Institute of Economic Development and Research
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CAPITAL UTILIZATION IN GOVERNMENT 'FAVORED' EXPORT-ORIENTED FIRMS

by

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CAPITAL UTILIZATION IN GOVERNMENT 'FAVORED' EXPORT-ORIENTED FIRMS: ERRATA

Page 26

Table 8 as shown in the text is simply a reproduction of Table 6 in page 22. The correct Table 8 is what is presented as Table 11 in page 44.

Page 44

The correct Table 11 which is supposed to illustrate the import dependence of most GFEO firms is attached.

Page 48

In the second paragraph, one whole sentence was omitted. (Note: some copies have already been corrected for this error). The following statement should be inserted between the words "firms" and "Secondly":

Firstly, the heavy concentration of "continous" or "batch" process industries like cement, textile, cordage and synthetic resins in this group of capital intensive firms.

BENJAMIN E. DIOKNO
30 July 1974

Table 11

DOMINANT REASONS FOR CAPITAL UNDERUTILIZATION, IN ORDER OF IMPORTANCE, IN GFEO FIRMS, 1972

ISIC Code	Industry	Number of Reporting Firms	Import Dependence (Per Cent)	Dominant Reasons For Capital Underutilization	Raw Materials In Short Supply
3113	Canning and preserving of fruits and vegetables	1	0	Lack of domestic inputs Insufficient demand	Coconut, fruits
3114	Canning, preserving and processing of fish crustacea and similar foods	2	0	Lack of domestic inputs Insufficient demand	Fish, shrimps
3115	Vegetable and animal oil fats	1	0	Maintainance time	
3116	Grain Mill Products	1	95	Lack of imported inputs	Wheat, grain, bags
3119	Cocoa, chocolate and sugar confectionary	4	46	Insufficient demand	
3121	Food products, N.E.C.	3	3	Lack of domestic inputs Insufficient demand	Coconut
3131	Distilling, rectifying and blending spirits	1	10	Lack of imported inputs	Essences
3211	Spinning, weaving and finishing textiles	8	83	Insufficient demand Lack of imported inputs Lack of working capital	Chemicals and dyestaffs, nylon fabrics, cotton and synthetic fibres
3212	Made-up textile goods, except wearing apparel	1	81	Insufficient demand	
3214	Carpets and rugs	1	70	Lack of imported inputs	Wool
3215	Cordage, rope and twine	2	84	Lack of imported inputs	Nylon filaments, Lubricant, Synthetic resins
3220	Wearing apparel, except footwear	8	52	Insufficient demand Lack of imported inputs Lack of working capital Lack of skilled labor	Nylon lining
3311	Sawmills, planing and other woodmills	6	33	Lack of domestic inputs Lack of imported inputs	Logs Glue
3312	Wooden and cane containers	1	0	Lack of domestic inputs	Acacia logs
3319	Wood and cork products, N.E.C.	1	0	Lack of domestic inputs	Wood

Table 11 (continued)

ISIC Code	Industry	Number of Reporting Firms	Import Dependence (Per Cent)	Dominant Reasons For Capital Underutilization	Raw Materials In Short Supply
3320	Furniture and fixture, except primarily of metal	3	0	Insufficient demand Lack of domestic inputs	Lumber
3513	Synthetic resins, plastic material and man-made fibres except glass	5	56	Insufficient demand Lack of imported inputs	Linseed oil
3521	Paints, varnishes and lacquers	4	57	Insufficient demand Lack of imported inputs	Resins, titanum, color pigments
3522	Drugs and medicines	2	90	Insufficient demand	
3529	Chemical products, N.E.C.	2	89	Insufficient demand	
3551	Tyre and tube industries	2	75	Lack of imported inputs	Synthetic rubber
3560	Plastic products, N.E.C.	1	47	Lack of imported inputs	Melamine moulding compounds, plastic
3620	Glass and glass products	3	42	Lack of domestic and imported inputs	Bunker oil Broker glass
3692	Cement, lime and plaster	8	24	Insufficient demand	
3699	Non-metallic mineral products	2	12	Insufficient demand Lack of imported inputs	Prestressed Steel
3710	Iron and steel industries	1	85	Lack of imported inputs	Steel coils
3720	Non-ferrous metal basic industries	1	73	Lack of skilled labor	
3819	Fabricated metal products except machinery and equipment, N.E.C.	2	52	Lack of working capital Lack of domestic inputs	Metal sheets
3829	Machinery and equipment except electrical, N.E.C.	3	38	Insufficient demand	
3832	Radio, Television and communication equipment	1	96	Insufficient demand	
3833	Electrical appliances and housewares	2	35	Insufficient demand	
3839	Electrical apparatus and supplies, N.E.C.	3	100	Insufficient demand Delay in shipment of imported raw material	
3852	Photographic and optical goods	1	55	Insufficient demand	
3902	Musical instruments	1	10	Insufficient demand	
3909	Industries, N.E.C.	2	41	Lack of domestic and imported inputs	Packaging material, paraffin wax, cedar wood, lead

CAPITAL UTILIZATION IN GOVERNMENT 'FAVORED' EXPORT-ORIENTED FIRMS*

by

BENJAMIN DIOKNO

INTRODUCTION

The new wave of studies on capital utilization in underdeveloped countries[1] can be seen as a fitting response to the awareness that while capital-shortage in less developed countries (LDCs) continues to be the focal point in studies in development economics, empirical evidences show that most (if not all) capital-poor, labor-surplus LDCs are faced with excess capacity in their manufacturing sectors. In West Pakistan, G. Winston (1971a) showed that the level of industrial capital utilization was about 14 percent. S. Paul (1971) approximated the average capacity utilization

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in India during the period 1961-1971 at 53 percent. In Colombia, F. Thoumi (1972) found the nonweighted average of capacity utilization in the magnitude of 51 percent. In their recent study of South Korean manufacturing sector, Kim and Kwon (1973) showed that the average utilization rate during the period 1968-1970 was in the order of 16 percent.

Undoubtedly, underutilization of existing capacity represents a grave misuse of scarce capital and foreign exchange -- a state of condition which a typical capital-poor, foreign exchange-constrained LDC should not allow to persist. Hence, the need for a policy-oriented study on the extent and causes of capital idleness in Philippine manufacturing industries. And if there is now a considerable "pay-off" for the study of capital utilization in manufacturing firms in general, then it is even more worthwhile to know the level of utilization of installed equipment and machinery in government assisted firms.

The emphasis of this study is on government favored export-oriented (GFEO) firms to be defined as firms registered with the Board of Investments (BOI) in

its Investment Priorities Plan (IPP) and have exported in 1972 and all firms registered with the BOI's Export Priorities Plan (EPP).

In recent years, the emphasis of government economic policy in the Philippines has moved distinctly towards the expansion of "new" manufactured exports. One can cite the following policy measures: the de facto devaluation of the peso in the early 1970, the establishment of the Mariveles Export Processing Zone and the tax incentives and other benefits given by the Board of Investments registered under the Export Priorities Plan.

The reasons for the emphasis on export promotion seem obvious enough. For one, increasing the export of manufactures can be one way of generating employment in a typically small, labor-surplus LDC like the Philippines. Lately, the need to tap "new" manufactured exports as a reliable foreign exchange earner emerged as an offset to the expected decrease of foreign exchange earnings due to the impending government policy to phase out the exports of logs and lumber. On the other side of the ledger, there can be expected a substantial rise in the demand for foreign

exchange due to the fast increasing bill for the country's fuel requirements.

One area which has not been explored thus far -- and which this paper would want to tackle partly -- is how to tap foreign trade as a possible avenue for increasing capital utilization in the Philippine manufacturing sector. Knowing the level of capital utilization in the GFEO firms is necessary in determining the extent of export expansion which can be undertaken without additional foreign exchange outlays for imported capital equipment and machinery.

It is even more important to know why the existing capital stock of GFEO firms are being left idle part (if not most) of the time. Underutilization of capital can reduce the competitiveness of the exports of the industry to the extent that it can adversely affect the rate of adoption of new technology by the firms. Obsolescence and intensity of use determine the length of economic life of capital equipment. Unutilized capacity lengthens the physical life of the machinery and consequently putsoff the adoption of process innovations.

METHODOLOGY

There is absolutely no published information on capital utilization in Philippine manufacturing industries in recent years. Inevitably, the first major concern of this study is the collection of micro-data on the level and causes of capital underutilization in government favored export-oriented (GFEO) firms.

