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CAPITAL UTILIZATION, GROWTH, EMPLOYMENT,
AND BALANCE OF PAYMENTS AND
PRICE STABILIZATION

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CAPITAL UTILIZATION, GROWTH, EMPLOYMENT, AND BOP AND PRICE
STABILIZATION

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and

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Capital Idleness in the Midst of Capital Scarcity

Latin American countries are unanimously regarded as being well endowed with labor and scarce of capital. In such a situation, common sense leads to the conclusion that what capital exists should be intensively used and what labor exists should be extensively applied. Yet casual empiricism and as well as more careful research indicates that this natural expectation does not correspond to reality: capital, despite its scarcity, is underutilized.^{1/} Parallely, large scale unemployment exists. Hence a situation reminiscent of Keynes pervades the Latin American economic scene: the coexistence of unemployed labor and unemployed capital. What is more, this underutilization of capital appears not to be a temporary phenomenon, the result of short term fluctuations in aggregate demand or of building ahead of future need, but rather it appears to be a permanent situation, where the low rate of utilization of capital reflects some more fundamental characteristics of the economic environment. A further element in the picture, which introduces a decidedly non-Keynesian note,

^{1/} Early documentation on underutilization of capital can be found in various publications of ECLA, for example, ILPES/CELADE, Elementos para la Elaboración de una Política de Desarrollo con Integración en América Latina, 1968, Ch. 3. More recent data has been developed on Brazil, Chile, Colombia, Costa Rica, Peru and Venezuela in the context of a collaborative research project coordinated by the author at Boston University's Center for Latin American Development Studies. See Kogut, Edy Luiz (1975); Ramos, Joseph (1974); Thoumi, Francisco (1975); Schydrowsky, Daniel M. (1975); Abusada, Roberto (1975/a, b); CORDIPLAN (1974), Abusada (1976)

is the foreign exchange constraint affecting most of these economies. As a consequence, it is not feasible to employ the existing capital and labor simply by expanding aggregate demand. Output might well go up with such a policy, but only for a time, since the import requirement generated by such an increase in industrial production would soon exhaust the international reserves of any of the countries in the hemisphere and hence the policy would abort on its own accord. At the same time, it is true that without additional demand, additional product could not be absorbed. Hence, Latin American capital and labor idleness may well be called quasi-Keynesian.

Capital idleness takes a number of forms. The most important is the short number of hours which machines are used during the day. Indeed, one would expect that under the existing conditions of scarcity, a very large number of firms would work two and three shifts. Yet the overwhelming number of enterprises work only a single shift. Although there are significant differences between firms' behaviour in this regard, the widespread practice of single shifting is the most important contributor to underutilization of capital in the region. Second in line stands the large number of days when activities shut down. These comprise Saturdays, Sundays, holidays, and collective vacations. Again, one would think that the capital scarcity and labor plenty would dictate the use of machines and equipment on a 365 day a year basis. Yet this does not occur. Finally, there is

a significant amount of underutilization of capacity within the shifts and days in fact worked. In some cases machines are idle for large parts of the working day, in other instances intensity of utilization is lower than it well might be.

A more detailed picture of the empirical situation than was heretofore available emerges from the research on capacity utilization in six Latin American countries, coordinated at Boston University's Center for Latin American Development Studies. The countries concerned are Brazil, Chile, Colombia, Costa Rica, Peru, and Venezuela. Table I.1 shows the percentage of firms working one, two, or three shifts in five of these six countries. ^{1/} It appears that except in Brazil about two-thirds of the firms typically work one shift, another fifteen percent work two shifts, and the remaining twenty percent work three shifts. The country variations around this average are significant with Venezuela showing more single-shift and fewer three-shift firms and Brazil the opposite. ^{2/}

The pattern inside different industrial groups of course varies both accross industries and across countries, as can be seen from Tables I-2. It is very significant that there are some single shifters

^{1/} For Chile, this breakdown has not been tabulated.

^{2/} The greater incidence of shift work in Brazil may be due to the higher representation of large enterprise in the Brazilian sample.

TABLE I-1

PERCENTAGE OF FIRMS BY NUMBER OF SHIFTS WORKED

		<u>1</u>	<u>2</u>	<u>3</u>
BRAZIL	1974	35.60	25.00	39.40
COLOMBIA	1973	58.79	20.46	20.75
COSTA RICA	1974	66.56	11.00	22.44
PERU	1971	63.70	16.50	19.80
VENEZUELA	1974	73.80	12.70	13.50

Source: Country studies.

