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Occupational Wage Differentials Among University Educated Technical Personnel in a Developing Economy

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Data taken in 1970-1971 from three university-trained occupational groups (2796 engineers, 1430 economists/business-administrators, and 162 basic scientists) in São Paulo's manufacturing industries are used in a path analysis[1] to draw interoccupational comparisons concerning the antecedents of occupational wage differentials. The worker's total hourly wage is the dependent variable. A new variable, occupational influence level, is employed as immediately antecedent to wage, as in job experience (years in the present job). Years of advanced education, age, and seniority in the firm are treated as exogenous variables. Similarities and differences among occupations are discussed. As a whole the analysis illustrates a strategy of comparative occupational analysis.

Data on the wage differentials of university-trained workers in different occupational families in São Paulo, Brazil's booming industrial economy, provide an unusual opportunity to advance the theory and method of occupational wage analysis in particular and comparative occupational analysis in general, and in so doing to assess the impact of key variables on wages. For more than half a decade Brazil's industrial output has yielded an increase in

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the Gross Domestic Product (GDP) of about 10% per year. This growth ha been largely concentrated in São Paulo, Latin America's major industria center. In this state 20% of the nation's people produce 50% of its GDP. It i the center of the automobile industry and of practically all other types o manufacturing. Present data are taken from a sample of the most productiv of these firms—those comprising the industrial sectors which together ar responsible for 80% of São Paulo's industrial output (see Pastore, Haller, & Gomez-Buendia, 1974).

Personnel trained as engineers of various kinds (chemical engineers electronic engineers, etc.), as economists or business administrators, and a basic scientists (physicists, chemists, mathematicians, etc.), occupy strategi roles in these industries. They are indispensible in management, cost analysis and production planning. Yet in Brazil qualified manpower is in short suppl and has been for many years. Wages are of course the main incentive whic firms have available to encourage workers to seek employment with them, t remain there, and to do good work. Among scarce personnel in such strategi occupations, differences in hourly salaries offer a particularly effectiv dependent variable by which to study the effects of social variables thought t influence individual productivity.

In this paper we present a hypothetical model of the basis of occupa tional competency and we apply it to each of the occupational familie mentioned above, with special attention to the impact of education on wages The scheme is a "path" or "causal" model. It places five antecedent variable in the order of their presumed causal priority. The five variables are take from the literature regarding status attainment and stratification in sociology and human capital and manpower analysis in economics. Path analysis permi an estimation of the effects—direct, indirect, and total—of a network o variables which are presumed to operate in concert. It is a form of regressio analysis, yet it is more enlightening than traditional applications of tha technique because it forces the researcher to specify his assumptions abou antecedent-consequent relations, and because within the assumptions s specified it permits an estimation of the amounts of influence exerted by eac antecedent on a dependent variable by way of each of the intervenin variables included in the model (Blalock, 1971). The variables are selected measured, and combined in ways which may facilitate systematic comparison of the causes of wage differentials among occupations within and, in the lon run, among societies.

METHOD

Sample. In 1970-1971, data were collected on all of the specialize employees (the highest 6%) in a size-stratified sample of 688 industrial firm in the 11 most productive industrial sectors of São Paulo. Within this group the university trained numbered 5994. From these we selected all the engineers (2796), all the economists and business administrators (1430), and all the basic scientists (162). The first group includes 42% mechanical engineers, and small, decreasing percentages of industrial, electrical, chemical, metallurgical, electronic, civil, and operational engineers. They are employed primarily in the motor vehicle, electrical equipment, and metal processing industries. They were grouped together because as engineers their training has a strong common element of applied physical science. The second occupational family is composed mostly of economists (64%), but includes many trained in business administration (28%), and a few (8%) trained as actuaries and accountants. They were grouped together because of the strong common core of training in economics. The basic scientists are the smallest group. Again there is a strong (if obvious) common physical scientific element in their training which is shared with engineers, yet unlike the latter they were not trained as applied scientists. Each of them is analyzed separately to permit identification of similarities and differences among them in the effects of the antecedent variables on wages.

