plants by 3-digit Industry

| Industry | Total | Local | MNCs by foreign share 10-49% | 50-89% | 90%+ |
|---|---|---|---|---|---|
| Manufacturing | 13,937 | 11,950 | 909 | 355 | 723 |
| Large Energy Users | 11,333 | 9,625 | 760 | 316 | 632 |
| 151 | 748 | 695 | 37 | 6 | 10 |
| 152 | 62 | 59 | 2 | 0 | 1 |
| 153 | 482 | 460 | 15 | 6 | 1 |
| 154 | 695 | 645 | 27 | 9 | 14 |
| 155 | 167 | 156 | 8 | 2 | 1 |
| 171 | 591 | 537 | 31 | 18 | 5 |
| 172 | 287 | 251 | 19 | 6 | 11 |
| 173 | 78 | 69 | 6 | 3 | 0 |
| 181 | 890 | 825 | 44 | 10 | 11 |
| 182 | 6 | 5 | 1 | 0 | 0 |
| 210 | 485 | 431 | 36 | 7 | 11 |
| 241 | 307 | 251 | 26 | 17 | 13 |
| 242 | 540 | 448 | 43 | 12 | 37 |
| 243 | 23 | 19 | 3 | 1 | 0 |
| 251 | 332 | 252 | 37 | 15 | 28 |
| 252 | 1,005 | 836 | 69 | 31 | 69 |
| 261 | 68 | 56 | 6 | 2 | 4 |
| 269 | 824 | 775 | 33 | 7 | 9 |
| 271 | 176 | 148 | 14 | 3 | 11 |
| 272 | 102 | 78 | 15 | 2 | 7 |
| 273 | 94 | 82 | 6 | 1 | 5 |
| 281 | 336 | 298 | 21 | 4 | 13 |
| 289 | 905 | 765 | 72 | 22 | 46 |
| 291 | 320 | 234 | 31 | 19 | 36 |
| 292 | 307 | 254 | 20 | 12 | 21 |
| 293 | 78 | 62 | 10 | 3 | 3 |
| 300 | 40 | 19 | 4 | 4 | 13 |
| 311 | 77 | 58 | 7 | 2 | 10 |
| 312 | 96 | 70 | 6 | 5 | 15 |
| 313 | 48 | 31 | 6 | 3 | 8 |
| 314 | 25 | 20 | 1 | 2 | 2 |
| 315 | 44 | 32 | 9 | 1 | 2 |
| 319 | 55 | 29 | 5 | 5 | 16 |
| 321 | 251 | 115 | 30 | 22 | 84 |
| 322 | 28 | 17 | 2 | 1 | 8 |
| 323 | 57 | 39 | 3 | 0 | 15 |
| 331 | 53 | 41 | 1 | 3 | 8 |
| 332 | 25 | 15 | 4 | 0 | 6 |
| 333 | 18 | 8 | 1 | 5 | 4 |
| 341 | 39 | 23 | 5 | 3 | 8 |

Appendix Table 2d (continued)

| Industry | Total | Local | MNCs by foreign share 10-49% | 50-89% | 90%+ |
|---|---|---|---|---|---|
| 342 | 37 | 36 | 0 | 0 | 1 |
| 343 | 373 | 244 | 31 | 36 | 62 |
| 351 | 42 | 40 | 2 | 0 | 0 |
| 353 | 15 | 2 | 11 | 1 | 1 |
| 359 | 102 | 95 | 0 | 5 | 2 |
| Small Energy Users | 2,604 | 2,325 | 149 | 39 | 91 |
| 160 | 29 | 28 | 1 | 0 | 0 |
| 191 | 151 | 136 | 10 | 1 | 4 |
| 192 | 193 | 170 | 13 | 6 | 4 |
| 201 | 197 | 194 | 3 | 0 | 0 |
| 202 | 347 | 333 | 8 | 3 | 3 |
| 221 | 141 | 132 | 5 | 1 | 3 |
| 222 | 379 | 364 | 9 | 1 | 5 |
| 223 | 9 | 9 | 0 | 0 | 0 |
| 231 | 6 | 6 | 0 | 0 | 0 |
| 232 | 54 | 49 | 4 | 1 | 0 |
| 361 | 468 | 437 | 20 | 6 | 5 |
| 369 | 607 | 445 | 76 | 20 | 66 |
| 371 | 4 | 3 | 0 | 0 | 1 |
| 372 | 19 | 19 | 0 | 0 | 0 |

Source: Compilations from data underlying National Statistical Office (2009).

Appendix Table 2e: Number of Sample Plants by 4-digit Industry

| Industry | Total | Local | MNCs by foreign share 10-49% | 50-89% | 90%+ |
|---|---|---|---|---|---|
| Manufacturing | 13,937 | 11,950 | 909 | 355 | 723 |
| Large Energy Users | 11,333 | 9,625 | 760 | 316 | 632 |
| 1511 | 121 | 118 | 2 | 1 | 0 |
| 1512 | 346 | 322 | 16 | 5 | 3 |
| 1513 | 196 | 177 | 13 | 0 | 6 |
| 1514 | 85 | 78 | 6 | 0 | 1 |
| 1520 | 62 | 59 | 2 | 0 | 1 |
| 1531 | 319 | 308 | 7 | 4 | 0 |
| 1532 | 63 | 58 | 5 | 0 | 0 |
| 1533 | 100 | 94 | 3 | 2 | 1 |
| 1541 | 112 | 101 | 6 | 2 | 3 |
| 1542 | 51 | 49 | 2 | 0 | 0 |
| 1543 | 43 | 39 | 3 | 0 | 1 |
| 1544 | 68 | 59 | 5 | 3 | 1 |
| 1549 | 421 | 397 | 11 | 4 | 9 |
| 1551 | 26 | 24 | 2 | 0 | 0 |
| 1552 | 6 | 6 | 0 | 0 | 0 |
| 1553 | 5 | 4 | 0 | 0 | 1 |
| 1554 | 130 | 122 | 6 | 2 | 0 |
| 1711 | 441 | 400 | 24 | 13 | 4 |
| 1712 | 150 | 137 | 7 | 5 | 1 |
| 1721 | 131 | 117 | 6 | 0 | 8 |
| 1722 | 21 | 16 | 2 | 3 | 0 |
| 1723 | 52 | 50 | 1 | 1 | 0 |
| 1729 | 83 | 68 | 10 | 2 | 3 |
| 1730 | 78 | 69 | 6 | 3 | 0 |
| 1810 | 890 | 825 | 44 | 10 | 11 |
| 1820 | 6 | 5 | 1 | 0 | 0 |
| 2101 | 102 | 86 | 8 | 4 | 4 |
| 2102 | 279 | 256 | 17 | 2 | 4 |
| 2109 | 104 | 89 | 11 | 1 | 3 |
| 2411 | 139 | 108 | 17 | 7 | 7 |
| 2412 | 80 | 74 | 4 | 1 | 1 |
| 2413 | 88 | 69 | 5 | 9 | 5 |
| 2421 | 33 | 26 | 1 | 2 | 4 |
| 2422 | 133 | 107 | 12 | 2 | 12 |
| 2423 | 147 | 136 | 8 | 0 | 3 |
| 2424 | 138 | 120 | 8 | 4 | 6 |
| 2429 | 89 | 59 | 14 | 4 | 12 |
| 2430 | 23 | 19 | 3 | 1 | 0 |
| 2511 | 68 | 50 | 8 | 4 | 6 |
| 2519 | 264 | 202 | 29 | 11 | 22 |
| 2520 | 1,005 | 836 | 69 | 31 | 69 |