Despite its many drawbacks -- for example, a considerable research outlay and the probable presence of bias and non-random error in the results -- the survey method is employed in this study. One virtue of the survey interview method is that specific questions relating to capital utilization are answered by competent people: plant owners, production managers, financial officials and sales directors.

The questionnaire used includes questions on plant characteristics, pattern and intensity of capital use, wages and shift premia, labor and productivity, input and product demand variations and market structure.

As of December 31, 1972, there were approximately 214 establishments which fell under our definition

of government favored export-oriented firms. We tried to reach all the firms through personal interviews and mailed questionnaires. The survey took place from September, 1973 to February, 1974. As of February 28, 1974, about 105 GFEO firms had been interviewed but only 91 replies were deemed useful for several reasons: some of the firms in the original list started operating only in 1973, some have been "delisted" by the Board of Investments, while others in the BOI-IPP list have not really exported since they started operation. In a number of cases, company officials refused to give the minimum basic information required.

Of the 91 replies, about 95 percent were acquired through personal interviews and plant visits.

Two Approaches

One of the foremost objectives of this study is to pinpoint the major reasons why capital in GFEO firms are being left idle part (if not most) of the time. This accent on the major determinants of capital resource wastage is to a large extent biased by

A. Phillips' view that "it is far more important for the less developed countries to find out why scarce capital is underutilized than to determine the precise degree of under utilization".[2]

The results of the survey interviews of the government-assisted firms are analyzed at two levels: quantitatively and qualitatively.

The quantitative approach involves the formulation of a regression model with the view of finding the statistically significant determinants of capital utilization in GFEO firms. The explanatory variables used are prompted both by the data collected during the survey interviews and by recent econometric studies on capital use. The effect of some policy-related variables on the level of capital utilization in GFEO firms are analyzed using the conventional statistical test of significance.

In the subjective approach, production managers and other respondents are asked to give the reasons why "actual" capacity is less than the desirable "standard" or "normal" capacity. As in the McGraw-Hill method (A. Phillips, 1970), no attempts are made to define

capacity -- whether in the "actual" or "desired" sense.

Another judgmental question which turned out to be useful in analyzing the nature of capital use in the relatively capital intensive firms, is "Is it difficult or expensive to shut the plant down and interrupt production for a short period, say 24 hours? Why?"

Sources of Data

The major sources of data are those collected during the survey interviews of government assisted manufacturing firms. In addition, it was also possible to use some quantitative and qualitative information at the Board of Investments. For more accurate financial figures, the data gathered during the survey interviews were compared with those of the Business Day's Top 1,000 Philippine Corporation (1973).

Towards the end of the study, the levels of capital utilization in the BOI-registered export-oriented firms and firms which are not enjoying government assistance are compared. Here the data gathered in the National Economic and Development Authority-

sponsored survey on capital utilization in Philippine manufacturing industries in 1972 are used.

Measures of Capital Utilization

There are a number of alternative ways of measuring the degree of capital utilization. In his paper, A. Phillips (1970) indentified five methods for measuring capacity utilization rate, namely: (1) use of capital-output ratios, (2) Wharton School "peak-to-peak" method, (3) Klein-Preston econometric method, (4) direct engineering estimates, and (5) survey methods.

In this study, basically two measures of capital utilization are used: time utilization and the "subjective" measure.

The Time Utilization

This method, basically that of Foss (1963), measures the hours worked per annum by a given machine expressed as a percentage of the maximum possible number of production hours per year. Assuming continuous operation, the latter figure is 8,760 hours (365 days x 24 hours/day).

The time utilization rates are presented in two forms: unadjusted capital utilization rate (CUR) and the adjusted capital utilization rate (CUR*). The difference between the two alternative measures of time utilization is that the adjusted utilization rate (CUR*) takes into account sectional variation and intensity of use of the equipment. Specifically, CUR* is estimated by the following formula:

$$CUR^* = \sum_{i=1}^{n} u_i C_i p_i$$

where

CUR* = plant capital utilization rate, adjusted for sectional and intensity use.

u_i = intensity of use of the ith section of the plant

$C_i = \frac{h_i}{H_i}$ where h_i is the number of hours worked by the ith section in one year (1972) and H_i is the maximum possible number of hours per annum that a plant could operate under ideal conditions (assumed in the study to be 8,760).

P_i = proportion of the ith section to total plant in terms of cost of installed equipment

n = number of sections in the plant

M. Foss (1970) and later Kim and Kwon (1973) used the so-called "electricity measure" of capital utilization to approximate the annual time utilization rate in any given industry. The "electricity measure" which incidentally will not be used in this study, works on the assumption that electricity is the dominant source of energy in manufacturing industries.

What may be called a variant of the McGraw-Hill measure of capacity utilization is the "subjective" measure which is culled from the respondents' replies on some of the judgmental questions raised during the survey interviews. "Subjective" capital utilization rate (CUR^m) is defined here as "actual" capacity as a percentage of the desired "standard" or "normal" capacity - both measures of "actual" and "desired" levels of capital use as perceived by people most competent to answer them: production managers and factory owners.

CHARACTERISTICS OF GFEO FIRMS

Of the 91 firms surveyed, only 76 or 84 percent have actually exported in 1972. The percentage distribution of exporting firms according to the share total exports to gross output is shown in Table 1. Of those exporting, some 32 firms or about 42 percent have very minimal exports (1-19 percent). On the other extreme, about one-fourth of those interviewed have exported about 80-100 percent of their gross output. Heavy exporters are those in the preserved seafoods, garments, food and electronics industries.

Table 2 shows the relative "bigness" of GFEO firms in terms of employment size. About 15 percent of the government-assisted export-oriented establishments employ 50 or more production workers; some 51 firms or about 56 percent have 200 or more production workers.

In terms of sales, about 52 firms or roughly 57 percent of GFEO firms are among the top 495 manufacturing firms in 1972 as ranked by the Business Day (1973).

TABLE 1

EXPORT PERFORMANCE OF GOVERNMENT 'FAVORED' EXPORT-ORIENTED FIRMS, 1972

Export as a Proportion of Gross Output	Number of Firms	Percentage Distribution (Total No. of Oberations)	Percentage Distribution of Exporting Firms
90-100	16	17.58	21.05
80-89	2	2.20	2.63
70-79	2	2.20	2.63
60-69	3	3.30	3.95
50-59	7	7.69	9.21
40-49	3	3.30	3.95
30-39	3	3.30	3.95
20-29	8	8.79	10.53
10-19	7	7.69	9.21
1-9	25	27.47	32.89
Not Exporting	15	16.48	

TABLE 2

EMPLOYMENT SIZE OF GFEO FIRMS, 1972

Number of Production Workers	Number of Firms	Cumulative Frequency
5-19	3	3.30
20-49	11	15.36
50-99	14	30.76
100-199	12	43.95
200-499	28	74.72
500-999	14	90.10
1,000-1,999	2	92.30
2,000 and above	7	99.99
TOTAL	91	

These two sets of information tend to support the view that the Board of Investments has, by and large, reached only the big, organized industrial segment of the economy "Bigness" or the size of the firm, as will be shown later, has a positive influence on capital utilization.

Of the 91 firms interviewed, 22 started operation in 1965-1969 while 10 started in 1970 or later. Of the 59 firms that were established prior to 1965, 11 had made substantial improvements to their equipment during the period 1965-1969, a sizable number (20) had expanded during the period 1970-1972, 8 had made new additions in 1964 or earlier, 6 had expanded gradually while 14 had made no expansion since its year of operation.

THE LEVEL OF UTILIZATION: FINDINGS AND ANALYSIS

The Results

The data in Table 3 support the a priori expectation that the installed capital and machinery in government-assisted firms are largely underutilized.

The non-weighted average of CUR* for the whole GFEO firms was 52.67 percent while the coefficient of variation was 45.53 percent implying the wide range of variation in the levels of capital utilization in GFEO firms. The average CUR* weighted by fixed assets and sales were 69.20 and 62.49, respectively.

Table 3 show the various capital utilization rates -- unweighted, weighted by assets and sales at the 4-digit levels of disaggregation.

Capital utilization rates are lowest in ISIC 3114 (Canning and processing of Fish), 3319 (Wood and work products), 3832 (Radio and TV equipment) and 3902 (Musical instruments). Except for ISIC 3832, the industries which rank high in capital idleness can be classified as industries dependent on domestic raw materials.

