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CAPITAL UTILISATION OF LOCAL AND FOREIGN ESTABLISHMENTS IN MALAYSIAN MANUFACTURING

David Lim*

I. Introduction

IT is often argued that foreign firms operating in less developed countries have greater X-efficiency than their local counterparts. However, little empirical evidence has been presented to substantiate this claim. This paper attempts to fill part of this gap, first, by presenting data on the level of capital utilisation in Malaysian and foreign firms in Malaysian manufacturing and, second, by testing the importance of X-efficiency in determining differences in the utilisation levels of the two categories of firms. The extent to which capital is utilised is an important part of economic efficiency, for an increase in capital utilisation can result, *ceteris paribus,* in lower unit costs of production and a higher rate of economic growth.

II. Utilisation in Malaysian and Foreign Firms

Two measures of capital utilisation are used. The first, U_1, is suggested by Winston and measures the number of hours the capital plant is utilised a year as a percentage of 8,760 hours, the maximum number of hours available per year.[1] U_1, therefore, associates 24 hours a day and 365 days a year with full capacity, a not altogether satisfactory assumption as time has to be set aside for holidays and for repairs and maintenance. The latter stoppage is of special importance as it varies between industries and between firms within the same industry if different techniques of production are used and if firms are of different vintages.[2] However, U_1 can still be useful for a first approximation of capital utilisation. The second measure, U_2, adjusts U_1 for the intensity of use. Most machines can be operated at different speeds though there is probably only one "optimal" speed which corresponds to the least wear and tear. Production managers tend naturally to operate at such a rate and when their intentions are realised the intensity of use may be said to be 100% and there is no need to adjust U_1. If, on the other hand, the actual rate of operation is only 50% of the "optimal" because the lack of demand does not warrant "full" operation, then the intensity of use is only 50% and U_1 has to be adjusted downwards by half. The most obvious example of a need for such an adjustment is a factory that is run on a conveyor belt system where a reduction in the utilisation of the plant is achieved by slowing down and not stopping it. U_1 which measures utilisation purely in terms of time will tend to overstate the degree of capital utilisation.

The measures used are very different from that used by the McGraw-Hill approach which measures actual utilisation as a percentage of desired capital utilisation.[3] The McGraw-Hill measure is often used in studies on excess capacity in industrially advanced countries where the emphasis is on the Keynesian cycli-

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[1] See Winston (1974), p. 1310. For a discussion of the reasons why U_1 and U_2 were preferred to the more conventional measures of capital utilisation, see Lim (1976).

[2] These refinements were not made because the study on Malaysia is part of a multi-country project and adjustments to U_1 and U_2 to suit the peculiar conditions of the different countries will result in uncomparable measures of capital utilisation.

[3] See McGraw-Hill Publications Company (1972).

cal deviation of output from the desired level. It is a subjective measure, as the desired level of utilisation is not defined vigorously, but this lack of a proper definition is not serious for such studies as the interest is on the difference between actual and planned utilisation. However, the omission is serious if the concern is with the fundamentally different question of why the desired level of utilisation leaves a capital plant idle for much of the time. The use of the McGraw-Hill measure can lead to the anomaly where one firm actually uses its capital plant less fully than another and yet has a higher reported utilisation rate.

Data on U_1, U_2, and other variables were collected for 1972 for 350 establishments in the manufacturing sector of West Malaysia by in-depth interviews with production managers. Whenever necessary, the data so collected were supplemented by information from published sources and from returns submitted to the Registry of Companies. The 350 establishments represented about 10% of the total number of manufacturing establishments in West Malaysia in 1972. They were divided into 28 industry-groups at the 3-digit level of the Malaysian Industrial Classification (MIC), which is patterned on the post-1968 U.N. International Standard Industrial Classification (ISIC). The criterion for the sampling selection of the 350 establishments among the 28 industry-groups was the share of each industry-group in the total value added of the manufacturing sector. This rule was also followed whenever it was necessary to move down to the 4- or the 5-digit MIC/ISIC level. The only constraint imposed was that each industry-group must have at least 3 establishments in order to obtain meaningful results for the minor industries. The adjustments to the value added proportionality rule in incorporating this were, however, minimal. The selection at the establishment level was carried out randomly. Out of the 350 establishments, 191 (54.4%) were Malaysian-owned, 117 (33.4%) foreign-owned, and the balance of 42 (12.2%) of mixed ownership. A mixed establishment is one with at least a third of the ownership in foreign hands. The distribution of shares in these establishments is, in fact, two to one in favour of foreign interests, so that the distribution of the 350 establishments by nationality conforms to the overall national distribution to a large extent.