Appendix Table 2e (continued)

| Industry | Total | Local | MNCs by foreign share 10-49% | 50-89% | 90%+ |
|---|---|---|---|---|---|
| 2610 | 68 | 56 | 6 | 2 | 4 |
| 2691 | 157 | 141 | 10 | 3 | 3 |
| 2692 | 24 | 21 | 0 | 1 | 2 |
| 2693 | 60 | 59 | 1 | 0 | 0 |
| 2694 | 80 | 75 | 3 | 1 | 1 |
| 2695 | 383 | 373 | 10 | 0 | 0 |
| 2696 | 71 | 65 | 6 | 0 | 0 |
| 2699 | 49 | 41 | 3 | 2 | 3 |
| 2710 | 176 | 148 | 14 | 3 | 11 |
| 2720 | 102 | 78 | 15 | 2 | 7 |
| 2731 | 48 | 40 | 4 | 1 | 3 |
| 2732 | 46 | 42 | 2 | 0 | 2 |
| 2811 | 258 | 228 | 16 | 3 | 11 |
| 2812 | 64 | 58 | 4 | 1 | 1 |
| 2813 | 14 | 12 | 1 | 0 | 1 |
| 2891 | 395 | 341 | 31 | 7 | 16 |
| 2892 | 144 | 116 | 14 | 4 | 10 |
| 2893 | 101 | 84 | 5 | 5 | 7 |
| 2899 | 265 | 224 | 22 | 6 | 13 |
| 2911 | 10 | 6 | 2 | 2 | 0 |
| 2912 | 51 | 39 | 2 | 4 | 6 |
| 2913 | 25 | 21 | 2 | 1 | 1 |
| 2914 | 14 | 10 | 2 | 2 | 0 |
| 2915 | 40 | 29 | 5 | 5 | 1 |
| 2919 | 180 | 129 | 18 | 5 | 28 |
| 2921 | 70 | 55 | 12 | 2 | 1 |
| 2922 | 51 | 38 | 0 | 3 | 10 |
| 2923 | 13 | 11 | 0 | 1 | 1 |
| 2924 | 34 | 32 | 2 | 0 | 0 |
| 2925 | 43 | 41 | 2 | 0 | 0 |
| 2926 | 25 | 19 | 2 | 1 | 3 |
| 2927 | 4 | 4 | 0 | 0 | 0 |
| 2929 | 67 | 54 | 2 | 5 | 6 |
| 2930 | 78 | 62 | 10 | 3 | 3 |
| 3000 | 40 | 19 | 4 | 4 | 13 |
| 3110 | 77 | 58 | 7 | 2 | 10 |
| 3120 | 96 | 70 | 6 | 5 | 15 |
| 3130 | 48 | 31 | 6 | 3 | 8 |
| 3140 | 25 | 20 | 1 | 2 | 2 |
| 3150 | 44 | 32 | 9 | 1 | 2 |
| 3190 | 55 | 29 | 5 | 5 | 16 |
| 3210 | 251 | 115 | 30 | 22 | 84 |
| 3220 | 28 | 17 | 2 | 1 | 8 |

Appendix Table 2e (continued)

| Industry | Total | Local | MNCs by foreign share 10-49% | 50-89% | 90%+ |
|---|---|---|---|---|---|
| 3230 | 57 | 39 | 3 | 0 | 15 |
| 3311 | 38 | 30 | 0 | 1 | 7 |
| 3312 | 10 | 6 | 1 | 2 | 1 |
| 3313 | 5 | 5 | 0 | 0 | 0 |
| 3320 | 25 | 15 | 4 | 0 | 6 |
| 3330 | 18 | 8 | 1 | 5 | 4 |
| 3410 | 39 | 23 | 5 | 3 | 8 |
| 3420 | 37 | 36 | 0 | 0 | 1 |
| 3430 | 373 | 244 | 31 | 36 | 62 |
| 3511 | 41 | 39 | 2 | 0 | 0 |
| 3512 | 1 | 1 | 0 | 0 | 0 |
| 3530 | 4 | 2 | 0 | 1 | 1 |
| 3591 | 94 | 78 | 9 | 5 | 2 |
| 3592 | 15 | 13 | 2 | 0 | 0 |
| 3599 | 4 | 4 | 0 | 0 | 0 |
| Small Energy Users | 2,604 | 2,325 | 149 | 39 | 91 |
| 1600 | 29 | 28 | 1 | 0 | 0 |
| 1911 | 36 | 34 | 2 | 0 | 0 |
| 1912 | 115 | 102 | 8 | 1 | 4 |
| 1920 | 193 | 170 | 13 | 6 | 4 |
| 2010 | 197 | 194 | 3 | 0 | 0 |
| 2021 | 80 | 76 | 1 | 2 | 1 |
| 2022 | 75 | 75 | 0 | 0 | 0 |
| 2023 | 63 | 57 | 4 | 1 | 1 |
| 2029 | 129 | 125 | 3 | 0 | 1 |
| 2211 | 68 | 63 | 2 | 0 | 3 |
| 2212 | 48 | 45 | 3 | 0 | 0 |
| 2213 | 5 | 4 | 0 | 1 | 0 |
| 2219 | 20 | 20 | 0 | 0 | 0 |
| 2221 | 354 | 341 | 8 | 1 | 4 |
| 2222 | 25 | 23 | 1 | 0 | 1 |
| 2230 | 13 | 9 | 4 | 0 | 0 |
| 2310 | 6 | 6 | 0 | 0 | 0 |
| 2320 | 50 | 49 | 0 | 1 | 0 |
| 3610 | 468 | 437 | 20 | 6 | 5 |
| 3691 | 289 | 193 | 52 | 7 | 37 |
| 3692 | 6 | 6 | 0 | 0 | 0 |
| 3693 | 36 | 20 | 8 | 3 | 5 |
| 3694 | 76 | 56 | 5 | 6 | 9 |
| 3699 | 200 | 170 | 11 | 4 | 15 |
| 3710 | 4 | 3 | 0 | 0 | 1 |
| 3720 | 19 | 19 | 0 | 0 | 0 |

Source: Compilations from data underlying National Statistical Office (2009).

Appendix Table 3: Fuel and Electricity Intensities in Sample Plants (percent)

| Industry | Local | MNCs by foreign share 10-49% | 50-89% | 90%+ |
|---|---|---|---|---|
| Manufacturing (21-industry mean) | 5.24 | 4.80 | 4.98 | 5.23 |
| Large Energy Users (15-industry mean) | 5.40 | 5.39 | 5.16 | 5.13 |
| Food products | 7.58 | 4.79 | 5.96 | 4.54 |
| Beverages | 6.48 | 4.55 | 3.17 | 9.59 |
| Textiles | 6.77 | 7.86 | 8.27 | 6.20 |
| Apparel | 4.39 | 4.13 | 7.25 | 4.22 |
| Paper products | 4.29 | 5.76 | 6.32 | 3.27 |
| Chemicals | 4.55 | 4.05 | 5.49 | 4.38 |
| Rubber products | 4.50 | 5.35 | 3.15 | 3.95 |
| Plastics | 6.05 | 4.28 | 4.24 | 5.16 |
| Non-metallic mineral products | 7.86 | 10.43 | 3.35 | 4.99 |
| Basic metals | 6.23 | 4.48 | 3.45 | 4.77 |
| Metal products | 4.66 | 4.88 | 5.78 | 5.87 |
| Non-electric machinery | 4.56 | 4.69 | 5.76 | 3.41 |
| Electronics-related machinery | 4.41 | 5.63 | 4.08 | 4.54 |
| Motor vehicles | 4.34 | 4.79 | 4.11 | 4.15 |
| Other transport equipment | 4.32 | 5.15 | 7.07 | 7.86 |
| Small Energy Users (6-industry mean) | 4.83 | 3.33 | 4.42 | 5.61 |
| Tobacco | 6.05 | 1.62 | - | - |
| Leather, footwear | 5.04 | 6.37 | 2.33 | 4.08 |
| Wood products | 4.64 | 3.37 | 6.67 | 10.82 |
| Publishing | 3.89 | 2.48 | 9.54 | 3.69 |
| Petroleum products | 5.26 | 2.32 | 0.00 | - |
| Miscellaneous & recycling | 4.09 | 3.81 | 3.57 | 3.86 |

Note: Data refer to the cost of fuel and electricity used in production processes.

