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Occupational Structure of Employment in India-A Cross-Section Analysis

Introduction

MANPOWER planning has become an integral part of development planning. This has resulted from an increasing awareness of the constraining influence of manpower shortages upon production plans. A variant of this situation is one in which surpluses co-exist with shortages, reflecting a disequilibrium of the labour market. This indicates that the expansion of the education system is not in line with the manpower needs of the economy. Clearly, this is not a desirable situation. If such imbalances are anticipated well in advance, corrective measures could be worked out. This is easier said than done as the estimation of manpower requirements raises difficult problems. One of the problems relates to obtaining occupation-wise requirements. Owing to inadequacies of time-series data on the occupational pattern, this is attempted on the basis of fixed occupational proportions. This procedure is questionable as no allowance is made for likely variation in the skill-coefficients arising from, technological and sectoral size changes.

The aim of this paper is to examine the sensitiveness of occupational proportions to selected economic variables with the help of cross-section data and to suggest a basis for predicting changes in the occupational structure. Admittedly, cross-section analysis is not a substitute for time-series analysis, but it could identify relevant economic variables and reveal the nature of their relationship with the skill-coefficients.

Some Theoretical Issues

We shall first discuss a few theoretical issues.

A production function may be put down as follows:

$$X = f(K, L) \qquad (1)$$

where X refers to output, K to capital and L to labour. This function implies that both capital and labour are homogeneous inputs. But this is not the case. For instance, labour force comprises workers possessing different types of skills. To allow for the heterogeneity in labour the above function is modified as follows:

$$X=f(K \quad L_1,L_2...,L_n). \qquad (2)$$

A special form of (2) is:

$$X = \text{mm.}\ (K, L_1, L_2, \ldots, L_n). \qquad (3)$$

This relationship is used in the manpower requirements approach. This formulation rules out substitution possibilities between capital and labour, as also between different categories of labour, as it postulates a complementary relationship between the explanatory variables. These are restrictive assumptions as the empirical studies indicate substitution possibilities both between capital and labour, and between different categories of labour.[1]

In the original version of the manpower requirements approach, Parnes[2] had assumed fixed occupational proportions. In later variations of this methodology, for example, Horowitz, Zymelman and Herrnstadt[8] and Layard and Saigal,[4] these proportions were taken to be functions of output per worker. Both Layard and Horowitz rewrite equation (2) in the following way:

$$XI\ L = f(K!L,\ L_1/L,\ L_2/L,\ ...,\ Ln!L). \qquad (3a)$$

On the assumption that K/L is a function of the occupational composition of L, Horowitz reduces (3a) to the following equation:

$$XIL = f(L,IL,\ LilL,\ \ldots,\ LnlL). \qquad (3b)$$

Layard, on the other hard, points out that (3) and *(3d)* do not necessarily imply that there is a unique relationship between output and either the total labour force or its skill composition, as the combination of inputs associated with a particular output depends on their relative prices. But, once a technique is chosen, this choice simultaneously determines the level of output per worker, the amount of capital per worker, and the occupational proportions. If we further assume that for a given *XIL* there is one and only one set of *Lj/L's* and a given *KjL,* we can set up demand functions for the factors of production, in which *Lj/L's* and *KjL* are given as functions of *XIL* rather than the other way round, as in equation *(3d).*

Horowitz's contention is that for a given level of productivity, the contribution of capital to output is fixed and, therefore, this variable can be dropped from the equation, but there are substitution possibilities between the various occupational categories, and so different occupational structures are possible at the same level of output and labour productivity.

These two views may be summarised as follows: both Horowitz and Layard agree that substitution possibilities exist at a given level of output; Horowitz goes further and assumes that partial substitution is still possible at the same level of technology and productivity, whereas Layard assumes that there are fixed skill coefficients once the technique is chosen and the level of productivity determined.