The basic questions asked were: (1) the number of days the plant was operated in 1972, (2) the number of hours the plant was operated on a typical day, and (3) the intensity of use when the plant was in operation. For those establishments which have more than one section and which operate different schedules for the different sections, the shares of the sections in the total replacement value of the plant were used as weights in the calculation of U_1 and U_2.

Table 1 shows U_1 and U_2 for the three categories of establishments at the 4-digit MIC/ISIC level. The 4-digit level was chosen as the 3-digit level would be too aggregative to provide meaningful results in the comparison. The 5-digit level was not chosen as it would not result in enough industry-groups that are common to the three categories of establishments for a meaningful comparison. The replacement value of the fixed assets of the establishment was used as the weight in the calculation. A number of interesting observations can be made. The first is that capital utilisation in West Malaysian manufacturing is much higher than that observed in Pakistan, South Korea and other less developed countries for which utilisation studies have been carried out.[4] U_1 for the 350 establishments as a whole is 74.9 while U_2 is 70.7. The second is that certain industry-groups can be identified as having low utilisation rates (leather and leather products, footwear, furniture and fixtures, pottery, china and earthenware, metal products, machinery, and transport equipment) and others as having high utilisation rates (industrial chemicals, products of petroleum and coal, rubber products, plastic products, glass and glass products, non-metallic mineral products, non-ferrous metal products, and electrical machinery).

Third and most important for the discussion of the role of direct foreign investment in Malaysia, is the observation that foreign owned and controlled establishments tend to utilise their capital plant and machinery longer and

[4] See Winston (1971) and Kim and Kwon (1973).

TABLE 1. — CAPITAL UTILISATION AND CAPITAL-INTENSITY IN WEST MALAYSIAN MANUFACTURING BY INDUSTRY AND NATIONALITY
1972

MIC/ ISIC	Description	M	Md	F	U_1 M	U_1 Md	U_1 F	U_2 M	U_2 Md	U_2 F	P_2K/L(US$'000) M	P_2K/L(US$'000) Md	P_2K/L(US$'000) F
3111	Preserving meat	0	0	2	—	—	43.7	—	—	43.6	—	—	14.2
3112	Dairy products	0	1	5	—	53.5	44.8	—	53.5	42.3	—	11.8	28.4
3113	Canning of fruits & vegetables	6	0	0	66.2	—	—	60.0	—	—	3.9	—	—
3114	Canning of fish, etc.	2	0	0	86.5	—	—	86.5	—	—	1.4	—	—
3115	Vegetable & animal oils & fats	5	0	0	75.4	—	—	73.9	—	—	11.5	—	—
3116	Grain mill products	11	1	0	71.9	53.8	—	68.8	48.4	—	210.9	124.8	—
3117	Bakery products	2	2	1	47.5	46.8	49.6	45.3	46.8	24.8	0.9	5.2	2.9
3118	Sugar factories and refineries	1	1	0	82.2	74.1	—	82.2	65.5	—	39.9	70.6	—
3119	Cocoa, chocolate & sugar confectionery	1	0	1	22.5	—	31.5	22.5	—	27.0	0.6	—	7.9
3121	Other food products	3	0	3	77.7	—	46.4	77.2	—	35.8	4.3	—	11.5
3122	Prepared animal feeds	1	0	2	42.0	—	64.7	42.0	—	61.9	9.5	—	3.2
3133	Malt liquors & malt	0	0	2	—	—	77.3	—	—	72.4	—	—	36.8
3134	Soft drinks & carbonated water industries	2	1	5	25.8	27.8	57.7	25.8	25.1	55.1	12.7	4.3	37.9
3140	Tobacco	9	0	4	49.0	—	50.5	44.9	—	49.8	1.6	—	26.6
3211	Spinning, weaving and finishing textiles	8	3	4	80.4	77.7	98.4	76.5	77.7	86.3	9.7	17.0	14.4
3213	Knitting mills	0	1	0	—	98.1	—	—	98.1	—	—	24.9	—
3214	Carpets and rugs	0	0	1	—	—	59.2	—	—	59.2	—	—	6.3
3215	Cordage, rope & twine industries	1	0	0	96.1	—	—	86.6	—	—	9.3	—	—
3220	Wearing apparel, except footwear	2	0	2	67.0	—	27.7	67.0	—	27.7	4.0	—	0.5
3231	Tanneries & leather finishing	2	0	0	26.7	—	—	19.0	—	—	26.0	—	—
3233	Leather products	0	0	1	—	—	26.1	—	—	18.3	—	—	2.8
3240	Footwear	3	0	0	28.6	—	—	24.4	—	—	3.3	—	—
3311	Sawmills, planing & other woodmills	27	3	1	47.8	75.5	64.7	39.6	72.2	64.7	17.2	13.8	4.0
3320	Furniture & fixtures	3	0	0	46.2	—	—	44.4	—	—	27.6	—	—
3411	Pulp, paper & paperboard	0	0	1	—	—	55.7	—	—	44.6	—	—	28.6
3412	Containers & paper boxes	1	0	2	80.2	—	49.8	80.2	—	42.1	7.5	—	11.9
3420	Printing, publishing & allied industries	17	1	2	43.5	99.4	76.6	42.4	99.4	76.6	27.2	57.0	16.8
3511	Basic industrial chemicals	2	2	0	91.8	76.6	—	89.1	79.6	—	155.8	48.2	—
3512	Fertilizers & pesticides	0	1	2	—	82.3	23.6	—	75.1	21.1	—	2.7	3.0
3521	Paints, varnishes & lacquers	0	3	2	—	24.6	36.5	—	22.8	36.4	—	6.9	10.3
3522	Drugs & medicines	1	0	2	25.2	—	22.9	20.7	—	20.9	7.3	—	6.4
3523	Soap & cleaning preparation, etc.	1	1	5	48.8	25.1	67.5	48.8	17.5	60.9	6.7	1.8	24.9
3529	Other chemical products	2	0	1	26.6	—	41.7	21.8	—	41.7	22.8	—	6.3
3530	Petroleum refineries	1	0	4	27.7	—	87.3	19.4	—	84.1	6.4	—	1210.9