Source: Compilations from data underlying National Statistical Office (2009).

Appendix Table 4: Estimates of MNE-Local Energy Intentisty Differentials and Related Details for Large Energy Using Industries Combined (all p-values based on robust standard errors)

| Indepen-dent variable, statistic | 3-digit industry dummies | | | | 4-digit industry dummies | | | |
|---|---|---|---|---|---|---|---|---|
| | Initial Capital | | Yearend capital | | Initial Capital | | Yearend capital | |
| | Value | P-val. | Value | P-val. | Value | P-val. | Value | P-val. |
| 15 LARGE ENERGY USING INDUSTRIES COMBINED, Equation (1) | | | | | | | | |
| $LE_{it}$ | 0.4613 | 0.00 | 0.5928 | 0.00 | 0.4978 | 0.00 | 0.6206 | 0.00 |
| $LK_{it}$ | 0.9403 | 0.00 | 0.7276 | 0.00 | 0.8504 | 0.00 | 0.6566 | 0.00 |
| $LM_{it}$ | -1.1829 | 0.00 | -1.1106 | 0.00 | -1.0703 | 0.00 | -1.0065 | 0.00 |
| $RD_{it}$ | -0.2208 | 0.35 | -0.2073 | 0.39 | -0.3092 | 0.22 | -0.2970 | 0.24 |
| $YR_{it}$ | 0.0350 | 0.00 | 0.0369 | 0.00 | 0.0367 | 0.00 | 0.0383 | 0.00 |
| $DF_{it}$ | -0.1184 | 0.51 | -0.0491 | 0.78 | -0.2540 | 0.16 | -0.1898 | 0.30 |
| Obs./$R^2$ | 11,322 | 0.10 | 11,322 | 0.10 | 11,322 | 0.15 | 11,322 | 0.14 |
| 15 LARGE ENERGY USING INDUSTRIES COMBINED, Equation (2) | | | | | | | | |
| $LE_{it}$ | 0.4633 | 0.00 | 0.5951 | 0.00 | 0.5000 | 0.00 | 0.6233 | 0.00 |
| $LK_{it}$ | 0.9442 | 0.00 | 0.7309 | 0.00 | 0.8552 | 0.00 | 0.6606 | 0.00 |
| $LM_{it}$ | -1.1808 | 0.00 | -1.1083 | 0.00 | -1.0673 | 0.00 | -1.0033 | 0.00 |
| $RD_{it}$ | -0.2226 | 0.35 | -0.2079 | 0.38 | -0.3100 | 0.22 | -0.2968 | 0.24 |
| $YR_{it}$ | 0.0344 | 0.00 | 0.0363 | 0.00 | 0.0360 | 0.00 | 0.0376 | 0.00 |
| $DF1_{it}$ | -0.0451 | 0.85 | 0.0149 | 0.95 | -0.1666 | 0.49 | -0.1129 | 0.64 |
| $DF5_{it}$ | -0.1249 | 0.73 | -0.1044 | 0.77 | -0.3364 | 0.36 | -0.3078 | 0.41 |
| $DF9_{it}$ | -0.3999 | 0.16 | -0.2959 | 0.30 | -0.5770 | 0.05 | -0.4819 | 0.10 |
| TestDF | 0.55 | 0.58 | 0.40 | 0.67 | 0.69 | 0.50 | 0.55 | 0.57 |
| Obs./$R^2$ | 11,322 | 0.10 | 11,322 | 0.10 | 11,322 | 0.15 | 11,322 | 0.14 |

Note: TestDF is a Wald Statistic testing the null hypothesis that coefficients on the three foreign ownership dummies are equal; estimated equations also include 3- or 4-digit industry dummies as indicated and relevant (see explanation in the text; detailed estimates including all dummies and the constant are available from authors).

Appendix Table 5: Estimates of MNE-Local Energy Intentisty Differentials and Related Details for Individual Industries (all p-values based on robust standard errors)

| Independent variable, statistic | 3-digit industry dummies | | | | 4-digit industry dummies | | | |
|---|---|---|---|---|---|---|---|---|
| | Initial Capital | | Yearend capital | | Initial Capital | | Yearend capital | |
| | Value | P-val. | Value | P-val. | Value | P-val. | Value | P-val. |
| FOOD PRODUCTS (ISIC 151,152,153,154), Equation (1) | | | | | | | | |
| $LE_{it}$ | -0.3184 | 0.24 | -0.2826 | 0.30 | 0.0824 | 0.78 | 0.1162 | 0.69 |
| $LK_{it}$ | 1.9537 | 0.00 | 1.8504 | 0.00 | 1.6625 | 0.00 | 1.5647 | 0.00 |
| $LM_{it}$ | -2.2733 | 0.00 | -2.2466 | 0.00 | -2.0802 | 0.00 | -2.0539 | 0.00 |
| $RD_{it}$ | -0.6626 | 0.35 | -0.6505 | 0.36 | -1.1521 | 0.13 | -1.1451 | 0.13 |
| $YR_{it}$ | 0.0847 | 0.00 | 0.0874 | 0.00 | 0.1038 | 0.00 | 0.1060 | 0.00 |
| $DF_{it}$ | -1.4398 | 0.01 | -1.4446 | 0.01 | -1.3652 | 0.01 | -1.3545 | 0.02 |
| Obs./$R^2$ | 1,986 | 0.18 | 1,986 | 0.18 | 1,986 | 0.24 | 1,986 | 0.24 |
| FOOD PRODUCTS (ISIC 151,152,153,154), Equation (2) | | | | | | | | |
| $LE_{it}$ | -0.3272 | 0.23 | -0.2920 | 0.28 | 0.0703 | 0.81 | 0.1036 | 0.72 |
| $LK_{it}$ | 1.9475 | 0.00 | 1.8444 | 0.00 | 1.6572 | 0.00 | 1.5596 | 0.00 |
| $LM_{it}$ | -2.2687 | 0.00 | -2.2420 | 0.00 | -2.0697 | 0.00 | -2.0435 | 0.00 |
| $RD_{it}$ | -0.6575 | 0.35 | -0.6452 | 0.36 | -1.1497 | 0.13 | -1.1428 | 0.13 |
| $YR_{it}$ | 0.0840 | 0.00 | 0.0867 | 0.00 | 0.1030 | 0.00 | 0.1053 | 0.00 |
| $DF1_{it}$ | -1.6102 | 0.01 | -1.6279 | 0.00 | -1.4859 | 0.01 | -1.4912 | 0.01 |
| $DF5_{it}$ | -0.3804 | 0.69 | -0.2941 | 0.76 | -0.3198 | 0.79 | -0.2144 | 0.86 |
| $DF9_{it}$ | -2.2476 | 0.16 | -2.2706 | 0.16 | -2.8037 | 0.11 | -2.8043 | 0.11 |
| TestDF | 0.85 | 0.43 | 0.97 | 0.38 | 0.77 | 0.46 | 0.85 | 0.43 |
| Obs./$R^2$ | 1,986 | 0.18 | 1,986 | 0.18 | 1,986 | 0.24 | 1,986 | 0.24 |
| BEVERAGES (ISIC 155), Equation (1) | | | | | | | | |
| $LE_{it}$ | -0.7081 | 0.46 | -0.6657 | 0.47 | -0.9161 | 0.32 | -0.8571 | 0.34 |
| $LK_{it}$ | 0.4507 | 0.35 | 0.3999 | 0.39 | 0.6128 | 0.21 | 0.5436 | 0.25 |
| $LM_{it}$ | -1.0865 | 0.02 | -1.0661 | 0.02 | -0.8797 | 0.06 | -0.8560 | 0.06 |
| $RD_{it}$ | 0.0940 | 0.91 | 0.0912 | 0.91 | 0.0378 | 0.96 | 0.0344 | 0.97 |
| $YR_{it}$ | 0.0062 | 0.90 | 0.0050 | 0.92 | -0.0247 | 0.65 | -0.0260 | 0.63 |
| $DF_{it}$ | 0.8745 | 0.49 | 0.8874 | 0.49 | 0.3938 | 0.77 | 0.4171 | 0.76 |
| Obs./$R^2$ | 165 | 0.08 | 165 | 0.08 | 165 | 0.10 | 165 | 0.10 |
| BEVERAGES (ISIC 155), Equation (2) | | | | | | | | |
| $LE_{it}$ | -0.6960 | 0.47 | -0.6511 | 0.49 | -0.9184 | 0.32 | -0.8541 | 0.35 |
| $LK_{it}$ | 0.4849 | 0.33 | 0.4305 | 0.37 | 0.6790 | 0.18 | 0.6025 | 0.22 |
| $LM_{it}$ | -1.1279 | 0.02 | -1.1057 | 0.02 | -0.9261 | 0.05 | -0.8995 | 0.06 |
| $RD_{it}$ | 0.1287 | 0.88 | 0.1240 | 0.88 | 0.0968 | 0.91 | 0.0902 | 0.92 |
| $YR_{it}$ | 0.0122 | 0.82 | 0.0106 | 0.84 | -0.0173 | 0.76 | -0.0190 | 0.74 |
| $DF1_{it}$ | 0.4128 | 0.78 | 0.4243 | 0.77 | -0.1720 | 0.90 | -0.1476 | 0.91 |
| $DF5_{it}$ | -0.1544 | 0.93 | -0.0833 | 0.96 | -1.6681 | 0.37 | -1.5492 | 0.40 |
| $DF9_{it}$ | 6.6527 | 0.00 | 6.5698 | 0.00 | 8.6188 | 0.00 | 8.4734 | 0.00 |
| TestDF | 7.44 | 0.00 | 7.62 | 0.00 | 13.64 | 0.00 | 13.80 | 0.00 |
| Obs./$R^2$ | 165 | 0.09 | 165 | 0.09 | 165 | 0.11 | 165 | 0.11 |