TABLE I-2a

DISTRIBUTION OF PLANTS BY SECTOR AND SHIFTS WORKED

COLOMBIA 1973

<u>ISIC</u>	<u>NUMBER OF FIRMS</u>			<u>PERCENTAGES</u>		
	<u>1</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>3</u>
31 Food, Bev. & Tobacco Ind.	32	18	21	45.1	25.4	29.6
32 Clothing & Leather	42	12	10	65.6	18.8	15.6
33 Wood & Woodwork	19	-	-	100	-	-
34 Paper, Printing & Publish.	10	6	7	43.5	26.1	30.4
35 Chemicals & Coal	29	10	16	52.7	18.2	29.1
36 Non-Metalic Mineral	17	6	7	56.7	20.0	23.3
37 Basic Metals	3	1	3	42.9	14.3	42.8
38 Metal Working	47	17	7	66.2	23.9	9.9
39 Miscellaneous	5	1	1	71.4	14.3	14.3

Source: Data underlying Thoumi (1975)

TABLE I-2b
DISTRIBUTION OF PLANTS BY SECTOR AND SHIFTS WORKED
COSTA RICA 1974

<u>ISIC</u>	<u>NUMBER OF FIRMS</u>			<u>PERCENTAGES</u>		
	<u>1</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>3</u>
31 Food, Bev. & Tobacco	18	5	7	6	17	23
32 Clothing & Leather	24	5	12	59	12	29
33 Wood & Woodwork	11	-	1	92	--	08
34 Paper, Printing & Publish.	9	3	2	64	21	14
35 Chemicals & Coal	31	6	10	66	13	21
36 Non-Metalic Mineral	6	1	4	55	09	36
37 Basic Metals	1	-	1	5	--	5
38 Metal Working	21	1	5	78	04	18
39 Miscellaneous	6	-	1	86	--	14

Source: Schydrowsky (1975)

TABLE I-2c

DISTRIBUTION OF PLANTS BY SECTOR AND SHIFTS WORKED

PERU 1971

<u>ISIC</u>	<u>NUMBER OF FIRMS</u>			<u>PERCENTAGES</u>		
	<u>1</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>3</u>
20 Food industries	69	35	54	43.7	22.2	34.2
21 Beverage industries	33	4	6	76.7	9.3	14.0
22 Tobacco	2	1	-	66.7	33.3	-
23 Textiles	58	59	63	32.2	32.8	35.0
24 Footwear and wearing apparel	80	2	1	96.4	2.4	1.2
25 Wood and cork	22	2	3	81.5	7.4	11.1
26 Furniture	46	1	-	97.9	2.1	-
27 Paper and paper products	8	1	12	38.1	4.8	57.1
28 Printing and publishing	41	18	3	66.1	29.0	4.8
29 Leather products	20	1	-	95.2	4.8	-
30 Rubber products	11	2	1	78.6	14.3	7.1
31 Chemicals	88	12	33	66.2	9.0	24.8
32 Petroleum and coal	4	1	3	50.0	12.5	37.5
33 Non-metallic mineral products	52	8	14	70.3	10.8	18.9
34 Basic metal industries	6	4	4	42.9	28.6	28.6
35 Metal products	49	13	1	77.8	20.6	1.6
36 Machinery (non electrical)	35	3	2	87.5	7.5	5.0
37 Electrical machinery	36	7	-	83.7	16.3	-
38 Transport equipment	36	5	-	87.8	12.2	-
39 Miscellaneous	58	16	34	53.7	14.8	31.5

Source: Abusada (1975)

TABLE I-2d
DISTRIBUTION OF PLANTS BY SECTOR AND SHIFTS WORKED
VENEZUELA 1974

<u>ISIC</u>	<u>NUMBER OF FIRMS</u>				<u>PERCENTAGES</u>		
	<u>1</u>	<u>2</u>	<u>3</u>	<u>TOTAL</u>	<u>1</u>	<u>2</u>	<u>3</u>
31 Food, Bev. & Tobacco	234	62	58	354	66.10	17.51	16.38
32 Clothing & Leather	264	48	47	359	73.54	13.37	13.09
33 Wood & Woodwork	154	13	5	172	89.54	7.56	2.90
34 Paper, Printing & Publish.	70	30	18	118	59.33	25.43	15.26
35 Chemicals & Coal	171	29	78	278	61.51	10.43	28.06
36 Non-Metal Metallic Mineral	119	13	18	150	79.34	8.67	12.00
37 Basic Metals	41	6	11	58	70.69	10.34	18.97
38 Metal Working	301	40	22	363	82.93	11.02	6.06
39 Miscellaneous	29	4	1	34	85.29	11.76	2.94