TABLE 1. — (*Continued*)

MIC/ ISIC	Description	M	Md	F	U_1			U_2			P_kK/L(US$'000)		
					M	Md	F	M	Md	F	M	Md	F
3551	Tyre & tube industries	2	2	0	58.5	71.5	—	58.5	71.2	—	0.9	9.2	—
3559	Other rubber products	25	0	19	67.4	—	86.3	57.2	—	81.9	30.3	—	37.4
3560	Plastic products	7	3	0	82.4	48.4	—	77.0	42.5	—	12.2	8.6	—
3610	Pottery, china & earthenware	3	0	0	36.0	—	—	33.4	—	—	3.4	—	—
3620	Glass & glass products	1	0	2	31.3	—	94.0	31.3	—	92.9	0.1	—	20.4
3691	Structural clay products	7	0	1	61.0	—	100.0	49.2	—	90.0	13.4	—	5.7
3692	Cement, lime & plaster	2	2	1	98.7	91.9	100.0	98.7	91.9	90.0	87.1	88.2	64.8
3699	Non-metallic mineral products, n.e.c.	4	1	5	38.3	91.4	85.6	32.5	91.4	85.6	1.5	7.4	17.9
3710	Iron & steel basic industries	7	1	3	92.0	55.0	67.8	82.6	46.7	65.4	52.9	9.9	6.3
3720	Non-ferrous metal basic industries	0	1	2	—	27.5	91.2	—	27.5	89.7	—	1.9	21.0
3811	Cutlery, hand-tools, etc.	0	1	0	—	82.2	—	—	77.3	—	—	29.3	—
3812	Metal furniture & fixtures	2	0	1	30.3	—	26.9	24.5	—	26.9	7.1	—	4.5
3813	Structural metal products	1	2	1	32.4	72.0	57.7	32.4	44.0	43.3	6.0	10.6	4.2
3819	Fabricated metal	3	1	4	59.8	84.9	37.5	53.5	51.0	32.0	11.2	44.0	9.0
3821	Engines & turbines	2	0	4	27.8	—	30.9	21.4	—	23.8	1.8	—	14.9
3822	Agricultural machinery	1	0	0	32.2	—	—	29.0	—	—	4.3	—	—
3823	Metal & wood working machines	1	0	0	30.3	—	—	30.3	—	—	3.6	—	—
3829	Other machinery & equipment except electrical	2	1	1	28.0	65.0	50.0	27.9	46.8	40.0	2.9	1.4	1.6
3832	Radio, television & communication equipment	0	1	4	—	47.9	49.9	—	38.4	48.3	—	5.5	3.6
3839	Other electrical apparatus	2	1	5	94.9	86.0	76.0	94.9	86.0	75.7	27.9	9.8	11.2
3841	Ship-building & repairing	1	0	0	32.4	—	—	32.4	—	—	44.6	—	—
3843	Motor vehicles	1	0	6	27.4	—	38.5	26.0	—	37.4	89.3	—	5.8
3844	Motor-cycle & bicycles	2	1	1	26.4	27.0	27.3	21.0	25.7	20.4	5.3	1.6	24.7
3851	Professional & scientific equipment	1	0	2	51.0	—	81.3	51.0	—	68.2	10.8	—	7.8
3908	Other manufacturing industries	0	3	0	—	84.9	—	—	70.1	—	—	5.3	—
	Total	191	42	117	65.1	79.7	78.4	60.0	76.2	74.6	36.9	56.4	671.0
	Sub-total				69.3	79.1	—	64.6	75.7	—	61.0	75.7	—
	Sub-total				65.9	—	79.8	59.9	—	76.0	40.1	—	715.6
											(56.8)	—	(188.2)