Appendix Table 5 (continued)

| Independent variable, statistic | 3-digit industry dummies | | | | 4-digit industry dummies | | | |
|---|---|---|---|---|---|---|---|---|
| | Initial Capital | | Yearend capital | | Initial Capital | | Yearend capital | |
| | Value | P-val. | Value | P-val. | Value | P-val. | Value | P-val. |
| TEXTILES (ISIC 17), Equation (1) | | | | | | | | |
| $LE_{it}$ | 0.8894 | 0.02 | 0.8931 | 0.02 | 0.8759 | 0.01 | 0.8885 | 0.01 |
| $LK_{it}$ | 0.9874 | 0.00 | 0.9676 | 0.00 | 0.8599 | 0.00 | 0.8252 | 0.00 |
| $LM_{it}$ | -0.7849 | 0.01 | -0.7891 | 0.00 | -0.6568 | 0.02 | -0.6496 | 0.02 |
| $RD_{it}$ | -0.8573 | 0.54 | -0.8661 | 0.53 | -0.8088 | 0.54 | -0.8034 | 0.54 |
| $YR_{it}$ | 0.0441 | 0.06 | 0.0448 | 0.06 | 0.0439 | 0.06 | 0.0445 | 0.06 |
| $DF_{it}$ | 0.4227 | 0.51 | 0.4582 | 0.48 | 0.4664 | 0.48 | 0.5002 | 0.45 |
| Obs./$R^2$ | 955 | 0.09 | 955 | 0.09 | 955 | 0.11 | 955 | 0.11 |
| TEXTILES (ISIC 17), Equation (2) | | | | | | | | |
| $LE_{it}$ | 0.8772 | 0.02 | 0.8805 | 0.02 | 0.8636 | 0.02 | 0.8757 | 0.01 |
| $LK_{it}$ | 0.9961 | 0.00 | 0.9769 | 0.00 | 0.8705 | 0.00 | 0.8367 | 0.00 |
| $LM_{it}$ | -0.7712 | 0.01 | -0.7756 | 0.01 | -0.6447 | 0.02 | -0.6379 | 0.03 |
| $RD_{it}$ | -0.7934 | 0.57 | -0.8038 | 0.56 | -0.7659 | 0.56 | -0.7617 | 0.57 |
| $YR_{it}$ | 0.0433 | 0.06 | 0.0440 | 0.06 | 0.0433 | 0.07 | 0.0439 | 0.06 |
| $DF1_{it}$ | 0.7537 | 0.37 | 0.8041 | 0.34 | 0.8285 | 0.34 | 0.8710 | 0.31 |
| $DF5_{it}$ | -0.1932 | 0.87 | -0.1884 | 0.87 | -0.3026 | 0.80 | -0.2847 | 0.81 |
| $DF9_{it}$ | -0.7258 | 0.57 | -0.6791 | 0.60 | -0.3692 | 0.77 | -0.3347 | 0.79 |
| TestDF | 0.60 | 0.55 | 0.61 | 0.54 | 0.51 | 0.60 | 0.52 | 0.60 |
| Obs./$R^2$ | 955 | 0.09 | 955 | 0.09 | 955 | 0.11 | 955 | 0.11 |
| APPAREL (ISIC 18), Equation (1) | | | | | | | | |
| $LE_{it}$ | 0.6113 | 0.11 | 0.6223 | 0.11 | 4-digit & 3 digit categories are identical | | | |
| $LK_{it}$ | 0.4337 | 0.03 | 0.3890 | 0.05 | | | | |
| $LM_{it}$ | -0.6702 | 0.03 | -0.6560 | 0.03 | | | | |
| $RD_{it}$ | 1.8263 | 0.06 | 1.8361 | 0.06 | | | | |
| $YR_{it}$ | -0.0216 | 0.33 | -0.0205 | 0.35 | | | | |
| $DF_{it}$ | 0.0812 | 0.91 | 0.0826 | 0.91 | | | | |
| Obs./$R^2$ | 895 | 0.02 | 895 | 0.02 | | | | |
| APPAREL (ISIC 18), Equation (2) | | | | | | | | |
| $LE_{it}$ | 0.5990 | 0.12 | 0.6069 | 0.11 | 4-digit & 3 digit categories are identical | | | |
| $LK_{it}$ | 0.4480 | 0.03 | 0.4072 | 0.04 | | | | |
| $LM_{it}$ | -0.6691 | 0.03 | -0.6557 | 0.03 | | | | |
| $RD_{it}$ | 1.9056 | 0.05 | 1.9221 | 0.05 | | | | |
| $YR_{it}$ | -0.0211 | 0.34 | -0.0201 | 0.36 | | | | |
| $DF1_{it}$ | -0.3349 | 0.67 | -0.3240 | 0.68 | | | | |
| $DF5_{it}$ | 2.6852 | 0.38 | 2.7205 | 0.38 | | | | |
| $DF9_{it}$ | -0.7744 | 0.50 | -0.8419 | 0.47 | | | | |
| TestDF | 0.55 | 0.58 | 0.58 | 0.56 | | | | |
| Obs./$R^2$ | 895 | 0.03 | 895 | 0.03 | | | | |