In this context a recent contribution by Dougherty[5] is quite significant. He attempts to explain variation in occupational proportions in terms of the output and the relative availability of different skill categories. The following equation is tested with cross-country data:

$$\frac{L_{i,j}}{\bar{L}} = b_{i,j} \frac{\bar{L}_j}{\bar{L}} + C_{i,j} \frac{X_i}{\bar{L}} + Q_{i,j} + U_{i,j}. \qquad (4)$$

where Z, refers to total supply of labour of type *j*, *l*, = 2 *Lj*• = total labour force, and X_t, to output of sector *i*. The significance of this formulation lies in the introduction of a supply variable which turns out to be significant in several equations. This shows that the utilisation of some occupational categories is partly determined by the availability of workers.

A consequence of the introduction of the supply variable is that the intercept, which assumes importance when the supply variable is omitted, and 'which appears to account for the stability of the occupational proportions, is reduced to a peripheral role.' This leads Dougherty to conclude that the manpower requirements approach gives a misleadingly rigid impression of the demand for different skill categories. The stability of the coefficients does not appear to be real as it is the outcome of an incomplete specification. Hence the assumption of technologically determined skill requirements should be modified. This conclusion is based on a certain interpretation of the statistical results. First, it is doubtful whether the technological minimum requirements of different skills can be ascertained by the significance of the intercept term, which implies that when the value of explanatory variables is reduced to zero, the dependent variable retains a certain minimum level. For example, the minimum level of consumption at zero income would be given by the intercept. However, this notion of minimum is not applicable to occupational proportions because their minimum requirements can be defined only in relation to a given technique and not independently of it. Second, since the choice of a technique depends upon the relative prices of the inputs, and so also on their availability, and, since this equation does not have a technological variable, it is possible that the supply variable acts partly as a proxy for the technique. Hence, part of the coefficient of the supply variable may well represent the contribution of technological factors to variations in occupational proportions.

Finally, we shall briefly refer to an O.E.C.D. study which uses monetary and non-monetary indicators of economic and technological development for explaining inter-country variation in the utilisation of different skills,[6] viz. output per worker, gross capital formation per worker, a non-monetary indicator of development, say, energy consumption per worker. The statistical superiority of this formulation over earlier formulations is not easily established for (a) the introduction of new variables makes the coefficients unreliable because of the high inter-correlation between the explanatory variables; and (b) the non-monetary variables just do not turn out to be significant.

Statistical Analysis

We are concerned with explaining inter-sectoral variation in the occupational proportions in India. We have, therefore, considered variables which reflect technological, and other relevant economic factors at the sectoral level. Our choice, however, is limited by availability of data, and involves use of some proxy variables.

We have tried two broad formulations : one formulation relies on only economic variables while the other uses additionally a dummy variable. These two alternative formulations have been tried for certain occupational divisions, with very uneven sectoral distribution. For the remaining divisions only the first formulation has been used.

Specifically, various combinations of the following variables have been tested: labour productivity $\left(\frac{L_i}{X_i}\right)$, growth rate of output *(Xi)*, capital output ratio $\left(\frac{\Delta K_i}{\Delta X_i}\right)$, gross output *(Xi)*, level of employment (L_z), and share of employment in public undertakings in sectoral employment of a given skill $\left(\frac{P_{i,j}}{L_{i,g}}\right)$. Labour productivity and capital output ratio are regarded as proxy variables for technological factors, gross output and the level of employment represent the scale factor. The growth rate of output is included because some occupations or skills, like investment, may be related to the growth rate rather than the level of output.[7] For instance, the employment of development scientists and engineers is more likely to depend on the growth rate of output rather than the level.

The Data

The data on occupational pattern of workers are published by the Registrar General and the Director General of Employment and Training (DGET). We have used the latter for the following reasons : (a) As the Census classification of sectors is different from our classification, sectoral occupational mix cannot be obtained. On the other hand, the data (unpublished) collected by the DGET are available for the three digit industrial classification and the five digit occupational classification ; (b) At present the Census data are available only for 1961, whereas the DGET data are available upto 1968 (although we have used the data for 1963-64).