Variables. Six variables are employed. They are described as follows:

W: Wage (W). This includes the individual's whole annual earnings with the company, including so-called "13th month" bonus which is mandatory in Brazil. It was standardized to an hourly rate, which is normal procedure in human capital research (Sorkin, 1968; Schweitzer, 1969; Mayhew, 1971). It is the dependent variable.

E: Advanced occupational education (E). This variable, also called "professional preparation" and "education," consists of the minimum education required for entrance into the occupation, together with the advanced occupational education acquired by the worker. Education which is not appropriate for the occupation (such as the business degree taken by an engineer, or an engineering degree taken by an economist) is not included. A university degree is required for each of these occupations, although quite a few persons have taken additional training. In Brazil, the minimum years of advanced education required for a university degree is 3 yr and the maximum education acquired by any of the sample members is 6 yr. Since 11 yr of education are the basic requirement for entrance into a university the minimum total years of occupational education is 14 and the maximum is 17. It is well known (Blaug, 1970; Sewell & Hauser, 1972; Müller, 1973; Spaeth, 1975) that years of education is one of the most powerful variables affecting income differentials of individual workers in highly industrialized countries. The variable is included here under the hypothesis that advanced specialized education is beneficial for the firms and therefore effects the salaries of highly educated personnel within specific occupational families in an industrializing economy. It is treated as an antecedent and exogenous variable in the model

SPAN OF INFLUENCE	CLASS OF INFLUENCE	
	AUTHORITY (LINE)	INDIRECT (STAFF)
WIDE	DIRECTORS AND MANAGERS (DIRECTORES E GERENTES) RANK-ORDER SCORE: SIX	EXPERTS: SCIENTISTS, ENGINEERS, ATTORNEYS, ECONOMISTS, ETC. (CONSULTORES) RANK-ORDER SCORE: FIVE
MEDIUM	DEPARTMENT HEADS AND SUPERVISORS (CHEFES E SUPERVISORES) RANK-ORDER SCORE: FOUR	TECHNICIANS (TECNICOS) RANK-ORDER SCORE: THREE
NARROW	FOREMEN (MESTRES) RANK-ORDER SCORE: TWO	AUXILIARY OFFICE PERSONNEL (PESSOAL AUXILIAR) RANK-ORDER SCORE: ONE

↓ : AUTHORITY, LINES OF DIRECT INFLUENCE (ORDERS)

⇠ : LINES OF INDIRECT INFLUENCE (ADVICE AND SERVICES)

Fig. 1. Rank-order scoring schema for occupational influence.

we employ, and is tested for direct effects as well as indirect effects mediated via its effect on occupational influence level.

I: The worker's occupational influence level (I) is the third variable. This variable might also be called "level of responsibility." Scored from six down to one, it is most immediately an index of the level in the company's authority system at which the individual worker's influence is initiated. For example, a manager's instructions move from the top down and ramify throughout the system. A section head directly influences only those in his section. As indicated in Fig. 1 we have based the scoring system on a combination of the span of influence and a staff-line distinction, which we have elaborated from Dahrendorf (1957). The former takes precedence over the latter. This is because line officials give orders; high staff functionaries make recommendations, while lower staff workers merely supply services. If accepted, the recommendations of high level staff personnel such as lawyers and engineers (who are not also managers) become influential when they are accepted by line officials. They may then become orders. One's I score might be interpreted as his "functional importance" to the firm, in the Davis-Moore (1945) sense. The more widely one's work ramifies throughout the company, the more important he is to it and the greater will be his rewards.