Appendix Table 5 (continued)

| Independent variable, statistic | 3-digit industry dummies | | | | 4-digit industry dummies | | | |
|---|---|---|---|---|---|---|---|---|
| | Initial Capital | | Yearend capital | | Initial Capital | | Yearend capital | |
| | Value | P-val. | Value | P-val. | Value | P-val. | Value | P-val. |
| PAPER PRODUCTS (ISIC 21), Equation (1) | | | | | | | | |
| $LE_{it}$ | 0.9833 | 0.05 | 1.0813 | 0.03 | 0.8322 | 0.09 | 0.9169 | 0.06 |
| $LK_{it}$ | 0.7714 | 0.00 | 0.6906 | 0.00 | 0.7363 | 0.00 | 0.6641 | 0.00 |
| $LM_{it}$ | -0.4497 | 0.09 | -0.4356 | 0.10 | -0.3937 | 0.14 | -0.3823 | 0.15 |
| $RD_{it}$ | -0.5856 | 0.12 | -0.6122 | 0.11 | -0.6713 | 0.11 | -0.6946 | 0.11 |
| $YR_{it}$ | 0.0099 | 0.75 | 0.0092 | 0.76 | 0.0080 | 0.79 | 0.0075 | 0.81 |
| $DF_{it}$ | 0.3004 | 0.76 | 0.1865 | 0.85 | 0.1984 | 0.84 | 0.0909 | 0.93 |
| Obs./$R^2$ | 485 | 0.10 | 485 | 0.09 | 485 | 0.11 | 485 | 0.11 |
| PAPER PRODUCTS (ISIC 21), Equation (2) | | | | | | | | |
| $LE_{it}$ | 1.0107 | 0.04 | 1.1044 | 0.03 | 0.8560 | 0.08 | 0.9344 | 0.06 |
| $LK_{it}$ | 0.7834 | 0.00 | 0.7062 | 0.00 | 0.7444 | 0.00 | 0.6771 | 0.00 |
| $LM_{it}$ | -0.4329 | 0.10 | -0.4193 | 0.12 | -0.3669 | 0.16 | -0.3561 | 0.18 |
| $RD_{it}$ | -0.6056 | 0.11 | -0.6326 | 0.10 | -0.6944 | 0.11 | -0.7182 | 0.10 |
| $YR_{it}$ | 0.0061 | 0.84 | 0.0052 | 0.87 | 0.0036 | 0.91 | 0.0028 | 0.93 |
| $DF1_{it}$ | 0.4486 | 0.72 | 0.3547 | 0.78 | 0.4400 | 0.72 | 0.3538 | 0.78 |
| $DF5_{it}$ | 1.9320 | 0.56 | 1.7137 | 0.60 | 1.2367 | 0.70 | 1.0163 | 0.75 |
| $DF9_{it}$ | -2.5586 | 0.03 | -2.7334 | 0.02 | -2.8082 | 0.01 | -2.9755 | 0.01 |
| TestDF | 2.10 | 0.12 | 2.16 | 0.12 | 2.47 | 0.09 | 2.57 | 0.08 |
| Obs./$R^2$ | 485 | 0.10 | 485 | 0.10 | 485 | 0.12 | 485 | 0.11 |
| CHEMICALS (ISIC 24), Equation (1) | | | | | | | | |
| $LE_{it}$ | 0.4266 | 0.19 | 0.6125 | 0.06 | 0.3740 | 0.30 | 0.5500 | 0.12 |
| $LK_{it}$ | 0.9016 | 0.00 | 0.5271 | 0.01 | 0.8584 | 0.00 | 0.4908 | 0.01 |
| $LM_{it}$ | -1.1220 | 0.00 | -0.9312 | 0.00 | -1.0928 | 0.00 | -0.9011 | 0.00 |
| $RD_{it}$ | -0.3634 | 0.15 | -0.3052 | 0.22 | -0.2964 | 0.24 | -0.2407 | 0.34 |
| $YR_{it}$ | 0.0161 | 0.26 | 0.0183 | 0.21 | 0.0056 | 0.71 | 0.0070 | 0.64 |
| $DF_{it}$ | 0.0309 | 0.95 | 0.2202 | 0.68 | -0.0090 | 0.99 | 0.1766 | 0.74 |
| Obs./$R^2$ | 869 | 0.07 | 869 | 0.05 | 869 | 0.08 | 869 | 0.07 |
| CHEMICALS (ISIC 24), Equation (2) | | | | | | | | |
| $LE_{it}$ | 0.4306 | 0.19 | 0.6158 | 0.06 | 0.3774 | 0.30 | 0.5518 | 0.12 |
| $LK_{it}$ | 0.9080 | 0.00 | 0.5305 | 0.01 | 0.8629 | 0.00 | 0.4931 | 0.01 |
| $LM_{it}$ | -1.1223 | 0.00 | -0.9302 | 0.00 | -1.0923 | 0.00 | -0.8997 | 0.00 |
| $RD_{it}$ | -0.3615 | 0.14 | -0.3033 | 0.21 | -0.2925 | 0.24 | -0.2371 | 0.34 |
| $YR_{it}$ | 0.0159 | 0.26 | 0.0182 | 0.21 | 0.0054 | 0.72 | 0.0070 | 0.65 |
| $DF1_{it}$ | -0.4698 | 0.48 | -0.3087 | 0.65 | -0.5046 | 0.46 | -0.3549 | 0.61 |
| $DF5_{it}$ | 0.8156 | 0.37 | 0.9705 | 0.32 | 0.6199 | 0.52 | 0.7809 | 0.44 |
| $DF9_{it}$ | -0.0946 | 0.92 | 0.1819 | 0.85 | -0.0367 | 0.97 | 0.2432 | 0.79 |
| TestDF | 0.73 | 0.48 | 0.67 | 0.51 | 0.50 | 0.61 | 0.50 | 0.61 |
| Obs./$R^2$ | 869 | 0.07 | 869 | 0.06 | 869 | 0.08 | 869 | 0.07 |

Appendix Table 5 (continued)