The DGET data are collected separately for small and large establishments in the private sector and for all establishments in the public sector in alternate years. The coverage of large establishments (i.e. units employing 25 or more persons) is quite comprehensive as it is collected under the provisions of the Employment Exchanges (Compulsory Notification of Vacancies) Act 1959, on a statutory basis, whereas the coverage of small establishments is patchy as it is done on a voluntary basis. On the other hand, all establishments in the public sector are covered.

A major difficulty with this data is that since the coverage varies from year to year inter-temporal comparisons of occupational patterns cannot be attempted. Hence a cross-section analysis is attempted.

We have constructed sector-occupation matrices separately for small and large private establishments, and for public establishments for 1963 and 1964, respectively. By consolidating these matrices we have arrived at an all-India sector-occupation matrix for 1963-64. The consolidated matrix is shown in the Appendix. Although the occupational data are available upto 1968, 1963-64 is the most recent 'normal' year for which actual data on the independent variables are available.

A question arises about the inclusion of vacancies in the base line established for projecting the occupational structure into the future. There are two opposite views on this question. One view favours their inclusion on the ground that the sum of existing employment and vacancies represents the total labour force which employers evidently consider optimal in the current situation. This involves an assumption that vacancies are accurately reflected by employers' estimates of the additional numbers they would employ at the going wage rate, provided that potential recruits were available. The argument for their exclusion is that since the current level of production is achieved by the existing employment this level represents the minimum requirement. Further, public sector establishments tend to overrate current requirements at the going wage rate.

Jolly and Colclough[8] suggest that the optimum requirement lies somewhere between these two extremes. Although the exact location of this point depends upon the elasticities of the demand and supply curves, a rough approximation would be that it lies midway between the two extreme points. We have not applied this rule of thumb for *(a)* the data on vacancies cover only 10 per cent of the establishments, and *(b)* in most cases the vacancies bear no relation to actual requirements at the prevailing wage rate. Our dependent variable, therefore, is obtained from the actual employment figures in 1963-64.

Now we turn to the independent variables. The first independent variable is labour/output ratio. As the employment and output data are not available in any one publication we have used the Census data (1961) for estimating employment in Agriculture and Plantations, Mining, Transport, Construction and for some unclassifiable industries included in the residual sector, others and margin. The corresponding output data (except for the last sector) are taken from CSO's Estimates of National Product. For the residual sector, the output figure is taken from Eckaus and Parikh.[9] The output and employment data for the remaining sectors are taken from the Annual Survey of Industries.[10] The next independent variable is growth rate of sectoral output, which is obtained from the output data used for constructing the labour/output ratios. The capital/output ratios and the output figures are taken from Eckaus and Parikh. Both employment levels and the share of employment in public undertakings in sectoral employment are estimated from the DGET data.

The Results

It can be seen from Table 1 that we have used a double-log functional form for all the occupations. Not only does it appear to be appropriate to the data but it also removes the heteroscedasticity. Further, we have applied a two-tailed /-test on the coefficients of the explanatory variables, except for the last two variables, namely, the share of employment in public undertakings and the dummy. This may appear to be quite severe but in the absence of a known, firm relationship between the dependent variable and any of the explanatory variables, it is valid to apply the two-tailed test.

(0) *Professional, Technical and Related Workers :* This is a heterogeneous group as it lumps together development scientists, engineers, economists, doctors, creative arists, etc. It is, therefore, not surprising that none of the equations gives a good fit. (The growth rate of output variable was dropped because of its negligible contribution to the explanatory power of the equation.) It can be seen from Table 1 that none of the coefficients is significant. It is, however, possible that regression of the proportions of development scientists and engineers on the growth rate of output and the share of sectoral investment used in research and development, could explain inter-sectoral variation in the utilisation of this skill-

(1) *Administrative, Executive and Managerial Workers.* This occupational division is more homogeneous than the above. Both the equations perform quite well. But when the employment variable is dropped, not only the explanatory power of the equation increases but also the coefficient of the output variable becomes significant. This suggests that the employment variable partly takes away the contribution of the output variable. The negative sign of the two coefficients is significant suggesting that a sector with a high capital/output ratio and a high level of output is associated with a lower proportion of workers in this occupation compared to one with a small capital/output ratio and a low level of output. This implies also that with an increase in a sector's output, the proportion of this skill would fall, and with capital becoming more productive over time, the opposite would happen.