Notes: M = Malaysian, Md = mixed and F = foreign. Figures in parentheses refer to comparison when industry-group 3530 is excluded.

more intensively than their Malaysian counterparts. Thus, of the 30 industry-groups that are common to the Malaysian and the foreign owned establishments, the latter have higher values for U_1 in 22 cases and higher values for U_2 in 21 cases. The most significant differences can be found in the manufacture of soft drinks and carbonated water products, other chemical products, petroleum refineries, glass and glass products, structural clay products, and other non-metallic mineral products where the utilisation rates of foreign owned establishments are more than twice those of Malaysian establishments. For the foreign owned establishments as a whole, U_1 and U_2 are 78.4 and 74.6, respectively, while the values for the Malaysian establishments are only 65.1 and 60.0, respectively. When the comparison is limited to only those industry-groups that are common to the two categories of establishments, the difference is also significant. U_1 and U_2 for the foreign owned establishments are 79.8 and 76.0, respectively, while those for the Malaysian establishments are only 65.9 and 59.9, respectively.

Only a slightly different picture emerges when the comparison is between Malaysian and mixed establishments. The former have higher utilisation rates in 10 of the 19 industry-groups that are common to them but the differences on the whole are not marked. It is only in the manufacture of basic industrial chemicals, soap and cleaning preparations, plastic products, and basic iron and steel products that the differences are more than 10 percentage points. In fact, the mean values for U_1 and U_2 for Malaysian establishments are only 69.3 and 64.6, respectively, compared to the 79.1 and 75.7 recorded for the mixed establishments. For the 42 mixed establishments as a whole, U_1 and U_2 are 79.7 and 76.2, respectively, compared to the corresponding values of 65.1 and 60.0 for the 191 Malaysian establishments. In view of the dominance of foreign interests in them, mixed establishments should be considered foreign in the comparison. When the mixed and the foreign establishments are grouped together, then, of the 35 industry-groups that are common to this combined group and the Malaysian establishments, the latter have higher utilisation rates in only 10 of them. It would thus appear that foreign owned and controlled establishments utilise their capital plants longer and more intensively than their Malaysian counterparts.

III. Determinants of Capital Utilisation

Our findings so far, though interesting, do not provide the desired empirical basis for the debate on the role of direct foreign investment in Malaysian economic development. It would also be necessary to know why foreign owned and controlled establishments utilise their capital plant and machinery longer and more intensively than Malaysian establishments. For example, it is quite possible for foreign companies to have higher capital utilisation simply because of the technological economies that come with their larger size and operation. It may not have anything to do with the usual claim put forward by advocates of foreign investment in Malaysia that foreign companies have greater X-efficiency than their Malaysian competitors.[5]

The attempt to explain the higher capital utilisation of foreign companies consists of two related steps. The first is to establish, through step-wise regression analysis, the determinants of capital utilisation for the entire sample of 350 establishments and the order in which they appear. Among the independent variables included is a variable for nationality to test the hypothesis that the X-efficiency of foreign firms is higher than that of Malaysian firms. The second step is to examine the relative importance of each one of the determinants for the Malaysian and the foreign owned and controlled subsamples. These two steps taken together would be able to show whether greater X-efficiency per se has accounted for the higher capital utilisation observed in foreign manufacturing establishments in West Malaysia.