| Independent variable, statistic | 3-digit industry dummies | | | | 4-digit industry dummies | | | |
|---|---|---|---|---|---|---|---|---|
| | Initial Capital | | Yearend capital | | Initial Capital | | Yearend capital | |
| | Value | P-val. | Value | P-val. | Value | P-val. | Value | P-val. |
| RUBBER PRODUCTS (ISIC 251), Equation (1) | | | | | | | | |
| $LE_{it}$ | 0.9525 | 0.01 | 1.0868 | 0.00 | 0.9572 | 0.01 | 1.0695 | 0.00 |
| $LK_{it}$ | 0.6075 | 0.03 | 0.4511 | 0.01 | 0.5640 | 0.05 | 0.4299 | 0.01 |
| $LM_{it}$ | -1.1112 | 0.00 | -1.0899 | 0.00 | -1.0912 | 0.00 | -1.0740 | 0.00 |
| $RD_{it}$ | -0.9929 | 0.01 | -0.9857 | 0.01 | -0.9358 | 0.02 | -0.9232 | 0.02 |
| $YR_{it}$ | 0.0045 | 0.89 | 0.0075 | 0.82 | 0.0004 | 0.99 | 0.0021 | 0.95 |
| $DF_{it}$ | -0.2387 | 0.71 | -0.0389 | 0.95 | -0.2252 | 0.73 | -0.0498 | 0.94 |
| Obs./$R^2$ | 332 | 0.11 | 332 | 0.11 | 332 | 0.11 | 332 | 0.12 |
| RUBBER PRODUCTS (ISIC 251), Equation (2) | | | | | | | | |
| $LE_{it}$ | 0.9227 | 0.01 | 1.0442 | 0.00 | 0.9269 | 0.01 | 1.0261 | 0.00 |
| $LK_{it}$ | 0.6207 | 0.02 | 0.4781 | 0.01 | 0.5764 | 0.05 | 0.4570 | 0.01 |
| $LM_{it}$ | -1.0907 | 0.00 | -1.0708 | 0.00 | -1.0697 | 0.00 | -1.0539 | 0.00 |
| $RD_{it}$ | -0.8572 | 0.03 | -0.8504 | 0.02 | -0.7923 | 0.04 | -0.7787 | 0.04 |
| $YR_{it}$ | 0.0039 | 0.90 | 0.0064 | 0.85 | -0.0003 | 0.99 | 0.0009 | 0.98 |
| $DF1_{it}$ | 0.2527 | 0.78 | 0.6034 | 0.48 | 0.2726 | 0.76 | 0.5942 | 0.48 |
| $DF5_{it}$ | -1.1319 | 0.34 | -1.0104 | 0.39 | -1.1543 | 0.34 | -1.0655 | 0.38 |
| $DF9_{it}$ | -0.6618 | 0.41 | -0.6260 | 0.44 | -0.6524 | 0.41 | -0.6386 | 0.42 |
| TestDF | 0.70 | 0.50 | 1.06 | 0.35 | 0.72 | 0.49 | 1.08 | 0.34 |
| Obs./$R^2$ | 332 | 0.11 | 332 | 0.12 | 332 | 0.12 | 332 | 0.12 |
| PLASTICS (ISIC 252), Equation (1) | | | | | | | | |
| $LE_{it}$ | 0.3629 | 0.24 | 0.3999 | 0.15 | 4-digit & 3 digit categories are identical | | | |
| $LK_{it}$ | 0.1874 | 0.28 | 0.1806 | 0.06 | | | | |
| $LM_{it}$ | -0.4737 | 0.01 | -0.4884 | 0.01 | | | | |
| $RD_{it}$ | -0.3090 | 0.59 | -0.3200 | 0.58 | | | | |
| $YR_{it}$ | 0.0523 | 0.02 | 0.0529 | 0.02 | | | | |
| $DF_{it}$ | -1.2293 | 0.01 | -1.1693 | 0.01 | | | | |
| Obs./$R^2$ | 1,004 | 0.02 | 1,004 | 0.02 | | | | |
| PLASTICS (ISIC 252), Equation (2) | | | | | | | | |
| $LE_{it}$ | 0.3728 | 0.23 | 0.3986 | 0.15 | 4-digit & 3 digit categories are identical | | | |
| $LK_{it}$ | 0.1698 | 0.33 | 0.1787 | 0.07 | | | | |
| $LM_{it}$ | -0.4836 | 0.01 | -0.5050 | 0.01 | | | | |
| $RD_{it}$ | -0.2691 | 0.64 | -0.2805 | 0.62 | | | | |
| $YR_{it}$ | 0.0544 | 0.02 | 0.0554 | 0.02 | | | | |
| $DF1_{it}$ | -1.5300 | 0.01 | -1.4812 | 0.01 | | | | |
| $DF5_{it}$ | -1.6988 | 0.10 | -1.7087 | 0.10 | | | | |
| $DF9_{it}$ | -0.5985 | 0.45 | -0.5069 | 0.51 | | | | |
| TestDF | 0.64 | 0.53 | 0.73 | 0.48 | | | | |
| Obs./$R^2$ | 1,004 | 0.02 | 1,004 | 0.02 | | | | |

Appendix Table 5 (continued)

| Independent variable, statistic | 3-digit industry dummies | | | | 4-digit industry dummies | | | |
|---|---|---|---|---|---|---|---|---|
| | Initial Capital | | Yearend capital | | Initial Capital | | Yearend capital | |
| | Value | P-val. | Value | P-val. | Value | P-val. | Value | P-val. |
| NON-METALLIC MINERAL PRODUCTS (ISIC 26), Equation (1) | | | | | | | | |
| $LE_{it}$ | 1.7415 | 0.00 | 1.7428 | 0.00 | 1.6308 | 0.00 | 1.5940 | 0.00 |
| $LK_{it}$ | 1.2685 | 0.00 | 1.2539 | 0.00 | 1.0133 | 0.00 | 1.0733 | 0.00 |
| $LM_{it}$ | -1.5967 | 0.00 | -1.6139 | 0.00 | -1.2528 | 0.00 | -1.2993 | 0.00 |
| $RD_{it}$ | 0.6609 | 0.31 | 0.6279 | 0.33 | 0.9705 | 0.10 | 0.9436 | 0.11 |
| $YR_{it}$ | 0.0658 | 0.08 | 0.0652 | 0.08 | 0.0655 | 0.07 | 0.0647 | 0.07 |
| $DF_{it}$ | -0.4826 | 0.68 | -0.5597 | 0.63 | -1.8312 | 0.15 | -1.9290 | 0.13 |
| Obs./$R^2$ | 891 | 0.07 | 891 | 0.07 | 891 | 0.17 | 891 | 0.17 |
| NON-METALLIC MINERAL PRODUCTS (ISIC 26), Equation (2) | | | | | | | | |
| $LE_{it}$ | 1.7336 | 0.00 | 1.7375 | 0.00 | 1.5987 | 0.00 | 1.5648 | 0.00 |
| $LK_{it}$ | 1.2766 | 0.00 | 1.2576 | 0.00 | 1.0225 | 0.00 | 1.0780 | 0.00 |
| $LM_{it}$ | -1.5825 | 0.00 | -1.5980 | 0.00 | -1.2265 | 0.00 | -1.2713 | 0.00 |
| $RD_{it}$ | 0.6999 | 0.28 | 0.6660 | 0.30 | 0.9702 | 0.11 | 0.9438 | 0.00 |
| $YR_{it}$ | 0.0613 | 0.10 | 0.0608 | 0.10 | 0.0596 | 0.09 | 0.0588 | 0.00 |
| $DF1_{it}$ | 1.6611 | 0.30 | 1.5573 | 0.33 | 0.4241 | 0.80 | 0.3072 | 0.00 |
| $DF5_{it}$ | -4.6616 | 0.00 | -4.7169 | 0.00 | -6.5921 | 0.00 | -6.6297 | 0.00 |
| $DF9_{it}$ | -4.2353 | 0.00 | -4.2412 | 0.00 | -5.7983 | 0.00 | -5.8740 | 0.00 |
| TestDF | 7.02 | 0.00 | 6.84 | 0.00 | 6.24 | 0.00 | 5.97 | 0.00 |
| Obs./$R^2$ | 891 | 0.08 | 891 | 0.08 | 891 | 0.18 | 891 | 0.18 |
| BASIC METALS (ISIC 27), Equation (1) | | | | | | | | |
| $LE_{it}$ | -0.0223 | 0.96 | 0.0032 | 1.00 | -0.1157 | 0.81 | -0.0863 | 0.86 |
| $LK_{it}$ | 0.6364 | 0.03 | 0.6210 | 0.03 | 0.6989 | 0.02 | 0.6801 | 0.02 |
| $LM_{it}$ | -0.7606 | 0.02 | -0.7769 | 0.02 | -0.8156 | 0.01 | -0.8325 | 0.01 |
| $RD_{it}$ | -0.2243 | 0.63 | -0.2203 | 0.64 | -0.3924 | 0.40 | -0.3869 | 0.41 |
| $YR_{it}$ | -0.0021 | 0.95 | -0.0001 | 1.00 | -0.0035 | 0.92 | -0.0013 | 0.97 |
| $DF_{it}$ | -1.5818 | 0.02 | -1.5938 | 0.02 | -1.6360 | 0.02 | -1.6486 | 0.02 |
| Obs./$R^2$ | 372 | 0.05 | 372 | 0.05 | 372 | 0.06 | 372 | 0.06 |
| BASIC METALS (ISIC 27), Equation (2) | | | | | | | | |
| $LE_{it}$ | -0.0324 | 0.95 | -0.0074 | 0.99 | -0.1262 | 0.79 | -0.0975 | 0.84 |
| $LK_{it}$ | 0.6303 | 0.03 | 0.6178 | 0.03 | 0.6929 | 0.02 | 0.6776 | 0.02 |
| $LM_{it}$ | -0.7628 | 0.02 | -0.7805 | 0.02 | -0.8182 | 0.01 | -0.8368 | 0.01 |
| $RD_{it}$ | -0.2337 | 0.62 | -0.2295 | 0.63 | -0.4029 | 0.39 | -0.3973 | 0.40 |
| $YR_{it}$ | -0.0003 | 0.99 | 0.0016 | 0.96 | -0.0015 | 0.96 | 0.0006 | 0.99 |
| $DF1_{it}$ | -1.6794 | 0.06 | -1.6687 | 0.07 | -1.7483 | 0.06 | -1.7360 | 0.06 |
| $DF5_{it}$ | -2.4218 | 0.07 | -2.5911 | 0.06 | -2.6246 | 0.03 | -2.8091 | 0.02 |
| $DF9_{it}$ | -1.1011 | 0.28 | -1.1080 | 0.28 | -1.1094 | 0.28 | -1.1166 | 0.28 |
| TestDF | 0.37 | 0.69 | 0.46 | 0.63 | 0.57 | 0.56 | 0.70 | 0.50 |
| Obs./$R^2$ | 372 | 0.05 | 372 | 0.05 | 372 | 0.06 | 372 | 0.06 |