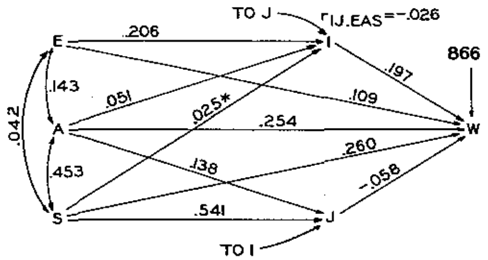
Because this is an unusual way to measure position in an occupational hierarchy, we included it with occupational prestige (by far the more common of such variables), as well as all other variables included herein, in a stepwise regression with W as the dependent variable. This was done to see whether the use of I is empirically justifiable, in view of the fact that occupational prestige is usually so employed, even though no explicit rationale for its inclusion seems ever to have been proferred. The whole São Paulo sample was used. It is well known that occupational prestige hierarchies are stable over time (Hodge, Siegel, & Rossi, 1966), and that São Paulo's occupational prestige hierarchy is quite like that of the United States (Haller, Holsinger, & Saraiva, 1972). The stepwise regression analysis showed that I is one of the most powerful determinants of W, and that when I and the other variables have been taken into account the apparent effect of occupational prestige on wages drops almost to zero. We have therefore concluded that occupational influence can be justified theoretically and empirically, and that since it is available and is much more defensible, there is no justification for using prestige as the occupational variable of this study.

This variable is treated as intervening. In the path analysis sense, it is an endogenous variable. It is tested only for its direct effects on salary. The degree to which it is determined by education, age, and seniority is also assessed.

A: Age (A) is the fourth variable employed herein. We have incorporated it as perhaps the best proxy for overall experience in work relevant to the occupation. That is, the duties of an occupation are broader than those of any particular job those trained for the occupation may hold. On the average, the older a person is the wider the range of his experiences generally relevant to the job, and the longer he will have worked at jobs within his occupation. Furthermore, the longer a person has worked at his occupation, the deeper his knowledge of its duties and the more valuable he should be to the company. Age is treated herein as antecedent and exogenous in the path analysis.

S: Seniority (S) is the fifth variable. It was included for two reasons. For one, it might be argued that the longer one has been with the company the more he understands its operations and the better he serves it. Thus the higher his monetary reward for past and present service should be. It might also be argued that companies provide regular increments to salaries as an incentive for future services—to work hard and to stay with the company. S is also treated as antecedent and exogenous.

J: Years of experience in one's present job (J) is the last variable in the analysis. It is included to permit a test of the hypothesis that the greater one's experience in his present job the greater his rewards will be. We have included it despite our recognition that it is especially problematical. The effects of age may well override those of J. The older a worker is the more likely he is both to have been in the job for a longer time (see Appendix) and also to have had the broadening experience of several jobs. Moreover, to the extent that its effect is not overridden by age, it may well be absorbed by seniority in the company. Yet at first sight the hypothesis seems plausible and indeed it occurs frequently in the literature on wage differentials. In the analysis it is treated as an intervening variable which is affected both by age and by seniority.



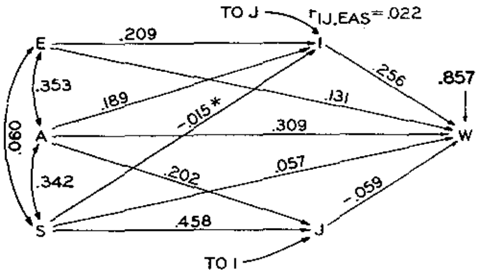
TOTAL EFFECTS	DIRECT EFFECTS	TRANSMITTED VIA I	TRANSMITTED VIA J
$\pi_{WA}=.256$	$P_{WA}=.254$	$\pi_{WA(I)}=.010$	$\pi_{WA(J)}=-.008$
$\pi_{WS}=.234$	$P_{WS}=.260$	$\pi_{WS(I)}=.005$	$\pi_{WS(J)}=-.031$
$\pi_{WE}=.150$	$P_{WE}=.109$	$\pi_{WE(I)}=.041$	------------**
$\pi_{WI}=.197$	$(P_{WI}=\pi_{WI})$	------------**	------------**
$\pi_{WJ}=-.058$	$(P_{WJ}=\pi_{WJ})$	------------**	------------**

W: HOURLY WAGE
I: OCCUPATIONAL INFLUENCE
J: YEARS IN THE JOB
E: PROFESSIONAL PREPARATION
A: AGE
S: SENIORITY-YEARS IN THE COMPANY
* P>.05
** NOT IN MODEL

Fig. 2. Engineers ($R^2 = .250$).

