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GOVERNMENT EXPORTS INCENTIVES AND CAPITAL UTILIZATION IN PHILIPPINE MANUFACTURING

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1. Introduction

The influx of studies on capital utilization in less developed countries (LDCs) may be viewed as a response to the awareness that while capital shortage in LDCs continues to be the focus of 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, Winston (1971) showed that the level of industrial capital utilization was about 14 per cent. Paul (1971) approximated the average capacity utilization in India during the period 1961-1971 at 53 per cent. In Colombia, Thoumi (1972) found the nonweighted average capacity utilization in the magnitude of 51 per cent. In their study of South Korean manufacturing sector, Kim and Kwon (1973) showed that the average utilization rate during the period 1968-70 was about 16 per cent. Although these estimates are not exactly comparable, they all indicate the proportion of time that installed capital and machinery were being operated on the average.

If fuller utilization of existing capital is considered socially desirable in less developed countries, public policy and development planning should be concerned not only with narrowing the divergence between actual from desired utilization. A deliberate policy of incentives and disincentives must also be designed so that intended capital idleness is minimized. Such policy will increase labor use and decrease capital-ouput ratio.

Using cross-section data from the 1973-1974 Survey on Industrial Capital Utilization in the Philippines, this paper seeks to test whether the determinants of capital utilization have the same marginal effects for both government 'favored' export-oriented firms (GFEO) and those firms not directly receiving government assistance. That is, can the two sets of data be regarded as belonging to the same linear regression model?

Why is there a need to make this distinction and disaggregate the data? For one, as shown in two studies (Bautista, 1972; Diokno, 1974), capital utilization in government 'favored' export-oriented firms is

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significantly higher than in the non-government 'favored' firms (NGF). Bautista (1972) showed that the average utilization rate of the manufacturing firms registered with the (Philippine) Board of Investments is 53.47 per cent, which is much higher than the observed capital utilization rate for the non-registered firms (37.70 per cent).

From the public policy viewpoint, knowing the determinants of capital utilization in the GFEO firms and the NGF firms, separately, could result in a more "correct" policy prescription. In addition, on a *quid pro quo* basis, the government can institute corrective actions more directly, and with less delay, on the GFEO firms than on NGF firms.

A study explicitly taking foreign trade as a possible avenue for increasing capital use has considerable payoffs for a typically poor, foreign-exchange constrained LDC, especially if such LDC is embarking on a program of promotion of "new" manufactured exports and at the same time faced with a high level of excess capacity in its manufacturing sector. To determine the most effective manufactured exports promotion policy, it is important to know the level and the potency of the determinants of capital utilization in Philippine manufacturing industries and in particular, the GFEO firms. Since if the marginal effects (or elasticities) differ for the two groups, then drawing policy conclusions for both the GFEO and the NGF firms from an equation fitted to show the marginal effects of the determinants of capital utilization in the whole manufacturing industry becomes inappropriate and could lead to erroneous policy prescription.

In the study, government 'favored' export-oriented (GFEO) firms are defined as those firms registered with the Philippine Board of Investments (BOI) in its Investment Priorities Plan (IPP) and have exported in 1972 and all firms registered with the BOI's Exports Priorities Plan (EPP).

2. Theoretical Considerations

The analysis will follow G.E. Winston's (1974) rhythmic costs model where the amount of planned capital idleness depends on relative factor prices, amplitude of the input price rhythm (for example, night shift wage differential), the capital intensity of the production process, and the elasticity of factor service substitution between capital services and other rhythmic inputs (e.g., labor).

The expected effect of a higher cost of owning capital, other things being equal, is to penalize capital idleness more; that is, it serves as a disincentive to underutilize the existing capital. The relevant measure

of capital cost is the price of owning a capital stock over a given period of time—a cost that is being incurred whether the capital stock is fully used or laid idle—rather than the price of a capital service flow.[1]

The more capital-intensive the operation, the more important capital cost is relative to the total cost of further operating the existing capital. Hence, the more capital-intensive the operation, the higher the capital utilization is because of the greater incentive to economize on the larger capital costs. On the other hand, we expect labor intensive operation to have lower capital utilization in order to avoid costs in night shifts and weekend work.

The relative costs of operating at different times are determined by the differences in the input price at different periods. *Ceteris paribus*, the higher the wage differential, the greater is the penalty for high utilization and the greater the incentive to operate only during low wage periods, i.e., during the daytime.