(2) *Clerical and Related Workers.* Both equations 1 and 2 give poor results. None

TABLE 1
RESULTS OF REGRESSION ANALYSIS

Equation	Dependent variable	$\log \alpha$	Coefficients of $\log \frac{L_i}{X_i}$	$\log \dot{X}_i$	$\log \frac{\Delta K_i}{\Delta X_i}$	$\log X_i$	$\log L_i$	$\log \frac{P_{i,j}}{L_{i,j}}$	$\log D_i$	R^2	$\bar{R}^2$	F-value ($N=10$)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
I	$\log \frac{L_{i,0}}{L_i}$	1.634 (1.027)			.217 (1.178)		−.542 (−1.957)			.445	.286	2.803
II	-do-	1.800 (1.109)					−.568 (−2.006)			.335	.251	4.024
III	-do-	−1.477 (−15.854)			.244 (1.145)					.141	.033	1.311
I	$\log \frac{L_{i,1}}{L_i}$	.354 (.299)			−.676* (−3.102)	−.365 (−1.698)	−.183 (−.706)			.718	.577	5.100*
II	-do-	−.395 (−.774)			−.746* (−3.992)	−.460* (−2.842)				.695	.607	7.970*
I	$\log \frac{L_{i,2}}{L_i}$	3.473 (1.587)				.151 (.617)	−.864 (−2.022)			.378	.200	2.131
II	-do-	−.745 (−.953)				−.089 (−.352)				.015	−.109	.124
III	-do-	3.470 (1.478)				.189 (.645)	−.875 (−1.903)	.095 (.291)		.387	.080	1.263
IV	-do-	−.772 (−.890)				−.073 (−.240)		.043 (.114)		.017	−.263	.061
I	$\log \frac{L_{i,3}}{L_i}$	.660 (.232)			−2.157* (−4.133)	−.998 (−1.939)	−.025 (−.040)			.796	.694	7.781*
II	-do-	.558 (.475)			−2.166* (−5.038)	−1.011* (−2.715)				.795	.736	13.613*
III	-do-	.707 (.239)			−1.691 (−2.030)	−.762 (−1.218)	−.143 (−.216)		−.345 (−.737)	.816	.668	5.528*
IV	-do-	.149 (.113)			−1.776* (−2.637)	−.848 (−1.935)			−.320 (−.770)	.814	.721	8.745*