Analytical scheme. Here we employ a path analytic scheme to tes causal hypotheses about the effects of the five antecedent variables on hourl salaries (W) (see Figs. 2-4). Education, age, and seniority are taken to b exogenous variables. Each is presumed to have a direct effect on W which i taken as equal to the standardized partial regression coefficient. In th conventional terms of path analysis these coefficients are labled p_{WX} (whicl means the path to W from variable X), and are represented by straight arrows The values calculated for these direct path coefficients are presented alongsid their respective arrows. (Curved lines stand for unanalyzed correlations, whos values, like the foregoing, are given alongside their respective arrows.) Eacl exogenous variable may also have indirect effects on W which are transmitte via I and/or J. Indirect effects are assessed only according to the model a herein specified. That is, we have made no allowance for "real world" effect transmitted via unanalyzed correlation coefficients or via potential paths no indicated by arrows. We have introduced new symbols for total and indirec effects. The former is π_{YX}, and is read "the total effect X has on Y transmitted by all paths, direct and indirect, dictated by the model." Th latter is $\pi_{YX(Z)}$, and is read "the indirect effect of X on Y which i transmitted via Z."

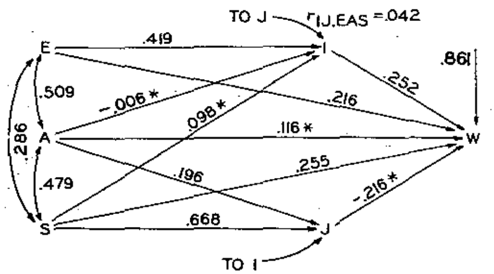
This model presumes that E affects W in two ways: directly an indirectly through E's effect on I and that of I on W. S $\pi_{WE} = p_{WE} + \pi_{WE(I)}$; and $\pi_{WE(I)} = p_{IE} \times p_{WI}$. No allowance is made fo



TOTAL EFFECTS	DIRECT EFFECTS	TRANSMITTED VIA I	TRANSMITTED VIA J
π_{WA}=.346	P_{WA}=.309	$\pi_{WA(I)}$=.048	$\pi_{WA(J)}$=−.012
π_{WS}=.026	P_{WS}=.057	$\pi_{WS(I)}$=−.004	$\pi_{WS(J)}$=−.027
π_{WE}=.185	P_{WE}=.131	$\pi_{WE(I)}$=.054	------------**
π_{WI} =.256	(P_{WI}=π_{WI})	------------**	------------**
π_{WJ}=−.059	(P_{WJ}=π_{WJ})	------------**	------------**

W: HOURLY WAGE
I: OCCUPATIONAL INFLUENCE
J: YEARS IN THE JOB
E: PROFESSIONAL PREPARATION
A: AGE
S: SENIORITY—YEARS IN THE COMPANY
* P>.05
** NOT IN MODEL

Fig. 3. Economists/business administrators (R^2 = .266).



TOTAL EFFECTS	DIRECT EFFECTS	TRANSMITTED VIA I	TRANSMITTED VIA J
π_{WA}=.072	P_{WA}=.116*	$\pi_{WA(I)}$=−.002	$\pi_{WA(J)}$=−.042
π_{WS}=.136	P_{WS}=.255	$\pi_{WS(I)}$=.025	$\pi_{WS(J)}$=−.144
π_{WE}=.322	P_{WE}=.216	$\pi_{WE(I)}$=.106	------------**
π_{WI} =.252	(P_{WI}=π_{WI})	------------**	------------**
π_{WJ}=−.216	(P_{WJ}=π_{WJ})	------------**	------------**

W: HOURLY WAGE
I: OCCUPATIONAL INFLUENCE
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E: PROFESSIONAL PREPARATION
A: AGE
S: SENIORITY—YEARS IN THE COMPANY
* P>.05
** NOT IN MODEL

Fig. 4. Scientists (R^2 = .259).

possible effects of E on W through J. This path was excluded because there appears to be no theoretical or practical justification for it.