A priori considerations and empirical evidences from previous studies justify the use of determinants of capital utilization other than those given above. The additional explanatory variables which will be used are the following: value added (VAL4), export performance (EXP1), product demand seasonality (SEZN), degree of competition (MS12), and imported intermediate input dependence (MDEP). All these variables are defined in detail in section 4 of this paper.

Value added is used here as a proxy for firm size. We expect its effect on capital utilization to be positive as shown in the studies of Winston (1971) and Paul (1971). Big firms have undue advantage over small firms in various ways: good management, better technological know-how and greater socio-political power in terms of getting things done, as for example, easier access to loans and import licenses.

Export performance (EXP1) is expressed as the proportion of total products exported. Deficient demand comes in prominently as one of the major reasons for unplanned capital idleness. The expectation, therefore, is that exports will have a positive effect on capital utilization.

Previous studies in Philippine capital utilization (Bautista, 1974; Farooq and Winston, 1973) indicate that increasing competition leads to lower capital utilization. This can be partly explained by the observed overcrowding in certain highly protected industries.

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[1] A detailed methodology for computing the price of owning capital in Philippine manufacturing is given in Bautista (1972).

We expect imported intermediate input dependence (MDEP) to have a negative effect on capital utilization. In general, Philippine manufacturing firms are heavily dependent on imported raw materials, an industry structure which resulted from the import-substitution industrialization scheme of the 1950s. If we assume that the difficulty of meeting the import requirements is constant across industries then input supply bottlenecks should be more serious in the more heavily import-dependent firm. Hence, the higher the degree of import dependence, the lower the capital utilization rate.

3. Methodology and Data Source

Using cross-section data collected during the survey interviews of manufacturing firms in the Philippines from September 1973 to February 1974, we used the Chow test to verify whether the two sets of observations—GFEO versus NGF—belong to the same linear regression model.

The survey was jointly sponsored by the Philippines' National Economic and Development Authority and the International Bank for Reconstruction and Development (World Bank). A stratified random sample of 400 establishments was selected from the population consisting of manufacturing firms employing 20 or more workers in 1972. Stratification was done at the 4-digit ISIC level, the number of sampled firms in which 4-digit industry was determined by the industry's relative contribution to manufacturing value added in 1969. Since the intent is to measure the extent of utilization of industrial capital, the allocation of predetermined number of sample establishments to the various 4-digit industries according to the latter's value added contribution is inferior to having the industrial sample weights determined by the relative amounts of the industries' capital assets. The use of value added was resorted to as a second-best procedure since reliable capital figures were not available when sampling was done.

In addition to the survey interview data, it was also possible to use some quantitative and qualitative information from the Philippine Board of Investments. For more accurate financial figures, specifically sales and capital assets, the data gathered during the survey interviews were compared with those of the Business Day's *Top 1,000 Philippine Corporations (1973).*

Of the 400 sampled establishments, 317 and 83 firms were designated as non-government 'favored' firms and government 'favored' export-oriented firms, respectively.

4. Notations

Variables starting with L are logarithmic values of the variables given by the immediately following variable name. For example, LCURJ means the log value of CURJ which is the capital utilization rate, adjusted for sectional and intensity use. We use the following notations:

CURJ : capital utilization rate, adjusted for sectional and intensity use, in percentage units.

PKWR : factor-price ratio, measured as the annual cost of owning capital (KP13) divided by the hourly wage rate (HWR), in pesos.

WDF8 : amplitude of the wage rhythm, or the wage differential between day and night-shift, in percentage units.

CLNR : capital intensity estimate for the firm; measured as replacement value of capital (CRV5) divided by the number of production workers in a typical day shift (LED9), in thousand pesos.

EXP1 : export performance, proportion of exports to total product, in percentage units.

VAL4 : total value added, in thousand pesos; to be used as a proxy for size; an alternative proxy variable for the size of the firms is total sales, SAL3, also in thousand pesos.

SEZN : seasonality; a dummy variable, *1* if the demand for the product is steady and *0*, if not steady; culled from the question on product demand variations, "Is the demand for your *product* fairly *steady* throughout the year? ____(yes/no)"

MS12 : degree of competition; a proxy variable, *1* for monopoly, *2* for tight oligopoly, *3* for loose oligopoly, and *4* if competitive.