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
I	$\log \frac{L_{i,4}}{L_i}$	−9.481 (−4,373)		.450 (.757)	2.032* (4.168)	2.231* (4.039)				.818	,727	8.990*
II	-do-	−8.115 (−6.974)			1.872* (4.396)	1.928* (5.229)				.801	.744	14.056*
III	-do-	−7.663 (−3.392)		.675 (1.224)	1.367 (2.254)	1.551 (2.361)			1.128 (1 575)	.878	.780	9.026*
IV	-do-	−6.117 (−3.137)			1.278 (2.039)	1.263 (1.979)			.901 (1.251)	.842	.763	10.650*
I	$\log \frac{L_{i,5}}{L_i}$	−1.668 (−.209)			2.441 (1.671)	2.112 (1.466)	−1.249 (—.721)			.325	−.013	.961
II	-do-	−6.796 (−1.981)			1.961 (1.563)	1.463 (1.347)				.266	.056	1.269
III	-do-	−2.574 (−.502)			2.692* (2.851)	2.583* (2.746)	−1.413 (−1.265)		1.918* (3.076)	.767	.580	4.104
IV	-do-	−8.343 (—3.391)			2.145 (2.436)	1.841 (2.385)			1.881* (2.878)	.692	.538	4.488
I	$\log \frac{L_{i,6}}{L_i}$	1.863 (.655)		−.630 (−.808)	−.325 (−.508)	−.961 (−1.326)				.300	−.050	.860
II	-do-	−.264 (−.252)	.027 (.068)			−.481 (—1.355)				.222	.000	.996
III	-do-	−.740 (−.458)		.179 (.395)	−.212 (—.634)	−.407 (−1.012)			1.367* (4.116)	.841	.714	6.595*
IV	-do-	−.687 (−1.253)	−.131 (−.631)			−.321 (−1.723)			1.307* (4.508)	.823	.734	9.271*
I	$\log \frac{L_{i,7-8}}{L_i}$	.937 (1.442)		.017 (.093)	−.341 (−2.335)	−.385 (−2.324)				.668	.502	4.030
II	-do-	.988 (2.962)			−.347* (−2.843)	−.396* (−3.747)				.668	.573	7.038*
III	-do-	.287 (.931)				−.178 (−1.782)				.284	.194	3.176
IV	-do-	.440 (.624)		−.045 (−.261)	−.159 (−.842)	−.199 (−.969)			−.308 (−1.381)	.759	,566	3.958

V	-do-	.337 (.627)		−.153 (−.889)	−.179 (−1.021)	−.293 (−1.480)	.757	.635	6.220*
VI	-do-	−.091 (−.390)			−0.039 (−.512)	−.427* (−3.346)	.724	.645	9.212*
I	$\log \frac{L_{i,9}}{L_i}$	−.662 (−.865)	−.027 (−.098)		−.227 (−1.235)		.266	.056	1.268
II	-do-	−1.572 (−7.503)	.204 (.974)				.106	−.006	.948

D denotes the dummy variable.
Figures in parentheses are the t-values.
*Asterisk denotes the significance of the coefficient at the 5 per cent level.

of the coefficients turns out to be significant and the explanatory power of these equations is low. Since it is generally believed that public undertakings tend to overemploy clerical workers, we felt that the introduction of a variable reflecting the share of clerical workers in such undertakings in sectoral employment of clerical workers might improve the results. Surprisingly, this is not borne out by Equations 3 and 4. A possible reason is that as a result of excessive employment in several occupations, the proportion of clerical workers (is public undertakings) does not turn out to be vastly different from the proportion in private establishments.

(3) *Sales Worker:* Two alternative formulations are tried: one includes only economic variables and the other includes these variables plus the dummy. The second formulation is attempted for the reason that in sectors, such as Agriculture and Plantation, Electricity, etc. the shares of sales workers in employment are relatively small. Contrary to our expectations, both the formulations fare equally well. Since the coefficeint of the dummy is not significant, this variable is redundant. Comparing Equations 1 and 2, we notice that in the first the coefficient of only the capital/output ratio is significant, but in the second equation with the omission of the employment variable the output variable also becomes significant, indicating that the employment variable in equation 1 partly captures the influence of the output variable. Both the coefficients bear a negative sign suggesting that a sector with a high capital/output ratio and a high output requires a smaller proportion of sales workers than that of a sector with a small capital/output ratio and a low level of output. Over time, with an increase in a sector's output the occupational proportion would fall and with a fall in the capital/output ratio (as a result of capital becoming more productive over time), it would rise. The net impact would depend on the relative strength of these factors.

Even though our specification is substantiated by ths data, there is scope for improvement in it. For instance, requirement for sales workers would depend not only on the nature of the commodity but also on the extent of product-differentiation.