Source: Abusada (1976)

TABLE I-2e

DISTRIBUTION OF PLANTS BY SECTOR AND SHIFTS WORKED

BRAZIL 1974

<u>SECTOR</u>	<u>NUMBER OF FIRMS</u>			<u>PERCENTAGES</u>		
	<u>1</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>3</u>
10 Non-Metallic Minerals	25	11	66	24.5	10.8	64.7
11 Metalurgical Ind.	64	60	100	28.6	26.8	44.6
12 Mecanical Ind.	56	72	20	37.8	48.6	13.5
13 Electrical Prod.	44	36	24	42.3	34.6	23.1
14 Transport Material	18	33	29	22.5	41.3	36.3
16 Furniture	35	7	3	77.8	15.6	67.0
17 Paper & Celulose	9	12	54	12.0	16.0	72.0
18 Rubber	3	7	10	15.0	35.0	50.0
19 Skins and hides	12	7	2	57.1	33.3	9.5
20 Chemicals	31	20	87	22.5	14.5	63.0
21 Farmaceuticals	42	8	8	72.4	13.8	13.8
22 Soaps and Detergents	19	3	10	59.4	9.4	31.3
23 Plastics	4	6	26	11.1	16.7	72.2
24 Textiles	22	44	132	11.1	22.2	66.7
25 Clothing	77	7	6	85.6	7.8	6.7
26 Processed foods	82	54	52	43.6	28.7	27.7
27 Beverages	26	9	2	70.3	24.3	5.4
28 Tobacco	2	4	1	28.6	57.1	14.3
29 Diverse	3	4	4	27.3	36.4	36.4

Source: Kogut (1975)

and some triple shifters in each industrial category, thus the products produced do not seem to be a determinant of the pattern of utilization. Whereas this might appear to be a phenomenon of aggregation, it holds true at the more disaggregated level also. The implications of this finding are very interesting: on the one hand, it would appear that the different behavior patterns of different enterprises would reflect a combination of different preferences and different environments; on the other, it indicates that it is not impossible to work more shifts in any sector, as some of the single shifting firms allege.

Table I-3 tabulates the number of days worked in Peru. It is significant that the median firm works a 6-day week throughout the year. On the other hand relatively few firms are true "continuous process" firms, where the costs of stopping or starting the factory are tremendously large and where round-the-clock and round-the-year operation would thus appear to be indispensable.

An equally interesting view is offered by Table I-4 which shows the percentage of capital stock which operates one, two and three shifts with the percentage of labor employed and value added generated in plants working different number of shifts. It can be deduced from this table that the more capital-intensive firms operate a greater number of shifts. A similar conclusion is reached by cross-classifying firms by shifts worked and capital/labor ratios. ^{1/} Further confirmation

^{1/} Note, however, that the K/L ratio must be defined as the ratio of capital services to labor or a distorted measure will result.

TABLE I-3

PERU 1971: NUMBER OF DAYS WORKED PER YEAR IN MANUFACTURING PLANTS

<u>Number of days</u>	<u>One Shift</u>	<u>Two Shifts</u>	<u>Three Shifts</u>	<u>TOTAL</u>
Less than 100	8	-	-	8
100 to 150	18	5	1	24
151 to 200	31	7	6	44
201 to 250	104	15	16	135
251 to 270	95	15	17	127
271 to 290	113	50	55	218
291 to 310	317	71	62	450
311 to 330	48	9	22	79
331 to 360	13	2	28	43
361 to 365	22	18	24	64

Mean = 282
Median = 298
Mode = 302

Source: Ministry of Industry and Commerce, Industrial Statistics for 1971.