TABLE 3

CAPITAL UTILIZATION IN GFEO FIRMS

SUMMARY OF DATA BY 4-DIGIT
ISIC INDUSTRY CODE

ISIC CODE	NO. OF PLANTS	MEAN CUR*	STD DEV OF CUR*	COEFF OF VARIATION	WTD MEAN OF CUR* BY ASSETS	WTD MEAN OF CUR* BY SALES
3113	1	43.55	0.0	0.0	43.55	43.55
3114	2	21.55	0.78	3.61	21.63	21.81
3115	1	68.50	0.0	0.0	68.50	68.50
3116	1	45.62	0.0	0.0	45.62	45.62
3119	4	43.97	21.49	48.87	39.74	40.21
3121	3	63.06	4.82	7.64	64.45	66.12
3131	1	56.37	0.0	0.0	56.37	56.37
3211	8	71.93	15.53	21.59	73.39	76.78
3212	1	47.28	0.0	0.0	47.28	47.28
3214	1	27.67	0.0	0.0	27.67	27.67
3215	2	58.10	31.35	53.96	60.12	57.80
3220	8	51.58	21.72	42.11	60.44	58.94
3311	6	62.85	19.54	31.09	71.68	71.40
3312	1	28.22	0.0	0.0	28.22	28.22
3319	1	9.22	0.0	0.0	9.22	9.22
3320	3	43.52	8.03	18.44	40.17	43.45
3513	5	54.96	24.70	44.94	58.25	53.30
3521	4	29.41	24.51	83.33	40.33	29.76
3522	2	34.00	11.65	34.27	40.93	42.02
35.29	2	63.41	23.62	37.25	73.59	62.36
3551	2	71.07	20.89	29.40	84.19	84.28
3560	1	35.72	0.0	0.0	35.72	35.72
3620	3	59.64	36.08	60.49	80.25	80.82
3691	1	88.13	0.0	0.0	88.13	88.13
3692	8	76.68	13.39	17.46	77.78	78.98
3699	2	65.66	33.37	50.82	76.38	58.71
3710	1	42.57	0.0	0.0	42.57	42.57
3720	1	34.97	0.0	0.0	34.97	34.97
3819	2	26.32	17.32	65.82	26.56	26.63
3829	3	37.68	29.87	79.28	40.16	41.87
3832	1	7.72	0.0	0.0	7.73	7.73
3833	2	25.76	17.56	68.19	21.55	21.66
3839	3	60.16	12.31	20.46	61.72	57.36
3852	1	76.96	0.0	0.0	76.96	76.96
3902	1	16.49	0.0	0.0	16.49	16.49
3909	2	46.50	27.01	58.09	64.96	65.24
	91	52.67	23.98	45.53	69.20	62.49

Industries with relatively high utilization rates are ISIC 3692 (Cement), 3852 (Photographic and optical goods), 3115 (Vegetable and animal oil fats) and 3699 (Non-metallic mineral products).

Extremely wide variations in CUR* can be seen in ISIC 3521 (Paints, varnishes and lacquers), 3829 (Machinery and equipment, n.e.c.), 3833 (Electrical appliances and housewares), and 3620 (Glass and glass products).

The percentage distribution of CUR*s in GFEO firms is presented in Table 4. Installed machinery and equipment of some 44 firms, representing 48 percent of the government-favored firms were found to be lying idle at least half of the time.

The pattern of multiple shiftwork is shown in Table 5. As can be expected, the pattern of shiftwork is highly variable in industries which can be classified as less homogeneous, viz, ISIC 3819, 3829 and 3909.

One interesting finding that emerges in the survey is the high variation in the pattern of shiftwork in ISIC 3220 (Wearing apparel), implying that there are

TABLE 4

DISTRIBUTION OF CAPITAL UTILIZATION RATES
IN GFEO FIRMS, 1972

Capital Utilization Rate (%)	Number of Firms	Percent of Total
00.01-10.00	2	2.20
10.01-20.00	6	6.59
20.01-30.00	13	14.29
30.01-40.00	11	12.09
40.01-50.00	12	13.19
50.01-60.00	10	10.99
60.01-70.00	13	14.29
70.01-80.00	8	8.79
80.01-90.00	12	13.19
90.01-100.00	4	4.40

TABLE 5

PATTERN OF MULTIPLE SHIFTWORK IN GFEO FIRMS, SELECTED INDUSTRIES[a]

ISIC	Industry	No. of Reporting Firms	1-Shift Operation	2-Shift Operation	3-Shift Operation	End Use
	A. Highly variable					
3119	Cocoa, chocolate and sugar confectionery	4	1	2	1	Consumer Good
3220	Wearing apparel, except footwear	8	3	3	2	Consumer Good
3513	Synthetic resins, plastic materials	5	1	1	3	Intermediate
3620	Glass and glass products	3	1	-	2	Intermediate
3819	Fabricated metal products except machinery and equipment, N.E.C.	2	1	-	1	Capital Goods
3829	Machinery and equipment except electrical, N.E.C.	3	2	-	1	Intermediate
3909	Industries, N.E.C.	2	1	-	1	Consumer Good
	B. 2- and 3- Shift Operation					
3211	Spinning, weaving and finishing textiles[b]	8	-	1	7	Intermediate
3215	Cordage, rope and twine industries[b]	2	-	-	2	Intermediate
3311	Sawmills, planing and other woodmills	6	-	2	4	Intermediate
3529	Chemical products, N.E.C.	2	-	1	1	Intermediate/ Consumer Good
3551	Tyre and tube industries[b]	2	-	1	1	Intermediate
3692	Cement, Lime and plaster[b]	8	-	-	8	Intermediate
3699	Non-metallic mineral products	2	-	1	1	Intermediate
3839	Electrical apparatus and supplies, N.E.C.	3	-	2	1	Intermediate
	C. 1- and 2- Shift Operation					
3114	Canning, Preserving and Processing of Fish	2	2	-	-	Consumer Good
3300	Furniture and Fixtures	3	2	1	-	Consumer Good
3522	Drugs and medicines	2	1	1	-	Consumer Good
3833	Electrical apparatus and nonsewares	2	1	1	-	Consumer Good

[a] Includes only industries with 2 or more observations

[b] "Continous process" industries

no real institutional constraints nor insurmountable obstacles for a firm which is presently on 1-shift operation to go on multiple shiftwork. At present, the garments industry has been the focus of much interest of policymakers and development planners not only because of the industry's relative labor intensiveness but equally so due to its potential as a steady foreign exchange earner.

It is equally important to note that "continuous process" industries like cement, textile and cordage predominate the high capital-using industries, defined here as firms which are alternatively on 2- and 3- shift operation.

CUR*s by Various Classification

It is generally viewed that dependence on imported inputs restricts the utilization of installed machinery and equipment. The implicit assumption, of course, is that for the LDCs, most of which have embarked on import-substitution industrialization strategy at one time or another the more overriding constraint to full utilization is imported input shortages.

To show the relationship between the level of capital utilization and the degree of import dependence, the 91 surveyed firms were categorized into three groups based on the proportion of the firm's imported raw materials to total inputs, namely: (1) import dependent (61-100 percent), (2) intermediate (31-60 percent) and (3) domestic resource-based (0-30 percent).

Table 6 gives the set of average CUR*s by degree of imported raw-material dependence. The figures in parenthesis are the number of observations in each category.

TABLE 6

CUR* BY DEGREE OF IMPORTED RAW-MATERIAL DEPENDENCE

Category	Average CUR*	Significance of difference from import dependent, (per cent)
Import-dependent (30)	56.02	-
Intermediate (24)	45.17	10
Domestic-resource based (37)	54.82	Less than 40

One surprising finding of the study is that the average level of capital utilization in the domestic-resource based firms is not significantly different from the average CUR* of the heavily import-dependent firms. Undoubtedly, the average CUR* of the import-dependent firms, the highest among the three major groupings, has been pulled up somehow by the utilization rates of a number of re-exporting firms in the garments and electronics industries.

Product end-use has been seen to influence the levels of utilization of manufacturing firms. In general, consumer-goods firms are conceded to have higher levels of capital use than capital goods and intermediate goods. Unfortunately, the theoretical discussions and empirical evidences on the effect of end use on full utilization are mixed and inconclusive.[3] In Pakistan, G. Winston (1971a) was able to show that the average capacity utilization figures for consumption- and intermediate-goods firms are not significantly different from the average capacity utilization rates of capital-goods firms.