Index of the degree of competition	*No. of Domestic Firms Competing in the Sale of the Firm's Major Product*
1—Monopoly	0
2—Tight Oligopoly	1-7
3—Loose Oligopoly	8-20
4—Competitive	21 or more

MDEP : imported intermediate input dependents, measured as ratio of total imported inputs to total inputs; in percentage units.

5. Results and Analysis

Assuming fixed, exogenously determined capital-labor service ratio (CLNR), cost of owning capital (KP13), and a time pattern of wage rates by $w(1+\beta(t))$, where w is the hourly wage rate (HWR) and $\beta(t)$ is the amplitude of the wage rhythm, in percentage units, or the wage differential (WDF8), the OLS regression result for the basic equation is given in Table 1. The plot of the residuals for the basic equation suggests that there may be no discernible bias in predicting capital utilization level in the NGF firms using the estimated equation for the whole manufacturing industry. But the same thing may not hold for the government 'favored' export-oriented firms; for the GFEO firms, the fitted value is less than the actual value in 58 of the 83 firms. This result strongly suggests that the two samples may not be represented by the same regression equation.

It may be noted that simply using a dummy variable— *1* if GFEO and *0* otherwise—in addition to the basic equation does not help us in testing the hypothesis that the sets of slope coefficients in two regressions (one for the GFEO firms and the other for the NGF firms) are identical; it helps only concerning the intercept. Hence, we used the statistical test as discussed in Section 3 of this paper.

The estimated regression equations are shown in Tables 1-7 and the result of the Chow-test for the seven linear regressions is summarized in Table 8. All the regression equations are estimated by ordinary least squares method.

In all the estimated equations, the calculated statistic for the Chow test falls under the critical region at the 1 per cent level of significance except in LCURJ (3) where the estimated F-statistic falls under the critical region at the 5 per cent level of significance. Therefore, in all cases we reject the null hypothesis that the marginal effects (or elasticities) of the relevant explanatory variables on capital utilization rate are the same for both GFEO firms and the NGF firms.

Of all the explanatory variables, value added (LVAL4) and capital-labor service ratio (LCLNR) are consistently statistically significant in both the GFEO and the NGF regressions. The estimated coefficients of LCLNR in the NGF regressions are consistently higher than in the GFEO regressions. This implies that, *ceteris paribus,* for equivalent increases in capital intensity, the response in terms of higher capital utilization rate will be higher among the NGF firms than the GFEO firms.

Table 1—LCURJ (Basic)

	Regression Equations		
	All	Non-government assisted firms	Government favored export-oriented firms
Constant	2.5185	2.2950	3.2682
	(7.85)	(6.35)	(5.73)
LPKWR	0.1856	0.0497	0.6235
	(1.48)*	(0.36)	(2.43)**
LCLNR	0.2048	0.2164	0.1560
	(10.2)***	(9.14)***	(4.95)***
LWDF8	−0.0156	0.0350	−0.1647
	(0.18)	(0.33)	(0.01)
R^2	.212	.211	.324
s.e.	0.623	0.626	0.498
SSE	153.562	122.859	19.560

Table 2—LCURJ (1)

	Regression Equations		
	All	Non-government assisted firms	Government favored export-oriented firms
Constant	2.7044	2.4642	3.2369
	(8.00)	(6.50)	(5.14)
LPKWR	0.1919	0.0635	0.6274
	(1.53)*	(0.46)	(2.41)**
LCLNR	0.1974	0.2085	0.1567
	(9.60)***	(8.60)***	(4.88)***
LWDF8	−0.0143	0.0409	−0.1624
	(0.15)	(0.39)	(0.98)
MS12	−0.055	−0.0539	0.007
	(1.70)*	(1.46)*	(0.12)
R^2	.218	.216	.324
s.e.	0.621	0.625	0.501
SSE	152.444	122.022	19.556

Notes: Figures in parenthesis under the regression coefficients are t-values.

The symbol ***, **, or * indicates that the slope coefficient is significantly different from zero at the 1 %, 5 %, or 20 % level, respectively.