Both the linear and non-linear forms of step-wise regression analysis were attempted, with the former producing the better results. The equations obtained for U_1 and U_2 using linear step-wise regression analysis are:

$$U_1 = 43.40 + 0.0577E - 0.00002E^2$$
$$(5.51) \quad (6.2307) \quad (-4.1030)$$
$$(0.1073) \quad (0.1554)$$

[5] For a discussion of the concept of X-efficiency, see H. Leibenstein (1966).

$$\begin{array}{rrrr} & +\ 0.4919Z & +\ 0.1343X & -\ 11.1340V_q \\ & (4.6377) & (3.5013) & (-4.0449) \\ & (0.2046) & (0.2388) & (0.2654) \\ -\ 0.3209B & +\ 9.0609LS & -\ 0.0739IM & \\ (-2.8551) & (2.4931) & (-1.9866) & \\ (0.2856) & (0.3030) & (0.3083) & \end{array}$$

$$R^2 = 0.3083 \quad F = 10.29 \quad N = 350$$

$$\begin{array}{rrrr} U_2 = 46.36 & +\ 0.0575E & -\ 0.00002E^2 & \\ (6.34) & (6.6904) & (-4.9460) & \\ & (0.0717) & (0.1372) & \\ +\ 0.4847Z & -\ 0.4671B & +\ 0.1332X & \\ (4.9233) & (-4.4775) & (3.7412) & \\ (0.1920) & (0.2381) & (0.2742) & \\ -\ 11.6830V_q & +\ 8.4024LS & & \\ (-4.5733) & (2.4910) & & \\ (0.3112) & (0.3300) & & \end{array}$$

$$R^2 = 0.3300 \quad F = 11.94 \quad N = 350$$

where E is the number of employees, a proxy for the scale or size of operation, and E^2 the number of employees squared, to show the fact that the effect of size on capital utilisation can be a non-linear one. Z is the relative factor intensity and is given by P_kK/L where P_k is the cost of owning capital for a year, K the physical stock of capital, and L the number of production workers on the biggest shift, which is usually the day-shift. The usual measurement of L as the total number of employees is not used, as the emphasis is on the amount of capital a production worker has to work with on the biggest shift. K is, of course, not measurable and is approximated by the value of the fixed assets at historical costs in U.S. dollars. P_k itself is given by $(r - s + d)$ where r is the real rate of interest, s the net subsidy that reduces the cost of owning the capital stock over the year, and d the real rate of depreciation.

X is exports as a percentage of the total domestic production. V_q is a dummy variable for the seasonal variation in output where a value of 1 is given to establishments whose output varies seasonally and a value of 0 to each one of those whose output does not vary at all.[6]

B is the wage premium factor and is given by bWL where b is the night-shift differential in percentage, W the net wage rate in U.S. dollars, and L the number of production workers on the day-shift. This formulation of the wage premium factor is different from the Winston derivation where only b is used.[7] It can be argued that b on its own cannot explain adequately the possible differences in behaviour between a firm which employs 1,000 workers and pays a night-shift differential of 10% and one which employs 10 workers and pays a wage premium of 50%. Under Winston's formulation the latter firm will be expected to be affected more by the wage premium because of the much larger value for b, whereas the size of the wage premium may not be very relevant because of the smallness of the labour force. Under such circumstances the much larger first firm may be affected more by the wage premium in spite of having to pay only a much smaller 10% premium. As such, the relevant variable to use is the wage premium adjusted for the wages bill and not the wage premium per se.

LS is a dummy variable for legal status where a value of 1 is given to each of the establishments that is incorporated, and a value of 0 to each one of those that is not. IM is imported inputs as a percentage of the total inputs used in the production process.