Age is another matter. It might well affect wages not only directly (p_{WA}) but also via J ($\pi_{WA(J)}$) and via I ($\pi_{WA(I)}$). Since $\pi_{WA(J)} = p_{WA} \times p_{JA}$, since $\pi_{WA(I)} = p_{WI} \times p_{IA}$, and since the total effect of a variable is defined as the sum of its direct and indirect effects as dictated by the model, it follows that $\pi_{WA} = p_{WA} + \pi_{WA(J)} + \pi_{WA(I)}$.

The effects of seniority (S) are calculated analogously to those of age (A).

According to the model, occupational influence level (I) and years in one's present job (J) only have direct effects on the dependent variable. That is to say, the total effect of each is equal to its direct effect: $\pi_{WI} = p_{WI}$, and $\pi_{WJ} = p_{WJ}$. Moreover, because there is no theoretical reason to expect either asymmetrical or reciprocal causal relationships between occupational influence level and years in the job, we have drawn no paths connecting them and have allowed their empirical relationships to stand as slightly correlated residuals. For all practical purposes this seems fully justified: the $r_{IJ.EAS}$ values for the three occupations range only from +.042 to −.026.[2]

In this analysis we have chosen to employ only techniques derived from linear regression analysis. This means that we have assumed that the relationships among variables can be described satisfactorily without taking into account possible curvilinear relations or complex interactions. In the past other researchers (see Blaug, 1970) have employed "dummy variable" analyses, various kinds of transformations of original metrics, and even undefined variables (Klevmarken, 1972, "job level"). These, capitalizing on nonlinear relationships, interaction, and perhaps even redundancy with the dependent variable, yield multiple coefficients of determination substantially greater than those we report herein, which vary from $R^2 = .250$ to $R^2 = .266$. But the disadvantages of manipulating variables solely to raise R^2 far outweigh the advantages, at least for present purposes. Our long-range aim is to provide a logically plausible and empirically defensible explanation of the causes of wage differentials among occupations and ultimately among societies. We use

[2]One of the main techniques for checking the adequacy of hypothetical models such as this, is to reconstitute the correlation coefficients and to compare these with the original empirical correlation coefficients. We have performed these calculations. For engineers and economist/business administrators the average difference between the original and the reconstituted correlations is <.001 and no one such value is >.002. For basic scientists the average difference is ≅.002 and in two cases is as large as .057. The model thus almost exactly fits the first two occupational samples and is quite close in the last. Such inaccuracy as exists in the latter is due to the larger sampling variation in estimating the parameters for the occupation, which is a consequence of the small sample size (see Table 1). This in no way affects the conclusions.

our data, among other purposes, to compare occupational families according to similarities and differences in the effects of these variables. The use of the present system is advantageous because it permits more nearly unambiguous interpretation.