Table 3—LCURJ (2)

	Regression Equations		
	All	Non-government assisted firms	Government favored export-oriented firms
Constant	2.0410 (6.41)	2.0092 (5.57)	2.0277 (3.30)
LPKWR	−0.0233 (0.19)	−0.1096 (0.78)	0.3865 (1.58)
LCLNR	0.1395 (6.25)***	0.1612 (5.98)***	0.0917 (2.75)***
LWDF8	−0.0515 (0.58)	−0.0081 (0.08)	−0.1085 (0.72)
LVAL 4	0.1294 (5.86)***	0.0997 (4.00)***	0.1812 (3.90)***
R^2	.275	.250	.434
s.e.	0.598	0.612	0.458
SSE	141.279	116.868	16.374

Table 4—LCURJ (3)

	Regression Equations		
	All	Non-government assisted firms	Government favored export-oriented firms
Constant	2.1244 (6.75)	2.0725 (5.74)	2.0361 (3.39)
LPKWR	−0.0028 (0.02)	−0.0942 (0.67)	0.3911 (1.64)*
LCLNR	0.1510 (6.79)***	0.1639 (6.09)***	0.1116 (3.28)***
LWDF8	−0.0694 (0.79)	−0.0224 (0.22)	−0.1224 (0.83)
LVAL 4	0.1113 (4.98)***	0.0918 (3.63)***	0.1636 (3.54)***
EXP 1	0.0038 (3.55)***	0.0025 (1.71)*	0.0029 (2.12)**
R^2	.297	.256	.465
s.e.	0.589	0.610	0.448
SSE	136.894	115.775	15.473

Table 5—LCURJ (4)

	Regression Equations		
	All	Non-government assisted firms	Government favored export-oriented firms
Constant	2.2136	2.1738	1.9595
	(6.60)	(5.76)	(2.94)
LPKWR	−0.0161	−0.0956	0.3940
	(0.13)	(0.68)	(1.59)*
LCLNR	0.1333	0.1538	0.0929
	(5.90)***	(5.62)***	(2.74)***
LWDF8	−0.0501	−0.0224	−0.1036
	(0.56)	(0.02)	(0.68)
LVAL 4	0.1284	0.0993	0.1816
	(5.82)***	(3.99)***	(3.88)***
MS12	−0.0500	−0.0520	−0.0145
	(1.61)*	(1.44)*	(0.27)
R^2	.280	.254	.434
s.e.	0.597	0.611	0.461
SSE	140.356	116.089	16.358

Table 6—LCURJ (5)

	Regression Equations		
	All	Non-government assisted firms	Government favored export-oriented firms
Constant	2.0634	2.0195	1.749
	(6.19)	(5.38)	(2.68)
LPKWR	0.0518	−0.0285	0.4690
	(0.41)	(0.20)	(1.94)*
LCLNR	0.1271	0.1411	0.0974
	(5.69)***	(5.16)***	(2.96)***
LWDF8	−0.0307	0.0306	−0.1130
	(0.35)	(0.30)	(0.76)
LVAL 4	0.1205	0.0905	0.1838
	(5.52)***	(3.66)***	(4.04)***
MS12	−0.050	−0.055	0.0208
	(1.62)*	(1.53)*	(0.40)
SEZN	0.2169	0.2318	0.1991
	(3.60)***	(3.09)***	(2.35)**
R^2	.303	.277	.473
s.e.	0.588	0.603	0.448
SSE	135.871	112.612	15.244

Table 7—LCURJ (6)

	Regression Equations		
	All	Non-government assisted firms	Government favored export-oriented firms
Constant	1.8916 (5.97)	1.8487 (5.14)	1.849 (3.07)
LPKWR	0.0447 (0.357)	−0.0440 (0.31)	0.4578 (1.91)*
LCLNR	0.1333 (6.04)***	0.1489 (5.54)***	0.0957 (2.95)***
LWDF8	−0.8321 (0.36)	0.0241 (0.23)	−0.1199 (0.82)
LVAL 4	0.1215 (5.56)***	0.0911 (3.68)***	0.1831 (4.05)***
SEZN	0.2171 (3.60)***	0.2291 (3.05)***	0.1974 (2.35)**
R^2	.298	.271	.472
s.e.	0.589	0.604	0.445
SSE	136.781	113.469	15.276