The determinants are presented in the order in which they appear at each step of the linear step-wise regression analysis and the figures in the second row of the parentheses are the coefficients of determinants (R^2s) recorded at each step. On the other hand, the regression coefficients are those obtained at the final stage of the analysis and the figures in the first row of the parentheses are their t-values.[8]

The analysis shows that capital utilisation as measured by time, U_1, and capital utilisation as measured by time and intensity, U_2, are affected by more or less the same factors and that these appear in more or less the same order of importance. The nationality variable, which was presented as a dummy variable with a value of 1 given to each of the foreign and mixed establishments and a value of 0 to

[6] The inclusion of this variable is justified by the high degree of economic instability in the Malaysian economy. See Lim (1974).

[7] Winston (1974).

[8] All of the regression coefficients are statistically significant at the 99% level of confidence. The exception is that for IM which is significant at the 95% level.

each of the Malaysian establishments, is not one of these determinants.[9] Support of the hypothesis that foreign owned and controlled establishments operate with greater X-efficiency than Malaysian establishments would have produced a statistically significant positive relationship between the dummy variable and U_1 or U_2. The absence of any such relationship suggests that foreign owned and controlled companies utilise their machinery longer and more intensively because of factors other than a greater level of X-efficiency.

One of these factors is their larger scale of operation. E is the most important determinant, and its presence with a positive sign shows that the size of operation has a favourable effect on capital utilisation probably because large firms enjoy technological and management economies of scale. Such advantages are more likely to be enjoyed by foreign establishments because they are generally much bigger than Malaysian establishments.[10] On the other hand, E^2 is also present and is the second most important determinant, and its negative sign suggests that diseconomies of scale set in after a certain level of operation. The larger operation of foreign companies has, therefore, positive and negative effects on their level of capital utilisation. However, the regression coefficient of E^2 is so much smaller than that for E that the net effect will become negative only for those establishments employing more than 3,000 workers. The average number of employees per establishment in West Malaysian manufacturing is only around 250. Under such circumstances, it would probably be fair to say that largeness in the scale of operation has more favourable than unfavourable effects on capital utilisation.

The presence of Z, the relative factor intensity, as the third most important determinant provides strong support for the Marris and Winston hypothesis, which is based on the simple premise that workers prefer to work during the day so that a wage premium, which may be substantial, will have to be paid for night-work.[11] The amount of idle time planned for the plant will thus depend on two opposing factors. On the one hand, there is the additional labor cost which comes with working an extra shift. On the other, there is the output foregone for not working more hours and the fixed capital costs, which have to be paid whatever the level of output. It is obvious that the more capital intensive is the production process, the more important are capital costs, *ceteris paribus,* and therefore the greater the incentive to economise on them by operating the machinery more fully. On the other hand, it would be more rational for a firm with a highly labour-intensive production process and therefore high labour costs, *ceteris paribus,* to work as few shifts as possible. A positive relationship can therefore be expected between Z and U_1 or U_2, which is, in fact, what was obtained.

Table 1 shows the capital intensity of the Malaysian, foreign, and mixed establishments in U.S. dollars. Of the 30 industry-groups that are common to the Malaysian and foreign establishments, the former has higher values in 16 of these, but in 6 (drugs and medicines, metal furniture and fixtures, structural metal products, fabricated metal products, other machinery and equipment, and professional and scientific equipment) the differences are not marked. Moreover, the mean value for the 30 industry-groups for the Malaysian establishments is only $40,093 compared to $715,566 for the foreign establishments.[12] When industry-group 3530 is excluded, the respective values are $56,837 and $188,254. When the comparison is between the Malaysian and the mixed establishments, the table shows that the former are more capital intensive in 10 of the 19 industry-groups that are common to them but the differences in industry-groups 3311 and 3560

[9] Other independent variables tested and found not to be statistically significant are the index for economic instability, competing imports as a percentage of total supply, market control, city-size, perishability of produce, seasonal variation in demand, the age of the plant, and the age of the plant squared.

[10] Lim (1973).

[11] Marris (1964), Winston (1971) and Winston and McCoy (1974).