Disaggregating the 91 GFEO firms into capital goods, intermediate goods and consumption goods, the results on the test of differences of the means of the three groups are reported in Table 7.

TABLE 7

CURs* BY END USE

Category	Average CUR*	Significance of Difference from Capital Goods (Percent)
Capital (33)	35.59	-
Intermediate (33)	61.60	5
Consumption (55)	48.29	20

The results show that while the average utilization rate of consumption-goods firms is much higher than that of the capital-goods firms, the difference between the two is not significant at the conventional level. The average CUR* of the intermediate-goods firms is unmistakably higher than the capital goods firms and the difference in means is statistically significant at 5 percent level. The much higher average CUR* in inter-

mediate-goods firms can be explained by the heavy concentration of "continuous" and "batch" process industries -- for example, cement, synthetic resins and textiles -- in this group.

Alternative Estimates of Capital Utilization

The alternative estimates of capital utilization measures -- CUR, CUR* and CUR^m -- are reported in Table 8. The estimated capital utilization rates tend to substantiate the generally held view on the presence of upward bias in "subjective" measures of capital utilization. Although not totally unexpected, the results show that the "subjective" CUR, in some cases, are three or even four times higher than the adjusted time utilization rate (CUR*).

A plausible explanation for this upward bias in the "subjective" measure of CUR is that one of the requirements before an existing BOI-registered firm may be allowed to tax- and duty-free importation of capital equipment is that they are presently operating close to 100 percent of their total existing capacity.

Also a comparative analysis between the time utilization rate (CUR*) and the "subjective" measure

Table 8

CUR* BY DEGREE OF IMPORTED RAW-MATERIAL DEPENDENCE

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Import-dependent	(30)	56.02	-
Intermediate	(24)	45.17	10
Domestic-resource based	(37)	54.82	Less than 40

of capital utilization (CUR^m) gives some insights on the extent of "planned" capital idleness in some industries. By comparing CUR* and CUR^m in Table 9 and interpreting the wide divergence (about 30 or more) between the two measures as some indication of "planned" idleness, then some degree of "built-in" capital idleness are apparent in the following industries: canning, preserving and processing of fish; wood and cork products; canning and preserving of fruits and vegetables; drugs and medicines; musical instruments; plastic products; fabricated metal products; paints, varnishes and lacquers; wearing apparel; electrical appliances and housewares; and, furnitures. However, knowing the inherent limitations of the "subjective" measure of capacity utilization,[4] the absolute difference between CUR* and CUR^m as a measure of planned idleness must be viewed with caution.

THE DETERMINANTS OF CAPITAL UTILIZATION

The main objective of this section is to identify the statistically significant determinants of capital utilization in government favored export-oriented firms employing data obtained in our survey interviews of 91 firms registered with the Board of Investments. A corollary objective is to test the hypothesis that certain public policy-related variables -- export orientation, capital intensity, imported raw-material dependence and wage rate, among others -- affect the capital utilization rate in GFEO firms.

A number of empirical studies tending to throw some light on the course of capital underutilization in typically capital-poor economies have been undertaken in recent years. Among these recent works are: Y.C. Kim and J.K. Kwon (1973), F. Thoumi (1972), G. Winston (1971a), and S. Paul (1971).

All these studies used multiple regression analysis to determine which variables affect capital utilization most in their respective country of study.

The present work differs from the above studies in two ways. Firstly, the firms covered in the survey interview can be characterized as generally large, export-oriented firms which are currently receiving government assistance, while the studies of Kim and Kwon, Winston, Thoumi and Paul tend to encompass the whole manufacturing sector of Korea, Pakistan, Colombia and India, respectively. Secondly, we are employing micro-data for individual firms, while the above studies -- except Thoumi's -- employ fairly aggregative data.

The Model

The basic model can be summarized as follows:

$$CUR^* = f(X,S,Z,MS,K/L,IC,HWR,PE,FT)$$

where:

CUR* = capital utilization rate, adjusted for sectional and intensity use

X = export orientation, proportion of exports to total product; in percentage units

X = total sales, in thousand pesos

Z = seasonality: a dummy variable, 1 if the demand is steady and 0 if it is not steady

MS = market structure; a dummy variable: 1 for monopoly, 2 for tight oligopoly, 3 for loose oligopoly, and 4 if competitive

K/L = capital-labor ratio, measured as fixed assets divided by the number of production workers in a typical day-shift; in thousand pesos

IC = imported raw-material dependence, measured as ratio of total imported inputs to total inputs; in percentage units.

HWR = hourly wage rate, in pesos

PE = plants expansion, measured as 1975 less year of last major expansion

FT = foreign technology, another dummy variable: 1 if firm ownership is foreign or mixed; 0 otherwise

The expected effects of these explanatory variables upon capital utilization were then:

Regression results

$$\frac{\partial CUR^{e}}{\partial X} > 0 \; ; \quad \frac{\partial CUR^{e}}{\partial S} > 0 \; ; \quad \frac{\partial CUR^{e}}{\partial E} > 0$$

The relevant regression equation are summarized in Table

$$\frac{\partial CUR^{e}}{\partial K/L} \gtrless 0 \; ; \quad \frac{\partial CUR}{\partial K/L} > 0 \; ; \quad \frac{\partial CUR^{e}}{\partial K/C} < 0$$

$$\frac{\partial CUR^{e}}{\partial MKR} < 0 \; ; \quad \frac{\partial CUR^{e}}{\partial PE} > 0 \; ; \quad \frac{\partial CUR^{e}}{\partial PI} \gtrless 0$$

Equation (3.10) that the ... included variables together explained only about 28 percent of the variation in capital utilization in the government favored export-oriented firms.

Regression equations showing the statistically significant determinants of capital utilization based on the pooled inter-industry cross section data for 81 government favored export-oriented firms were estimated using the ordinary least squares method.

The procedure is to explain capital utilization on the basis of as many explanatory variables as possible with an eye on their respective t-values and expected signs. To make sure that no linear dependence exists between the explanatory variables, the independent variables were regressed against each other. No two explanatory variables were found to be collinear except K/L and Assets (A) which I had planned to use as a proxy variable for size. I have calculated a high correlation coefficient of K/L and A equal to 0.55672. For both statistical and theoretical grounds, A was dropped in favor of K/L in the reported specifications.

level or higher. The significant determinants of capital utilization are: capital/labour ratio, sales and market structure.

In equation (3.10), capital utilization is explained in terms of four variables: export orientation

Regression Results

The relevant regression equation are summarized in Table 9.

Equation (1.10) shows that the nine included variables together explained only about 28 percent of the variation in capital utilization in the government favored export-oriented firms.

As the regression results indicate, only three out of nine explanatory variables estimated have statistically significant coefficients at the 5 percent level or higher. The significant determinants of capital utilization are: capital/labor ratio, sales and market structure.

Export orientation and age of plant expansion have the expected signs and are statistically significant at 20 percent level or higher. Four other variables -- seasonality, imported raw-material dependence, hourly wage rate and foreign technology -- were found to be statistically insignificant.

In equation (3.10), capital utilization is explained in terms of four variables: export orientation,

TABLE 9

SUMMARY OF REGRESSION RESULTS
POOLED INTER-INDUSTRY CROSS SECTION DATA FOR 91 GOVERNMENT 'FAVORED' EXPORT-ORIENTED FIRMS, 1972

t	X	S	Z	MS	K/L	IC	HWR	PE	FT	S	R^2	F
	0.11255 (1.650)***	0.00026 (3.015)*	3.80271 (0.754)	-7.11824 (2.634)**	0.01850 (2.960)*	-0.02120 (0.278)	0.01392 (0.222)	0.047152 (1.638)***	-7.56248 (1.267)	21.399	0.283	
	0.09653 (1.534)***	0.00027 (3.284)*	3.47225 (0.713)	-5.48797 (2.435)**	0.01872 (3.079)*					21.439	0.245	3.556
	0.10071 (1.612)***	0.00028 (3.509)*		-5.38598 (2.401)**	0.01751 (3.008)*					21.378	0.240	5.515
	0.08750 (1.402)***	0.00028 (3.445)*		-5.41310 (2.436)**	0.01796 (3.110)*			0.45931 (1.622)***		21.178	0.263	6.805
	0.09985 (1.585)***	0.00029 (3.459)*		-5.58011 (2.267)**	0.01735 (2.934)*	-0.01453 (0.197)				21.498	0.241	6.073
	0.10066 (1.601)***	0.00028 (3.439)*		-5.39363 (2.386)**	0.01757 (2.942)*		-0.00324 (0.053)			21.503	0.240	5.391
	0.12976 (1.946)***	0.00028 (3.441)*		-6.64402 (2.699)*	0.01724 (2.968)*				-7.08759 (1.223)	21.317	0.254	5.382

5.775

ranthesis under the regression coefficients are t-values.