Appendix Table 5 (continued)

| Indepen-dent variable, statistic | 3-digit industry dummies | | | | 4-digit industry dummies | | | |
|---|---|---|---|---|---|---|---|---|
| | Initial Capital | | Yearend capital | | Initial Capital | | Yearend capital | |
| | Value | P-val. | Value | P-val. | Value | P-val. | Value | P-val. |
| METAL PRODUCTS (ISIC 28), Equation (1) | | | | | | | | |
| $LE_{it}$ | 0.9734 | 0.01 | 1.0391 | 0.00 | 0.9102 | 0.01 | 0.9790 | 0.00 |
| $LK_{it}$ | 0.3977 | 0.02 | 0.2720 | 0.05 | 0.4251 | 0.01 | 0.2955 | 0.04 |
| $LM_{it}$ | -0.6768 | 0.00 | -0.6374 | 0.00 | -0.6751 | 0.00 | -0.6373 | 0.00 |
| $RD_{it}$ | 0.8458 | 0.46 | 0.8759 | 0.44 | 0.5913 | 0.59 | 0.6250 | 0.57 |
| $YR_{it}$ | -0.0094 | 0.58 | -0.0081 | 0.64 | -0.0085 | 0.62 | -0.0072 | 0.68 |
| $DF_{it}$ | 0.4597 | 0.48 | 0.4903 | 0.45 | 0.3858 | 0.55 | 0.4199 | 0.52 |
| Obs./$R^2$ | 1,239 | 0.03 | 1,239 | 0.03 | 1,239 | 0.04 | 1,239 | 0.04 |
| METAL PRODUCTS (ISIC 28), Equation (2) | | | | | | | | |
| $LE_{it}$ | 0.9805 | 0.00 | 1.0451 | 0.00 | 0.9181 | 0.01 | 0.9860 | 0.00 |
| $LK_{it}$ | 0.3970 | 0.02 | 0.2709 | 0.06 | 0.4254 | 0.01 | 0.2950 | 0.04 |
| $LM_{it}$ | -0.6670 | 0.00 | -0.6271 | 0.00 | -0.6660 | 0.00 | -0.6278 | 0.00 |
| $RD_{it}$ | 0.8774 | 0.44 | 0.9101 | 0.41 | 0.6166 | 0.57 | 0.6533 | 0.55 |
| $YR_{it}$ | -0.0098 | 0.56 | -0.0084 | 0.62 | -0.0090 | 0.59 | -0.0076 | 0.66 |
| $DF1_{it}$ | -0.0507 | 0.95 | -0.0488 | 0.95 | -0.0601 | 0.94 | -0.0573 | 0.94 |
| $DF5_{it}$ | 0.7464 | 0.61 | 0.7591 | 0.60 | 0.6170 | 0.68 | 0.6351 | 0.67 |
| $DF9_{it}$ | 0.5146 | 0.66 | 0.5933 | 0.61 | 0.3862 | 0.74 | 0.4735 | 0.68 |
| TestDF | 0.17 | 0.84 | 0.20 | 0.82 | 0.11 | 0.89 | 0.13 | 0.87 |
| Obs./$R^2$ | 1,239 | 0.03 | 1,239 | 0.03 | 1,239 | 0.04 | 1,239 | 0.04 |
| NON-ELECTRIC MACHINERY (ISIC 29), Equation (1) | | | | | | | | |
| $LE_{it}$ | 1.1832 | 0.00 | 1.5894 | 0.00 | 1.2277 | 0.00 | 1.6545 | 0.00 |
| $LK_{it}$ | 0.8898 | 0.00 | 0.2875 | 0.13 | 0.8787 | 0.00 | 0.2856 | 0.14 |
| $LM_{it}$ | -1.2301 | 0.00 | -1.0628 | 0.00 | -1.2088 | 0.00 | -1.0603 | 0.00 |
| $RD_{it}$ | -0.1514 | 0.84 | -0.0599 | 0.94 | -0.2531 | 0.75 | -0.1747 | 0.82 |
| $YR_{it}$ | -0.0153 | 0.54 | -0.0118 | 0.64 | -0.0133 | 0.59 | -0.0108 | 0.66 |
| $DF_{it}$ | -0.2983 | 0.64 | -0.0376 | 0.95 | -0.6074 | 0.34 | -0.3436 | 0.59 |
| Obs./$R^2$ | 784 | 0.06 | 784 | 0.04 | 784 | 0.10 | 784 | 0.08 |
| NON-ELECTRIC MACHINERY (ISIC 29), Equation (2) | | | | | | | | |
| $LE_{it}$ | 1.1997 | 0.00 | 1.6056 | 0.00 | 1.2458 | 0.00 | 1.6704 | 0.00 |
| $LK_{it}$ | 0.8949 | 0.00 | 0.2892 | 0.13 | 0.8780 | 0.00 | 0.2854 | 0.14 |
| $LM_{it}$ | -1.2102 | 0.00 | -1.0384 | 0.00 | -1.1862 | 0.00 | -1.0344 | 0.00 |
| $RD_{it}$ | -0.1344 | 0.86 | -0.0447 | 0.95 | -0.2441 | 0.75 | -0.1683 | 0.83 |
| $YR_{it}$ | -0.0185 | 0.47 | -0.0150 | 0.56 | -0.0166 | 0.51 | -0.0143 | 0.57 |
| $DF1_{it}$ | 0.1999 | 0.83 | 0.3805 | 0.68 | -0.2504 | 0.77 | -0.0617 | 0.94 |
| $DF5_{it}$ | 0.6646 | 0.57 | 0.9378 | 0.43 | 0.5483 | 0.62 | 0.8603 | 0.46 |
| $DF9_{it}$ | -1.5138 | 0.06 | -1.2248 | 0.13 | -1.8474 | 0.03 | -1.5798 | 0.07 |
| TestDF | 2.09 | 0.12 | 1.93 | 0.15 | 2.31 | 0.10 | 2.25 | 0.11 |
| Obs./$R^2$ | 784 | 0.07 | 784 | 0.05 | 784 | 0.11 | 784 | 0.08 |