[12] Because of their greater size and their international connections foreign firms tend to have access to capital at a lower annual cost than do Malaysian firms. In other words, the real rate of interest (r) is lower and the subsidy (s) higher for foreign firms. As such the differences in the capital-intensity of the two categories of establishments would be smaller than indicated. However, it is highly unlikely that an adjustment for this would reduce the differences significantly.

are not large. Again, when the mean values are compared, they show the mixed establishments ($75,687) to be more capital intensive than the Malaysian ones ($61,014). These figures and the existence of a positive relationship between Z and U_1 or U_2 show that another reason for foreign owned and controlled establishments having higher capital utilisation rates is their higher capital intensity.

Another reason is the presence of more professional managers in the foreign sector. *LS*, the dummy variable for legal status, appears with a positive sign to show that incorporated establishments run by professional managers utilise their capital more than sole proprietorships and partnerships, where there is not a similar separation of owners from managers. As all of the foreign owned and controlled establishments are incorporated, while a significant proportion (31%) of the Malaysian ones are not, it would appear that the influence of *LS* is to lead to higher capital utilisation in the foreign owned and controlled sector. This argument is not the same as that raised by the use of a nationality variable as a determinant. The purpose of introducing *LS* is to see the impact of professionalism in management on capital utilisation while that of introducing the nationality variable is to see whether foreign professional managers have greater *X*-efficiency than Malaysian professional managers.

A neutral effect can be expected from X and V_q on the capital utilisation of the Malaysian and foreign owned and controlled firms. Data from the survey show that foreign firms do not export more of their produce than do their Malaysian counterparts. The favourable effect that an increased market through export has on capital utilisation will, therefore, be evenly spread between the two categories of firms. The presence of V_q with a negative sign shows that instability in demand, when the products cannot be stored for long without serious loss of value from deterioration, results in excess capital capacity being installed and therefore in capital underutilisation. However, as there is no difference in the seasonal variation of demand and output between foreign and Malaysian firms the effect will again be neutral.

The only variables that unequivocably affect the capital utilisation of Malaysian firms more favourably relative to that of foreign firms are *B*, the wage premium factor, and *IM*, the percentage of total inputs imported. The presence of *B*, which is the shift premium adjusted by the wage bill, with a negative sign lends further support to the Marris and Winston hypothesis. The larger the shift premium that must be paid for working an extra shift for a given labour force, the higher the labour costs, and so the greater the reluctance to start another shift. The shift premium has to be adjusted for the total wage bill because a firm with a labour force of one and a shift premium of 1000% may not be affected by the shift premium, while a firm with one thousand workers may be with a shift premium of even 10%. The shift premium is decided by law, but the wage bills of foreign companies are likely to be higher than those of Malaysian companies because of the higher wage rates they pay and because of the larger number of workers they employ. This means that the importance of *B* as a determinant of capital utilisation is likely to lead to higher utilisation rates among Malaysian firms. The same effect can also be expected from *IM*, whose presence with a negative sign suggests that establishments with greater dependence on foreign inputs for their production suffer from greater logistics problems in their production processes. Foreign establishments do import a higher proportion of their inputs than Malaysian establishments do, though the difference is not considerable. Thus, of the 30 industry-groups that are common to foreign and Malaysian establishments, the former have a higher percentage of imported inputs in 18, and in 3 of these the difference is less than 5 percentage points.

IV. Conclusions

Our study shows that foreign owned and controlled establishments in West Malaysian manufacturing operate their plants and equipment longer and more intensively than their Malaysian counterparts. However, it also shows that this is not due, as advocates of direct foreign investment in Malaysia have claimed, to the greater *X*-efficiency of foreign companies. Eight variables were shown by linear step-wise regression analysis to be significant

in determining capital utilisation in West Malaysian manufacturing, and the nationality variable, used for testing the X-efficiency element, is not one of them.

The most important of these variables are E, E^2 and Z, and their overall favourable effect on capital utilisation seems to have benefited foreign establishments more than Malaysian establishments because the former are larger and more capital intensive. Another significant, but not so important, variable which has the same directional impact is LS, as foreign companies are more incorporated than Malaysian companies. Two variables, X and V_q, do not react either way and of the two which favour Malaysian establishments, B and IM, only the former matters as there is not much difference between Malaysian and foreign establishments in their dependence on imported inputs. Moreover, IM itself is the least important of the determinants of capital utilisation. On the whole, therefore, it is the foreign owned and controlled establishments which possess the characteristics that result in the high utilisation of capital plant and equipment. However, it is important to point out that these have more to do with the size of operation and the capital intensity of the production process and nothing to do with X-efficiency per se.

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