** or *** indicates that the slope coefficient is significantly different from zero at the 1-%, 5-% or 20-% level, respec

to have higher capital utilization rates. Big firms have undue advantage over small firms in various ways: good management, better technological knowhow and greater socio-political power in terms of getting things done, for instance, easier access to loans and import licenses.[5]

The uniform negative sign of market structure (MS) is an interesting but not totally unexpected result, suggesting that as the number of firms increases, capital utilization decreases. On purely theoretical grounds, one would expect that monopoly or oligopoly would lead to lower utilization of capacity.[6] One plausible explanation for this is the oligopolistic set-up in most BOI-favored industries. This is so in the case of cement, textile, food, synthetic resins, paints, manufacturing equipment and electronics industries. Given the very limited size of the domestic market, these industries were served by a few rather than a competitive number of firms. In a sense, therefore, the outcome can be viewed as a comparison between perfect competition. To some extent, the result would also tend to validate the view that demand uncertainties in an oligopolistic setting would cause

excess capacity.[7]

Capital-labor ratio, being used here as a measure of capital intensity, entered the regression equation with a positive sign. The policy implication of this finding is revealing. Getting the same result in his study of capital utilization in West Pakistan, G. Winston noted: "That this relationship is positive slightly weakens the case against capital wastage in a developing country that is based on simple unweighted averages of utilization rates, since the largest concentration of scarce capital are found in those sectors where utilization rates are the highest".[8]

That there is a positive relationship between capital intensity and capital utilization suggests that firm managers are acting as rational economic men in their determination of their levels of capacity. In their theoretical paper, Kim and Winston (1972) postulates that the condition for a 2-shift operation involving $\bar{K}$ (where $\bar{K}$ is the stock of capital) to be more profitable than a 1-shift operation involving $2\bar{K}$ is for the daytime relative factor share i.e., the share of capital with respect to the share of labor in a one-shift operation

to be greater than the percentage night-work wage-premium.[9]

Holding the four variables of (3.10) constant and adding PE, the age of plant expansion, yielded equation (3.11). Although the coefficient of PE is statistically insignificant at the conventional 5 percent level, (3.11) is reported to show the likely effect of the age of the firm on capital utilization.

The age of plant expansion is used here as a proxy for the age of the firm. On the assumption that building ahead of demand is common among the firms surveyed then excess capacity fades out as demand increases. F. Thoumi observes that the age of plant (PE) also "reflects the advantages of older firms anytime that the learning-by-doing process is important".[10]

Three other policy-related variables -- imported raw-material dependence, hourly wage rate and foreign technology -- were alternatively used as explanatory variable as shown in (3.12), (3.13) and (3.14) but were found to be statistically insignificant. On a priori grounds, capital utilization rate is expected to decrease with import dependence on raw materials (IC) and hourly wage rate (HWR).

The effect of foreign technology on capital utilization cannot be easily predicted. There are intuitively appealing theoretical interpretations and mixed empirical evidence on both the positive or negative effect of foreign technology on industrial capital utilization but it is not necessary to enter into such discussion since the coefficient of FT, which incidentally has been consistently negative in the numerous regressions ran, is not statistically significant.

FACTORS AFFECTING CAPITAL UTILIZATION

Without discounting the usefulness of the regression results, the need to go beyond the statistically-best explanatory variables of capital utilization in government-assisted firms justifies this discussion on the reasons for capital idleness as seen by people who are perhaps in the best position to know why their installed machinery and equipment are not being utilized all the time.

One obvious drawback of the survey method is that respondents are generally influenced by the most recent developments and would tend to limit their answers to the more apparent and direct determinants which need not be the only factors causing capital idleness.

At this point, it should be stated that the year 1972 was not a typical year. Two events of rather considerable magnitude occurred during the year: the July-August floods in Central Luzon and the imposition of martial law in the Philippines in late September.

The July-August catastrophe in Central Luzon and Greater Manila slackened production activities in two ways. Firstly, there was a substantial drop in the domestic demand of a number of commodities -- non-essential consumer goods, for example -- in the disaster area. Secondly, the frequent power failures in addition to the floods in Metropolitan Manila and other outlying provinces necessitated plant shutdowns in a number of firms. The influence of the frequent power interruptions were netted out simply by excluding from the number of idle days those resulting from floods and power failure.

A number of TV companies were shut down during the initial months of the martial law regime thereby affecting adversely the sale of televisions and TV-related intermediate goods. Furthermore, management-labor problems which were prevalent before the imposition of martial law were completely minimized since labor union activities were banned since the declaration of martial law in the Philippines.

In addition to those two major development, Philippine manufacturing firms were faced with increasing power rates and higher interest rates in 1972. Also,

import-dependent industries were continuously pressued from two opposing sides: credit restraints and rising costs of imported inputs.

Reasons for Capital Underutilization

There are various reasons -- not totally unrelated -- for capital idleness in underdeveloped countries. The causes for capital underutilization most frequently cited in the literature are: deficient demand, lack of imported raw materials, competitive practices in oligopolistic markets, shortage of skilled manpower, night shift wage differentials, competition from imports, and others.[11]

As shown in Table 10, the dominant reason given for capital underutilization is deficient demand (41.2 percent) while lack of imported inputs (18.8 percent) and lack of domestic inputs (11.2 percent) rank second and third, respectively.

These results should be analyzed with the understanding that one is dealing with a peculiar group of export-oriented firms, hence, the respondent's perception of what is the more overriding constraint to full capital

TABLE 10

DOMINANT REASONS FOR CAPITAL UNDERUTILIZATION IN GOVERNMENT 'FAVORED' EXPORT-ORIENTED FIRMS

Major Reasons	Number of Reporting Units	Percentage Distribution
Deficient demand	33	41.2
Lack of imported inputs	15	18.8
Lack of domestic inputs	9	11.2
Lack of skilled manpower	4	5.0
Lack of working capital	1	1.3
Other[a]	18	22.5
TOTAL	80[b]	100.0

[a]Reasons like power interruption, floods and other calamities, technical difficulties, Christmas season and Holy Week vacation.

[b]Other firms failed to indicate reasons for capital underutilization. Also, respondents who felt that they are operating 100 percent of full capacity and those whose actual operating level is equal to planned operating level considered the question irrelevant.

utilization need not necessarily apply to non-exporting firms. As an additional note, most of the firms which claimed deficiency in demand as the major reason for capital underutilization are those which have not yet exported or had very minimal exports in 1972. From the above discussion, one could reasonably expect deficient demand to be more pronounced as a reason for capital underemployment in the whole Philippine manufacturing industries.

Another corollary finding is that most GFEO firms are heavily dependent on imported raw materials. Table 11 shows that most firms can be classified as import-dependent. What may be termed as "heavily import-dependent industries" are: ISIC 3116 (Grain mill products), 3211 (Textiles), 3215 (Cordage, rope and twine), 3522 (Drugs and medicines), 3529 (Chemical products, n.e.c.), 3832 (Radio, TV and communication equipment), and 3839 (Electrical apparatus and supplies).