TABLE I-4

COMPARISON OF SHIFT-WORK MEASURES

PERU

	<u>Single Shift Firms</u>	<u>Double Shift Firms</u>	<u>Triple Shift Firms</u>
% of Firms	63.7	16.5	19.8
% of Employment	46.0	17.5	36.5
% of Capital Stock	21.9	13.9	64.2
% of Value Added	33.1	18.3	48.6

VENEZUELA

% of Firms	73.8	12.7	13.5
% of Employment	50.5	16.3	33.2
% of Capital Stock	24.8	10.0	65.1
% of Value Added	41.8	15.3	42.9

is obtained from logistic regression analysis.^{1/} This result is encouraging since it indicates a lower degree of capital idleness than appears from looking at the number of firms working multiple shifts. It should be borne in mind, however, that low capital-intensive processes have high output/capital ratios and high labor/capital ratios, which means that the amount of output and employment forgone by low capital use in low capital-intensive firms is very much higher than would occur if it were the capital-intensive firms which were underutilizing their capital stock.

The size of the establishment can also be seen to have an effect on the utilization of capital. Analysis of this variable must proceed with caution, however, since firms which work more shifts will simply by that fact be larger, thus output and employment must first be standardized at the single shift level before an impact on utilization can be derived. In the absence of this adjustment, one would pick up the impact of shifting on size and not the impact of size on shifting. Nonetheless, with this correction made, size continues to show an impact on utilization. This can be seen in summary form in Table I-5 which shows data for Colombia, Costa Rica, Peru, and Venezuela on utilization by size of firm.^{2/} The Abusada logistic regressions also bring out size as a significant determinant of utilization in a multiple regression framework.^{1/}

^{1/} See Abusada (1975a) and (1976)

^{2/} Note, however, that in Costa Rica, the percentage of firms working only one shift rises as one goes to the highest size group.

TABLE I-5

SHIFTWORK BY SIZE OF FIRM

NUMBER OF WORKERS PER SHIFT:	1 - 20			21 - 50			51 - 100			> 100		
	<u>1</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>3</u>
SHIFTS WORKED	PERCENT OF FIRMS											
COLOMBIA	73	18	9	71	21	8	47	29	24	36	16	48
COSTA RICA	73	9	18	73	6	20	50	15	35	67	20	14
PERU		n. a.		61	18	21	68	15	17	67	12	21
VENEZUELA		n. a.		75	13	12	77	11	12	67	15	18

The quality of organization is obviously also an important element affecting the level of utilization. The Chilean data show that family firms do not multiple shift nearly as much as do corporations. Indeed, when firms are classified by their form of legal organization (i.e. between corporations and non-corporations) it is found that corporate firms work more shifts than non-corporate ones. A similar variable also helps explain utilization in Colombia. Finally, a related variable, that of foreign participation, appears to have a positive correlation with utilization in both Peru and Costa Rica.

A further major variable which affects utilization is the extent to which a firm's output is exported. In the presence of economies of scale, protected domestic markets tend to develop oligopolistic structures, which hamper expansion of sales and multiple shifting. Exporting provides a "vent for surplus" for the production of additional shifts while not upsetting the domestic oligopolistic structure. Exports seem to be related to utilization in the Costa Rican and Peruvian data, but less so in the Colombian data.

The utilization picture is thus both varied and complex and its explanation requires a multidimensional framework. The next section surveys some recent thinking in this regard.

II

The Private and the Public Calculus of Capital Utilization

The common sense notion that when capital is scarce and labor is plenty the former should be used very intensively withstands rigorous analysis. At the same time, it rapidly becomes evident that there may be circumstances when it is preferable to use more capital than to work longer hours. Essentially, one is confronted with a trade off between working at less desirable hours, i. e., using higher cost labor, and using expensive capital. Such trade-offs are eminently amenable to economic analysis and indeed a number of models have been developed to analyze the optimality of different levels of capital utilization under varying conditions.^{1/} All these models maximize an objective, generally profits, but in a few instances the average income of labor, subject to the constraints imposed by a production function and the conditions in the factor and product markets. It turns out that the desirability of an intensive utilization of capital, i.e., shift work, depends essentially on six elements: 1) factor intensities, 2) relative factor prices and particularly, the cost differential between different shift labor i. e. the shift premium, 3) the extent of the economies of scale, 4) the elasticity of substitution between the inputs, 5) the price elasticity of demand, and, 6) the price and availability of working capital.

^{1/} See for example Abusada & Millan (1973), Betancourt & Clague (1975,a,b,c), Baily (1972), Millan (1973), (1974), Schydrowsky (1974), Winston (1972.)