Appendix Table 5 (continued)

| Independent variable, statistic | 3-digit industry dummies | | | | 4-digit industry dummies | | | |
|---|---|---|---|---|---|---|---|---|
| | Initial Capital | | Yearend capital | | Initial Capital | | Yearend capital | |
| | Value | P-val. | Value | P-val. | Value | P-val. | Value | P-val. |
| ELECTRONICS-RELATED MACHINERY (ISIC 30,31,32,33), Equation (1) | | | | | | | | |
| $LE_{it}$ | 0.5408 | 0.09 | 0.4878 | 0.13 | 0.5359 | 0.09 | 0.4838 | 0.13 |
| $LK_{it}$ | 0.3377 | 0.06 | 0.3947 | 0.03 | 0.3355 | 0.07 | 0.3923 | 0.03 |
| $LM_{it}$ | -0.9735 | 0.00 | -0.9927 | 0.00 | -0.9663 | 0.00 | -0.9861 | 0.00 |
| $RD_{it}$ | 0.0678 | 0.91 | 0.0651 | 0.91 | 0.0643 | 0.91 | 0.0616 | 0.92 |
| $YR_{it}$ | 0.0268 | 0.31 | 0.0277 | 0.30 | 0.0259 | 0.33 | 0.0269 | 0.31 |
| $DF_{it}$ | 0.7142 | 0.14 | 0.6748 | 0.15 | 0.7063 | 0.15 | 0.6676 | 0.16 |
| Obs./$R^2$ | 817 | 0.05 | 817 | 0.06 | 817 | 0.05 | 817 | 0.06 |
| ELECTRONICS-RELATED MACHINERY (ISIC 30,31,32,33), Equation (2) | | | | | | | | |
| $LE_{it}$ | 0.5531 | 0.08 | 0.5011 | 0.12 | 0.5482 | 0.08 | 0.4973 | 0.13 |
| $LK_{it}$ | 0.3510 | 0.05 | 0.4054 | 0.03 | 0.3490 | 0.06 | 0.4032 | 0.03 |
| $LM_{it}$ | -0.9702 | 0.00 | -0.9880 | 0.00 | -0.9629 | 0.00 | -0.9813 | 0.00 |
| $RD_{it}$ | 0.1131 | 0.85 | 0.1104 | 0.85 | 0.1084 | 0.85 | 0.1056 | 0.86 |
| $YR_{it}$ | 0.0274 | 0.30 | 0.0283 | 0.28 | 0.0264 | 0.32 | 0.0275 | 0.30 |
| $DF1_{it}$ | 1.2761 | 0.13 | 1.2382 | 0.14 | 1.2725 | 0.13 | 1.2346 | 0.14 |
| $DF5_{it}$ | -0.0203 | 0.98 | -0.0625 | 0.94 | -0.0262 | 0.98 | -0.0685 | 0.94 |
| $DF9_{it}$ | 0.6396 | 0.29 | 0.5984 | 0.31 | 0.6280 | 0.30 | 0.5880 | 0.33 |
| TestDF | 0.66 | 0.52 | 0.66 | 0.52 | 0.66 | 0.52 | 0.66 | 0.52 |
| Obs./$R^2$ | 817 | 0.06 | 817 | 0.06 | 817 | 0.06 | 817 | 0.06 |
| MOTOR VEHICLES (ISIC 34), Equation (1) | | | | | | | | |
| $LE_{it}$ | 0.1933 | 0.66 | 0.2649 | 0.55 | 4-digit & 3 digit categories are identical | | | |
| $LK_{it}$ | 0.5976 | 0.01 | 0.4844 | 0.04 | | | | |
| $LM_{it}$ | -0.5838 | 0.00 | -0.5428 | 0.01 | | | | |
| $RD_{it}$ | 0.8733 | 0.28 | 0.9185 | 0.27 | | | | |
| $YR_{it}$ | 0.0080 | 0.74 | 0.0095 | 0.69 | | | | |
| $DF_{it}$ | -0.2301 | 0.72 | -0.2131 | 0.74 | | | | |
| Obs./$R^2$ | 449 | 0.04 | 449 | 0.04 | | | | |
| MOTOR VEHICLES (ISIC 34), Equation (2) | | | | | | | | |
| $LE_{it}$ | 0.1890 | 0.67 | 0.2602 | 0.57 | 4-digit & 3 digit categories are identical | | | |
| $LK_{it}$ | 0.6101 | 0.01 | 0.4995 | 0.04 | | | | |
| $LM_{it}$ | -0.5662 | 0.00 | -0.5268 | 0.01 | | | | |
| $RD_{it}$ | 0.8197 | 0.30 | 0.8650 | 0.28 | | | | |
| $YR_{it}$ | 0.0045 | 0.85 | 0.0059 | 0.80 | | | | |
| $DF1_{it}$ | 0.1608 | 0.87 | 0.1813 | 0.85 | | | | |
| $DF5_{it}$ | -0.6712 | 0.56 | -0.6945 | 0.55 | | | | |
| $DF9_{it}$ | -0.4642 | 0.59 | -0.4354 | 0.61 | | | | |
| TestDF | 0.23 | 0.79 | 0.24 | 0.79 | | | | |
| Obs./$R^2$ | 449 | 0.04 | 449 | 0.04 | | | | |

Appendix Table 5 (continued)

| Indepen-dent variable, statistic | 3-digit industry dummies | | | | 4-digit industry dummies | | | |
|---|---|---|---|---|---|---|---|---|
| | Initial Capital | | Yearend capital | | Initial Capital | | Yearend capital | |
| | Value | P-val. | Value | P-val. | Value | P-val. | Value | P-val. |
| OTHER TRANSPORT EQUIPMENT (ISIC 35), Equation (1) | | | | | | | | |
| $LE_{it}$ | 0.6605 | 0.45 | 0.8812 | 0.32 | 0.6972 | 0.47 | 0.8997 | 0.35 |
| $LK_{it}$ | 0.4972 | 0.12 | 0.0481 | 0.81 | 0.5091 | 0.13 | 0.0502 | 0.81 |
| $LM_{it}$ | -0.4761 | 0.28 | -0.2524 | 0.56 | -0.4985 | 0.32 | -0.2605 | 0.58 |
| $RD_{it}$ | -0.7750 | 0.32 | -0.7212 | 0.34 | -0.7641 | 0.33 | -0.7160 | 0.36 |
| $YR_{it}$ | 0.0090 | 0.69 | 0.0032 | 0.89 | 0.0072 | 0.77 | 0.0022 | 0.93 |
| $DF_{it}$ | 0.9792 | 0.46 | 1.1007 | 0.41 | 0.9859 | 0.47 | 1.1046 | 0.42 |
| Obs./$R^2$ | 159 | 0.10 | 159 | 0.09 | 159 | 0.10 | 159 | 0.09 |
| OTHER TRANSPORT EQUIPMENT (ISIC 35), Equation (2) | | | | | | | | |
| $LE_{it}$ | 0.7248 | 0.42 | 0.9388 | 0.29 | 0.7505 | 0.44 | 0.9453 | 0.34 |
| $LK_{it}$ | 0.4658 | 0.15 | 0.0322 | 0.87 | 0.4754 | 0.16 | 0.0334 | 0.87 |
| $LM_{it}$ | -0.4933 | 0.27 | -0.2827 | 0.51 | -0.5081 | 0.31 | -0.2842 | 0.55 |
| $RD_{it}$ | -0.6079 | 0.42 | -0.5451 | 0.46 | -0.5991 | 0.44 | -0.5450 | 0.47 |
| $YR_{it}$ | 0.0120 | 0.59 | 0.0068 | 0.78 | 0.0105 | 0.66 | 0.0061 | 0.81 |
| $DF1_{it}$ | -0.1272 | 0.94 | -0.0242 | 0.99 | -0.1159 | 0.94 | -0.0215 | 0.99 |
| $DF5_{it}$ | 1.7636 | 0.43 | 1.9931 | 0.37 | 1.7499 | 0.45 | 1.9951 | 0.38 |
| $DF9_{it}$ | 3.9577 | 0.40 | 4.2463 | 0.36 | 3.9634 | 0.40 | 4.2507 | 0.37 |
| TestDF | 0.58 | 0.56 | 0.66 | 0.52 | 0.58 | 0.56 | 0.66 | 0.52 |
| Obs./$R^2$ | 159 | 0.11 | 159 | 0.10 | 159 | 0.11 | 159 | 0.10 |

Notes: All p-values based on robust standard errors; estimated equations also include 3- or 4-digit industry dummies as indicated and relevant (see explanation in the text; detailed estimates including all dummies and the constant available from authors).