On the other extreme, there are firms which are wholly dependent on indigenous inputs like fish processing and some woodbased industries like wood carving, woodenwares and furnitures. What is noteworthy is that even for

Table 11

ALTERNATIVE ESTIMATES OF UTILIZATION IN GOVERNMENT FAVORED EXPORT-ORIENTED FIRMS

	UTILIZATION RATES (%)		
	CUR	CUR*	CUR^m
3113	53.60	43.55	100.00
3114	21.55	21.55	n.c.
3115	68.50	68.50	n.e.
3116	45.62	45.62	57.00
3119	43.97	43.97	77.36
3121	66.48	63.06	n.c.
3131	72.10	56.37	100.00
3211	82.79	71.93	93.39
3212	47.48	47.28	66.67
3214	27.67	27.67	100.00
3215	78.76	58.10	87.50
3220	55.97	51.58	90.09
3311	71.33	62.85	90.42
3312	28.22	28.22	50.00
3319	18.44	9.22	70.00
3320	45.18	43.52	75.15
3513	62.38	54.96	89.80**
3521	33.20	29.41	68.27
3522	37.81	34.00	90.00
3529	63.46	63.41	82.72
3551	74.48	71.07	81.43
3560	51.03	35.72	76.47
3620	66.56	59.64	76.67
3691	100.00	88.13	102.04**
3692	81.13	76.68	85.42
3699	70.62	65.66	96.88**
3710	60.82	42.57	70.00
3720	50.59	34.97	37.50
3819	57.88	26.32	65.20
3829	44.52	37.68	63.48
3832	25.75	7.73	35.29
3833	39.12	25.76	57.50
3839	71.87	60.16	73.63
3852	99.73	76.96	80.00
3902	27.49	16.49	70.59
3909	54.40	46.50	61.43

NOTES: CUR* - refers to capital utilization adjusted for sectional and intensity use

CUR^m - refers to "subjective" measure of capital utilization

n.c.: not computable, data incomplete

**At least one firm considered actual capacity to be greater than desired "standard" or "normal" capacity level.

the domestic resource-based industries, shortage of raw materials appears to be the most frequently mentioned reason for capital idleness. Some of the inputs which are considered in short supply but are abundant locally are fish and shrimps, logs, wood and coconut.

One striking finding is that while imported raw-material dependence was found not to be statistically significant as an explanatory variable of capital utilization rate, shortages of imported inputs emerged as a constraint to full capital utilization in many industries. There are two plausible reasons for this. One, the inclusion in the sample of a number of re-exporting firms in the garments and electronics industries plus some 8 domestic resource-based cement firms may have obscured the effect of import dependence on capital utilization. Another reason is that, in general, firms with better than average export performance are less constrained by their dependence on imported raw materials due perhaps to the relative ease by which they can purchase the required imported inputs out of their exports earnings.

In this section, the dominant reasons for capital underutilization in selected 3-digit industries are discussed. As shown in Table 12 deficient demand emerges

TABLE 12

DOMINANT REASONS FOR CAPITAL UNDERUTILIZATION, SELECTED INDUSTRIES
(Row Percentages)

ISIC	Industry	Deficient Demand	Lack of Imported Inputs	Lack of Domestic Inputs	Lack Skilled Manpower	Others[a]	Total[b]
311-312	Food, Beverage and Tobacco	40.0	10.0	20.0	-	30.0	100.0
321	Textiles	27.3	45.4	-	-	27.3	100.0
322	Wearing apparel, except footwear	33.3	16.7	16.7	33.3	-	100.0
331	Wood and Cork Products, except Furnitures	-	14.3	42.9	-	42.9	100.1
332	Furniture and fixtures, except primarily of metal	66.7	-	-	-	33.3	100.0
351	Industrial chemicals	40.0	20.0	-	-	40.0	100.0
352	Other Chemical Products	62.5	12.5	-	-	25.2	100.0
369	Cement and structural clay products	77.8	-	-	-	22.2	100.0
383	Electrical machinery apparatus, appliances and supplies	66.7	-	-	16.7	16.7	100.1

NOTES: [a]Reasons like power interruption, floods and other calamities, technical difficulties, Christmas season and Holy Week vacation.

[b]Total may not always add up to 100.0 due to rounding.

as the major constraint to full capital utilization in the following 3-digit industries: food, furniture and fixtures, industrial chemicals, other chemical products, cement and structural clay products, and electrical machinery apparatus. As expected, the problem of deficient demand is most acute in the cement industry.

In the wearing apparel industry, the four major reasons for capital idleness are found to be deficient demand, lack of skilled manpower, and shortages in both imported and domestic raw materials. Since the sample includes a number of reexporting firms, it is very likely that the shortage of imported raw materials may be a constraint to full utilization in the magnitude much bigger than what our data show.

Lack of imported raw materials turns out to be the major reason for capital underutilization in the textiles industry, one of the more heavily import-dependent industries currently enjoying government assistance.

It is evident that the shortage of skilled manpower becomes a dominant reason for capital idleness only in two major industries: ISIC 322 (Wearing apparel)

and 383 (Electrical machinery apparatus, appliances and supplies). As shown in Table 12, institutional factors like employees' vacation during the Christmas and Holy week seasons partly influence the level of capital utilization in almost all industries, except in ISIC 322 (Garments).

Capital Utilization and Factor Intensity

The econometric results show that capital utilization increases with the firm's capital-labor ratio, implying that higher CURs* are found in industries where scarce capital are heavily concentrated. There are two plausible explanations for the high levels of capital utilization rates in the relatively capital intensive firms. Secondly, there may be some real efforts on the part of production managers and plant owners -- acting like rational "economic" men -- to operate the plant more intensively due to the high opportunity cost of interruption in production.

In the course of the survey, plant owners and production managers were asked the questions, "Is it difficult or expensive to shut the plant down and interrupt production for a short period, say 24 hours? Why?" The

answers to these questions are summarized in Table 13. Of the 91 production managers, 72 considered plant shutdown, even for 24 hours, rather costly. Significantly, most of those who felt plant shutdown to be expensive come from the capital- and intermediate-intensive firms.

Three different though not unrelated reasons why plant shutdown is expensive would already account for most of the respondents' perception of why a short stoppage in the production activity is costly. The 3 major reasons given are: high opportunity cost of interruption in production (44.4 percent), nature of production in "continuous" and "batch" process industries (36.1 percent) and unfulfilled demand schedule resulting in loss of clienteles (5.6 percent).

The results in Table 14 illustrate the wide divergence between the views of respondents from selected capital intensive firms vis-a-vis the respondents from some labor intensive firms, the comparison limited to industries where there are at least 3 reporting units. For instance, it appears that a 24-hour interruption in production activity would be extremely costly for ISIC 3311 (Sawmill, planing and other woodmills) but not so in a closely related but relatively labor intensive industry (Furnitures).

TABLE 13

RESPONDENT'S VIEWS ON THE 'COST' OF PLANT SHUTDOWN[a]

Factor Intensity	Number of Reporting Firms	YES	NO	REASON(S) FOR YES RESPONSE[b] (1)	(2)	(3)	(4)	(5)	(6)	(7)	REASON(S) FOR NO RESPONSE[c] (1)*	(2)*	(3)*	(7)
Capital Intensive	54	46	8	20	1	18	2	1	-	4	2	2	1	3
Intermediate	21	17	4	8	3	4	1	-	-	1	1	-	-	3
Labor Intensive	16	9	7	4	1	3	-	-	1	-	-	-	-	6
TOTAL	91	72	19	32	4	26	3	1	1	5	3	2	1	12

Notes: [a]Actual text of question: Is it difficult or expensive to shut the plant down and interrupt production for a short period, say 24 hours?

[b](1) High opportunity cost of interruption in production
(2) Unfulfilled demand schedule (foreign and domestic) resulting in loss of clienteles
(3) Nature of production process: high power consumption for "start-up" operation is incurred; spoilage of raw materials ensues.
(4) Both reasons (1) and (2) cited.
(5) Both reasons (1) and (3) cited.
(6) Other reasons.
(7) Reason(s) not indicated.

[c](1)* Nature of production process allows for interruption without costly damage or difficulty.
(2)* Deficient demand calls for a slowdown in production.
(3)* Other reasons.

TABLE 14

RESPONDENT'S VIEWS ON THE 'COST' OF PLANT SHUTDOWN, SELECTED INDUSTRIES[a]
(Row Percentages)

ISIC	Industry	Number of Reporting Units	Yes	No
	A. Capital Intensive			
3119	Cocoa, chocolate and sugar confectionery	4	75.0	25.0
3211	Spinning, weaving and finishing textiles	8	87.5	12.5
3311	Sawmill, planing and other woodmills	6	100.0	0.0
3513	Synthetic resins	5	100.0	0.0
3521	Paints, lacquers, thinners	4	100.0	0.0
3692	Cement, lime and plaster	8	100.0	0.0
3829	Machinery and equipment except electrical, N.E.C.	3	66.7	33.3
	TOTAL	35	92.1	7.9
	B. Labor Intensive			
3220	Wearing apparel, except footwear	8	62.5	37.5
3320	Furnitures	3	33.3	66.7
3839	Electrical apparatus and supplies	3	33.3	66.7
	TOTAL	14	50.0	50.0

[a]Actual text of question: Is it difficult or expensive to shut the plant down and interrupt production for a short, say 24 hours?