(4) *Farmers, Fishermen, Hunters, Loggers and Related Workers:* This occupational group being specific to the sector of Agriculture and Plantations, it is not surprising that the highest proportion is found therein; the proportions are uniformly low in the remaining sectors. In view of this unevenness, we have tried two alternative formulations, with and without the dummy. There are striking differences between the two sets of results. An important difference is the greater explanatory power of equations with the dummy than those without. Another important difference is in the values of the coefficients; the coefficients of the capital/output and the output variables are greater than the corresponding coefficients in Equations 3 and 4, implying that the dummy takes away part of the contribution of these two variables; but the dummy is not significant in these two equations.

Between Equations 1 and 2, the latter is the stronger relationship. The positive sign of the coefficients suggests that a sector with a high capital/output ratio and a high output is associated with relatively high proportions of farmers, etc.; and *vice versa.* **Over** time with an increase in a sector's output, the occupational proportion would rise; and with the capital becoming more productive, the opposite would happen.

(5) *Miners, Quarrymen and Related Workers'.* Considering the unevenness in the sectoral shares of miners etc., an intercept dummy is introduced. Altogether four equations are presented in Table 1. The results show that the introduction of the dummy considerably increases the explanatory power of the equations. Not only is the dummy significant in all the cases but also the coefficients of the capital/output ratio and the output variables are significant in Equation 3. However, the F-values are not significant. Presumably, this is due to the smallness of the number of observations.

(6) *Workers in Transport and Communication Occupations:* The equations without the dummy perform badly as neither the /-"-values nor the f-values are significant. But with the dummy, the explanatory power of the equations increases remarkably. Table 1 shows that in Equations 3 and 4 both the F-values and the /-values of the coefficients of the dummy are significant. However, none of these equations can be used for prediction as none of the economic variables turns out to be significant.

(7-8) *Craftsmen, Production Process Workers and Labourers not Elsewhere Classified:* Among the first three equations in Table 1, Equation 2 appears to be the strongest in terms of the predictive power. Specifically, both the F-ratio and the f-values of the coefficients of the capita! intensity and the output variables are significant. The negative sign of the coefficients suggests that sectors with a high capital intensity and a high output employ a relatively small proportion of production process workers, etc. and *vice-versa.* The inverse relationship between the capital/output ratio and production process workers indicates substitutability between the two.

Considering the low proportion of Production Process Workers in Agriculture and Plantations a dummy is introduced but it increases the explanatory power only nominally. Further, in Equation 5 the coefficients of the capital/output ratio and the output variables cease to be significant. Hence, the dummy is redundant.

Service, Sport and Recreation Workers. Both Equations 1 and 2 give poor results. The explanatory power of these equations is low and none of the coefficients turns out to be significant.

Conclusion

Our analysis has shown that the output and capital intensity variables determine the utilisation of Administrative, Executive and Managerial Workers, Sales Workers, Farmers, Fishermen, Hunters, Loggers and Related Workers, and Craftsmen, Production Process Workers and Labourers not elsewhere classified. In the case of Miners, Quarrymen and related workers, these two variables become significant only when a dummy is introduced to take into account the unevenness in the distribution of this category. Obviously, the nature of the relationship between these variables and the utilisation of skills as also the relative contribution of these variables vary from one occupation to another. For instance, while the size and capital-intensity variables are positively associated with the proportion of Farmers, Fishermen, Hunters, Loggers and related workers, their coefficients bear a negative sign, say, in respect of Sales Workers. Similarly, the relative magnitude of the elasticity coefficients varies from one skill category to another. These findings provide a first approximation to likely changes in the occupational structure over time. All that is required is to fix the values of two explanatory variables for each sector in the equations in order to predict the sectoral occupational profiles for a given year. An extension would be to attempt an explanation of sex-wise variations in occupational proportions.

However, limitations of our analysis need to be borne in mind. Firstly, we have reduced the structural differences among the sectors to differences in a few economic variables. Secondly, we have extracted inferences concerning likely changes over time from a cross-section analysis. Thirdly, our methodology is demand-oriented. The introduction of supply variable could improve the results. Finally, the coverage of small establishments is patchy. But these imperfections arising from the inadequacy of data are unavoidable.