Table 8—Summary of Results

Equation	Explanatory variables (K−1)	$F = \frac{(e'e-(e_1'e_1+e_2'e_2))/k}{(e_1'e_1+e_2'e_2)/(n_1+n_2-2k)}$ Chow statistic (F)
LCURJ (Basic)	LPKWR, LCLNR, LWDF8	10.223
LCURJ (1)	LPKWR, LCLNR, LWDF8 MS12	5.986
LCURJ (2)	LPKWR, LCLNR, LWDF8 LVAL4	4.706
LCURJ (3)	LPKWR, LCLNR, LWDF8 LVAL4, EXP1	2.782
LCURJ (4)	LPKWR, LCLNR, LWDF8 LVAL4, MS12	3.861
LCURJ (5)	LPKWR, LCLNR, LWDF8 LVAL4, MS12, SEZN	3.457
LCURJ (6)	LPKWR, LCLNR, LWDF8 LVAL4,SEZN	4.036

Of the three core variables—LPKWR, LCLNR, and LWDF8—the influence of the factor-price ratio appears to be more potent on GFEO firms than on NGF firms; the factor-price coefficient in the NGF regressions is consistently not significant from zero. While the wage differential has the correct sign in all regressions for GFEO firms, and in all but two in the NGF firms, the coefficient is not statistically significant from zero in all cases, suggesting that the day-night shift wage differential does not have a significant effect on capital utilization rate. This conclusion holds for both GFEO and NGF firms.

Another variable which turned out to be statistically significant for both groups is value added (LVAL4), the proxy variable for the size of the firm. The coefficient of LVAL4 in the GFEO regressions is on the average twice as big as the LVAL4 coefficient in the NGF regressions.

The export performance coefficient is statistically significant in both GFEO and NGF regressions. The 'correct' positive sign suggests that a policy of export expansion could increase capital utilization. The almost identical marginal effects of export orientation in both groups (0.0025 for the NGF firms and 0.0029 for the GFEO firms) partly explain why the computed F-statistic in LCURJ(3) is the lowest among the 7 estimated equations (See Table 8).

While the coefficient of the degree of competition (MS12) is statistically significant from zero in the NGF regressions, it is not the case in the GFEO firms. This suggests that the negative effect of overcrowding on capital utilization holds for firms with no government assistance and with low exports potentials; this is not so with the group of government-assisted, export-oriented firms.

The coefficient of seasonality (SEZN) is statistically significant for both the GFEO and NGF regressions. In both equations where the seasonality factor is considered, the marginal effect of a more steady demand is slightly higher in the NGF firms than the GFEO firms.

The degree of imported intermediate input dependence (MDEP) was dropped in the final regression run, since it did poorly in the first round of runs. The result on the imported input dependence variable implies that it is not so much the dependence on imported inputs that causes a firm to underutilize its plant but rather the ability of the firm to meet its import requirements. A closer look at the data on Philippine export-oriented firms would indicate that the ability of the firm to obtain adequate supply of imported materials has no relation to the degree of imported intermediate input dependence. For instance,

garments and electronics firms whose products are internationally subcontracted have very little problem with respect to the procurement of raw material requirements.

6. Concluding Remarks

The main results from the above analysis are as follows. First, using the Chow test, we conclude that the set of coefficients in the regression explaining capital utilization in the GFEO firms and the regression for the NGF firms are not the same. This conclusion holds for the 7 estimated equations. Second, while the coefficients of the capital-labor service ratio (LCLNR), value added (LVAL4), seasonality (SEZN) and export performance (EXP1) are all statistically significant and have the "correct" *a priori* sign for both sets of regressions, the magnitudes of the coefficients differ (with the exception of the export variables). This suggests areas where discriminatory industrial policy can be undertaken.

The study has a number of policy implications. One is in regard to the factor-price ratio which appears to have the most effect as far as the GFEO firms are concerned. For the NGF firms, the coefficient of the factor-price ratio is not statistically significant from zero. The coefficient of LPKWR in the basic equation for the GFEO firm is 0.6235. As discussed earlier, the higher the cost of owning capital, the higher is the capital utilization rate. Therefore, a government incentives policy mix—tax and tariff, interest rate, wage and foreign exchange—that keeps the price of capital artificially low has the adverse effect of increasing the level of capital idleness in the government-assisted firms. The strong capital-cheapening bias of past and present government incentives policy in the Philippines has been extensively discussed in G. P. Sicat (1967, 1968a, 1968b) and the Comprehensive Economic Mission (1974). For a start, such capital-cheapening incentives which are presently enjoyed by firms registered under the Board of Investments exports incentives plan have to be replaced by incentives which do not distort relative factor prices. Removal of incentives with capital-cheapening bias would raise the opportunity cost of owning capital, penalize capital idleness and consequently increase capital utilization.

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