Government Policies Affecting Capital Utilization

Government postwar incentives legislation dates back to 1946 with the passage of Republic Act 35. Since that time a number of legislation giving incentives to Philippine manufacturing industries had been enacted: Republic Act 901 (1951); Republic Act 3127 (1961), otherwise known as Basic Industries Act; Republic Act 5186 (1967), otherwise known as Investment Incentives Act; Republic Act 5490 (1970), Creating the Foreign Trade Zone Authority; and Republic Act 6135 (1970), otherwise known as Export Incentives Act.[12]

The above list is by no means comprehensive for there are other laws and executive orders affecting domestic manufacturing industries during the postwar period. In fact, one can state that the government during the whole postwar period had extended fiscal and other forms of assistance to almost all industries ranging from the most capital-intensive (cement, textile, paper products, transport equipment, for example) to the most labor-intensive (cottage industries like embroidery, woodcraft and shellcraft, for example).

In G.P. Sicat (1967, 1968a, 1968b) and the Comprehensive Economic Survey Mission (1973) report, it has been shown that the past and present government policy-mix -- tax and tariff, interest rate, wage and foreign exchange -- had the effect of keeping the price of capital artificially low, thereby making the private cost of capacity build-up relatively inexpensive. The highly protected domestic market and the implicit high rate of return facilitated the entry of many firms, each running at substantially less than full capacity.

The incentives given in the past cannot be ignored altogether since the present characteristics of the domestic market are carry-overs of the industrialization policy in the past. Also, a number of industries which were developed during the import-substitution phase in Philippine economic development are presently included in either the Investment Priorities Plan or Export Priorities Plan of the Board of Investments. Notable examples are the cement and textile industries. This is so since one of the objectives of the Export Priorities Act is to encourage the utilization of excess manufacturing capacities for exports.

Table 15 gives a comparative picture of the level of capital utilization in two sub-groups (GFEO firms and non-BOI firms), the comparison limited to 4-digit industries where there are at least two reporting firms in both sub-groups. It is evident that the CURs* in GFEO firms are higher than their respective counterparts in 13 out of 14 industry groups, with ISIC 3119 (Cocoa, chocolate and sugar confectionery) as the only exception.

As shown in Table 15, the observed average levels of capital utilization in GFEO firms are higher than the non-BOI firms at the 10 percent level or better in the following industries: ISIC 3211, 3220, 3311, 3320, 3699 and 3839. The observed differences in the average CURs* of the two groups of firms are found not statistically significant in the following subindustries: ISIC 3119, 3121, 3521, 3522 and 3692. At a relatively low 20 percent level of significance, the observed average capital utilization rates in GFEO firms are significantly higher than their respective counterparts in the following industry groups: ISIC 3513, 3551 and 3620.

TABLE 15

COMPARATIVE CURs* OF BOI AND NON-BOI FIRMS
(Per cent)

ISIC	Industry	Capital Utilization Rates		Computed T-value	d.f.
		BOI-EPP Firms	Non-BOI Firms		
3119	Cocoa, chocolate and sugar confectionery	43.97	53.74	-0.4959	4
3121	Food products, not elsewhere classified	63.06	52.73	0.5637	13
3211	Spinning, weaving and finishing textiles	71.93	45.99	2.5138[a]	18
3220	Wearing apparel, except footwear	51.58	23.26	2.5590[a]	10
3311	Sawmills, planing and other wood mills	62.85	31.56	2.9871[a]	15
3320	Furnitures and fixtures, except primarily of metal	43.52	29.74	1.4219[b]	10
3513	Synthetic resins, plastic materials	54.96	36.54	1.1474[c]	6
3521	Paints, varnishes and lacquers	29.41	17.24	0.6394	4
3522	Drugs and medicines	34.00	31.71	0.2121	12
3551	Tyre and tube industries	71.07	51.94	1.0794[c]	3
3620	Glass and glass products	59.64	32.53	1.0412[c]	9
3692	Cement, lime and plaster	76.68	76.43	0.0256	9
3699	Non-metallic mineral products, N.E.C.	65.66	26.12	2.3199[a]	6
3839	Electrical apparatus and supplies, N.E.C.	60.16	36.96	1.6249[b]	4

[a]Significant at 5-% level or better.
[b]Significant at 10-% level.
[c]Significant at 20-% level.

Still on the basis of the available information, it is unsound to attribute the high levels of CURs* in the government-favored export-oriented firms to government assistance alone. As shown earlier capital intensity, size of firm and export orientation affect the level of capital utilization positively. And comparing the two subgroups, the GFEO firms can be shown to be relatively more capital intensive, bigger both in terms of employment and sales, and higher in absolute export level.

One possible way to isolate the influence of government assistance on the level of capital utilization is by pooling all the 400 observations in the NEDA-sponsored capital utilization survey referred to earlier and including a dummy variable valued at one for GFEO firms and zero for firms not registered with the Board of Investments. However, this problem is not being pursued in this study.

THOUGHTS ON THE POLICY IMPLICATIONS OF THE STUDY

Export expansion as a deliberate government policy can be made to achieve one or a combination of the following developmental goals: increase in the country's foreign exchange earnings, employment generation, and reduction of excess capacity in the manufacturing sector.

While the study is focused mainly on the nature and extent of capital idleness in government favored export-oriented firms, still one can already make some broad inferences from the survey results on the possible impact of the present export promotion offensive on foreign exchange earnings and employment generation. The information at hand suggests the very limited prospect of employment generation through increased production activity in the GFEO firms. This is so since most of the "new" manufactured exports in the Board of Investment's priority list can not be labelled labor intensive. Only in a few industries, notably garments, electronics and furniture, does the prospect of increased employment look promising.

There is also reason to be skeptical about the possibility of relying on the "new" manufactured exports as a steady source of foreign exchange. From the observed heavy dependence of most GFEO firms on imported raw materials, it is most likely that the expected substantial net foreign exchange earnings from these manufactured exports may not be forthcoming. It is therefore appropriate to dampen the current optimism with which the foreign exchange-generating ability of new manufactured exports is regarded by stating that in the many more years to come, it seems that the Philippines will still have to rely on her traditional agriculture-based exports (e.g., sugar, logs and lumber) for her foreign exchange needs.

It should be clear that the 3 developmental goals mentioned earlier need not always be complimentary. Under some conditions, the very real possibility of a "trade-off" between any two goals can be observed. For instance, the goal of full utilization of installed machinery in inherently import dependent, capital intensive industries (e.g., textile and cordage and rope) may conflict with the goal of employment generation.

One possible policy issue is: Should the government liberalize the importation of inputs in critical supply or should it refuse capital intensive firms access to scarce foreign exchange? For obvious reasons, the social benefits of a policy of full utilization which would require the allocation of scarce capital and foreign exchange to capital-intensive firms should be weighed against the social cost corresponding to the employment opportunities foregone had the same resources been committed to some medium-scale, labor-intensive firms.

As the results of the survey interviews indicate, capital utilization in GFEO firms depends to a large extent on the constant flow of imported raw materials. What is surprising, however, is that supply bottlenecks are also noticeable in the following domestic resource-based industries: fish processing, coconut oil, and some woodbased industries like wood carving, woodenwares and furnitures. In addition, skilled manpower are found to be in short supply in two relatively labor intensive industries: garments and electronics.

Deficient demand, contrary to expectation, emerged as a strategic determinant of capital utilization.

Of course, the a priori conjecture is that deficient demand will be less relevant to this group of government favored export-oriented firms, partly due to its wider market base and partly due to its relatively easy access to scarce capital and foreign exchange.

The policy implications of the above finding are many. For one, it gives us some broad insights on how crucial bottlenecks in product demand is in the Philippine manufacturing sector as a whole. It also tends to support the view that the industrialization policy in the past have provided a climate of easy entry, resulting in widespread excess capacity in several industries. Significantly, this finding is validated by the consistent negative sign of market structure in the numerous regression runs, implying a decrease in the level of capital utilization as the number of firms in any given industry increases. This emphasizes the real basic need to widen the market base -- by stimulating domestic demand and/or a vigorous export promotion drive. In the long run, one of the possible investment policies might well be the establishment of a "controlled" monopoly rather than an oligopoly in industries where the size of the domestic market appears

to be too small even for a few competing firms. Government control may be instituted by requiring the monopolistic firm to open up ownership to end-users and consumers, by price setting, and by threatening to allow importation of similar products.