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APPENDIX

TABLE 1
CONSOLIDATED SECTOR-OCCUPATION MATRIX FOR 1963-64

Occupations	Sectors									
	1	2	3	4	5	6	7	8	9	10
0	.0183	.0284	.0549	.0726	.0177	.0133	.0844	.0265	.0761	.0359
1	.0043	.0100	.0187	.0177	.0171	.0093	.0101	.0097	.0166	.0483
2	.0383	.0741	.1243	.1509	.0605	.0548	.2347	.0244	.1811	.3733
3	.0001	.0011	.0046	.0116	.0015	.0051	.0007	.0004	.0006	.0444
4	.7055	.0506	.0039	.0039	.0023	.0056	.0056	.0016	.0lC0	.0062
5	.0000	.2638	.0036	.0050	.0961	.0003	.0013	.0022	.0032	.0004
6	.0045	.0169	.0261	.0230	.0109	.0048	.0237	.3361	.0302	.0181
7-8	.2134	.5184	.7176	.6580	.7658	.8768	.5922	.5033	.6218	.4271
9	.0156	.0367	.0463	.0573	.0281	.0300	.0473	.0958	.0604	.0463

TABLE 2
DATA ON INDEPENDENT VARIABLES

Sector	$\frac{L_i}{X_i}$	$\dot{X}_i$	$\frac{\Delta K_i}{\Delta X_i}$	X_i (Rs. crores)	Li	$\frac{P_{i,2}}{L_{i,2}}$
	1	2	3	4	5	6
1	209.27	2.0	1.500	6771	853048	.503
2	17.31	14.1	2.400	1035	944691	.437
3	9.22	15.8	.910	S44	457084	.341
4	5.44	11.1	.880	771	3005521	.293
5	12.61	10.4	.890	568	252485	.096
6	8.63	6.4	.551	3076	1639247	.052
7	9.83	38.8	6.300	183	189570	.862
8	24.46	5.3	2.200	696	908599	.633
9	48.67	5.6	3.300	452	659071	.944
10	11.21	7.4	.160	7253	391470	.153

Col. 1 denotes number of persons employed for Rs. one lakh of output.
Col. 2 refers to sectoral growth rates of output during 1960-64.
Output figures in Col. 4 for sectors (3) to (6) are obtained as follows; first the actual growth rate of output in the manufacturing activity during 1960-61 to 1963-64 computed from the ASI data is applied on the actual output of these sectors in 1960-61 as reforted in the Eckaus-Parikh study in order to arrive at the output in 1963-64, and then applying the 1960-61 sectoral output proportions on the manufacturing output, the sectoral shares are worked out.

TABLE 3
VALUE OF DUMMY VARIABLES

Sector	$D_{i,3}$	$D_{i,4}$	$D_{i,5}$	$D_{i,6}$	$D_{i,7-8}$
1	10	10	1	1	10
2	1	1	10	1	1
3	1	1	1	1	1
4	1	1	1	1	1
5	1	1	10	1	1
6	1	1	1	1	1
7	10	1	1	1	1
8	10	1	1	10	1
9	10	1	1	1	1
10	1	1	1	1	1

Occupations: 0. Professional, Technical and Related Workers ; 1. Administrative, Executive and Managerial Workers; 2. Clerical and Related Workers ; 3. Sales Workers ; 4. Farmers, Fishermen, Hunters, Loggers and Related Workers ; 5. Miners, Quarrymen, and Related Workers; 6. Workers in Transport and Communication Occupations; 7-8. Craftsmen, Production Process Workers and Labourers not Elsewhere Classified ; 9. Service, Sport and Recreation Workers.

Sectors: 1. Agriculture and Plantations; 2. Mining and Metals; 3. Equipment; *4*. Chemicals; 5. Cement and Non-Metals; 6. Food, Clothing and Leather; 7. Electricity; 8. Transport; 9. Construction; 10. Others and Margin.