While sales is fittingly related to the problem of product demand, it is also used in the regression exercises as a proxy for the size of the firm. The econometric results imply that the larger the firm, the higher the level of capital utilization. This is to be expected since big firms have inherent advantages over small firms in a number of ways: good management, technological know-how and greater socio-political power in getting things done, for instance, easier access to loans and import licenses. If indeed, it is socially desirable to favor medium-scale and small-scale industries presumably due to its higher potential employment effect, then government assistance must be aimed at neutralizing the inherent advantages of big firms. In broad terms, government assistance may come in the form of consultancy and extension services, provision of capital, the development of management skills and organization of retraining schemes for workers in selected industries.

NOTES

[1]The World Bank, for instance, is presently undertaking studies on capital utilization in four countries: Colombia, Israel, Malaysia and the Philippines. A research group headed by Dr. Romeo M. Bautista of the U.P. School of Economics, is conducting the study on capital utilization in Philippine manufacturing industries jointly with the National Economic and Development Authority. In a sense, the present study is a subset of this government-supported research.

[2]A. Phillips (1970), p. 21.

[3]For a more elaborate discussion, see G. Winston (1971a), pp. 49-50.

[4]For a detailed discussion on some of the limitations of the "subjective" measure of capital utilization, see A. Phillips, .An Appraisal of Measures of Capacity," The American Economic Review, Vol. LIII (May, 1963).

[5]Capacity utilization is also positively correlated with firm size in the studies of G. Winston (1971a) and S. Paul (1971).

[6]See, for instance, Chamberlin (1943).

[7]A. Hirschman (1967) argues that uncertainties of demand may lead to overinvestment in new investment projects.

[8]G. Winston (1971a), p. 43.

[9]Kim and Winston argue that if the maximum daily output of the firm were Q, the total cost of producing one-half of Q by daytime operation would be

$$C = P_K \bar{K} + P_L \bar{L} \qquad (1)$$

where C = total cost of producing one-half of Q
P_k = cost of owning a unit of capital stock
K^k = stock of capital
P_L = wage payment per worker for a daytime shift of work
$\bar{L}$ = stock of labor at work at any moment

Equation (1) presents two alternatives for producing the daily output of Q. The first alternative is to employ twice the size of $\bar{K}$ and $\bar{L}$ in (1) on one shift operation (H=1), which is

$$2 \quad (P_K\bar{K} + P_L\bar{L}) \tag{2}$$

The second alternative is to work two shifts (H=2) with the same $\bar{K}$ and $\bar{L}$ in (1). The total cost of producing Q with a high utilization (H=2) is

$$P_K\bar{K} + P_L\bar{L} + P_L \ (1 + B) \ \bar{L} \tag{3}$$

where β is the night-work wage-premium in percent. $P_L\bar{L}$ is the wage payment to daytime workers and $P_L \ (1+\beta)\bar{L}$ to nightime workers.

The 2-shift method (i.e., higher H and smaller $\bar{K}$) is preferable to 1-shift operation if

$$2 \ (P_K\bar{K} + P_L\bar{L}) \quad P_K\bar{K} + P_L\bar{L} + P_L \ (1 + \beta) \ \bar{L} \tag{4}$$

By rearranging the terms in (4) and dividing throughout by $P_L\bar{L}$ (>0) we find

$$\frac{P_K\bar{K}}{P_L\bar{L}} > \beta \tag{5}$$

where the left-hand term of (5) is the daytime relative factor intensity.

[10] F. Thoumi (1972), p. 8.

[11]For a more comprehensive discussion on each or a combination of these reasons, see G. Winston (1971a, 1971b), F. Thoumi, (1972) and R. Marris (1964).

[12]A brief summary of postwar incentives legislation is given in "A Design for Export-Oriented Industrial Development," in G.P. Sicat (1972), pp. 16-21.

References

Bautista, Romeo M. "Capital Coefficients in Phi... Manufacturing: An Analysis," The Philippin... Economic Journal (Second Semester, 1966), pp. 205-227.

_____ "Employment Effects of Export Expansion in the Philippines," IEDR Discussio... Paper 73-15, School of Economics, U.P., August 30, 1973.

_____ "Notes Toward the Collection of Capacity Utilization Data for Philippine Manufacturing," IEDR Discussion Paper No. 72-10, School of Economics, U.P., May 11, 1972. (a)

_____ "On Excess Capacity in Philippine Manufacturing," IEDR Discussion Paper No. 72-22, School of Economics, U.P., July 28, 1972. (b)

Chamberlin, Edward H. Theory of Monopolistic Competition. Cambridge: Harvard University Press, 1943. Fifth Edition.

Comprehensive Economic Survey Mission, Sharing in Development: A Programme of Employment, Equity and Growth for the Philippines. International Labour Office, 1973. (mimeo).

Farooq, Ghazi M. and Winston, Gordon C. "Shift Working, Employment and Economic Development: A Study of Industrial Workers in Pakistan," Center Discussion Paper No. 181, Economic Growth Center, Yale University, June, 1973.

Foss, M.F. "The Utilization of Capital Equipment: Post-war Compared with Prewar," Survey of Current Business, XLIII, (June 1963), pp. 8-16.

Hirschman, A.D. Development Projects Observed, Washington, D.C. The Brookings Institution, October 1967.

Indexes to the International Standard Industrial Classification of All Economic Activities. (New York: Statistical Office of the United Nations, 1971).

Kim, Young Chin "Sectoral Output-Capital Ratios and Levels of Economic Development: A Cross-Sectional Comparison of Manufacturing Industry," Review of Economics and Statistics (November, 1969).

Kim, Y.C. and Kwon, J.K. Capital Utilization in Korean Manufacturing, 1962-1971: Its Level, Trend and Structure. Agency for International Development, 1973. (mimeo.)

Kim, Y.C. and Winston, G.C. "The Optimal Utilization of Capital Stock and the Level of Economic Development," December 1972, (mimeo.)

Klein, L.R., "Some Theoretical Issues in the Measurement of Capacity," Econometrica, Vol. XXVIII (April, 1960).

Klein, L.R., and R. Preston, "Some New Results in the Measurement of Capacity Utilization," American Economic Review (1965).

Marris, Robin The Economics of Capital Utilization: A Report on Multiple-Shift Work. Cambridge: Cambridge University Press, 1964.

Mason, R.H., "Some Aspects of Technology Transfer: A Case Study Comparing U.S. Subsidiaries and Local Counterparts in the Philippines," The Philippine Economic Journal, (First Semester, 1970).

"1,000 Top Philippine Corporation," The Business Day, 1973.

Paul, Samuel. "Industrial Performance and Government Controls," 1971 (mimeographed).

Phillips, Almarim. "Measuring industrial capacity and capacity utilization in less developed countries," Industrialization and Productivity Bulletin, No. 15, UNIDO, 1970, pp. 16-21.

Sicat, G.P. "An Analysis of the Investment Incentives Act of 1967," IEDR Discussion Paper 67-5, U.P. School of Economics, June 20, 1967.

Sicat, G.P. "Economic Incentives, Industrialization and Employment in the Developing Economies," IEDR DISCUSSION Paper 68-30, U.P. School of Economics, September 29, 1968. (a)

_____ Economic Policy and Philippine Development. Quezon City: University of the Philippines Press, 1972.

_____ "Towards Industrial and Employment Expansion: Alternative Proposals for Economic Incentives Legislation Applied to Export and Industrial Promotion," IEDR Discussion Paper 68-22, U.P. School of Economics, July 5, 1968. (b)

Thoumi, Francisco E. "Industrial Capacity Utilization in Colombia: Some Empirical Findings," IEDR Discussion Paper No. 14, Center for Economic Research, University of Minnesota, April 1972.

Williamson, Jeffrey S. "Capital Accumulation, Labor Saving, and Labor Absorption Once More," Quarterly Journal of Economics, LXXXV (February, 1971), pp. 40-65.

Winston, Gordon C. "Capital Utilization in Economic Development," Economic Journal, LXXXI (March 1971), pp. 36-60. (a)

_____ "The Four Reasons for Idle Capital," Karachi: September, 1971, (mimeo.) (b)