RESULTS

Figure 1 presents the path analysis of the wage determinants of engineers. The only independent variable with truly negligible—and negative—effects is job experience (J). The apparent effect, or zero-order correlation, of this variable ($r = +.207$, from Table 1) is wholly absorbed in the overriding effects of age (A) and seniority (S). The latter variables, indeed, exert the greatest direct effects on wages, at $p_{WA} = .254$ and $p_{WS} = .260$. Their total effects are not much different, at $\pi_{WA} = .256$ and $\pi_{WS} = .234$. It will be noticed that the indirect effect of each through J tends to attenuate their total effects. Engineers average 35.44 yr of age (Table 1). This is at least 10 yr beyond the normal age of graduation. They have been with their companies an average of 4.28 yr. Yet they have only held their present jobs an average of 2.34 yr. Note that the standard deviation for J (as well as for the other variables) is larger than the mean. We infer that the normal pattern is for engineers to change companies at least once and to change jobs within the present company at least once. Most of this movement is doubtless upward. This seems to mean that, net of age and seniority, once in the firm an engineer gets ahead monetarily by rising in occupational influence. Next to A and S, I is the most influential determinant of engineers' wages, at $p_{WI} = .197$. Table 1 shows that, at an average $I = 4.56$ and $\sigma = 1.05$, engineers tend to occupy positions which generally range between the level of departmental heads and that of general managers, with the average being at the level of technical consultants.

All of the foregoing not withstanding, differences in the amount of occupational education are factors in the wage levels of engineers. The direct path is $p_{WE} = .109$ and the total effect is $\pi = .150$, when the impact of E on W via I ($\pi_{WE(I)} = .041$) is taken into account. Note, too, that much more than age or seniority, education leads to a higher position in the company ($p_{IE} = .206$). All of this is especially noteworthy because the variability in E among engineers ($\sigma = .75$; $V = .05$) is really quite small. This seems to mean that though engineers differ but little in the degree of their specialized occupational preparation those small differences count. Even under the stringent conditions imposed here, the evidence says that among engineers in São Paulo's growing industrial system, those who have the more advanced occupational preparation obtain the highest salaries. This not withstanding, the

TABLE 1

Descriptive Statistics and Zero-Order Correlations

	Engineers ($N = 2796$)			Economists/business-administrators ($N = 1450$)			Basic scientists ($N = 162$)		
	$\bar{X}$	σ	V^*	$\bar{X}$	σ	V^*	$\bar{X}$	σ	V^*
A	35.44	9.46	.27	33.32	8.46	.25	36.00	12.11	.34
E	15.77	.75	.05	14.47	.88	.06	14.29	.96	.07
S	4.28	4.74	1.11	4.66	5.04	1.08	6.39	6.89	1.08
J	2.34	3.00	1.28	2.02	2.57	1.27	3.46	5.54	1.60
I	4.56	1.05	.23	3.84	1.62	.42	3.91	1.45	.37
W	14.96	8.31	.55	12.00	7.61	.63	11.91	7.29	.34

A: Age (years)
E: Occupational preparation (years)
S: Seniority (years with the firm)
J: Job experience (years)
I: Occupational influence level
W: Salary in cruzeiros/hour
*V: $\sigma/\bar{X}$.

Correlations

		Economists/business administrators												
		A	E	S	J	I	W		A	E	S	J	I	W
Engineers	A	–	.353	.342	.358	.258	.419	Basic	–	–	–	–	–	–
	E	.143	–	.060	.100	.275	.308	scientists	.509	–	–	–	–	–
	S	.453	.042	–	.527	.062	.155		.479	.286	–	–	–	–
	J	.383	.055	.603	–	.098	.120		.516	.232	.762	–	–	–
	I	.092	.214	.057	.026	–	.369		.254	.444	.215	.192	–	–
	W	.384	.195	.356	.207	.257	–		.300	.410	.261	.136	.391	–

experience indicated by age and seniority and the fact of having obtained an influential position in the firm have even a greater effect on the salaries of engineers.

Economists/business-administrators. For reasons already discussed in the preceding section, experience on the job counts for less than nothing ($p_{WJ} = -.059$) among these economists and business administrators. Unlike the situation prevailing among engineers, neither does seniority count for much. When the attenuating indirect effects are taken into account, $\pi_{WS} = .026$, which is almost zero. Age (A) is another matter. It counts a great deal. The direct effect of A on W is $p_{WA} = .309$. The indirect effects bring the total to $\pi_{WA} = .346$. The effect of occupational influence (I) on the salaries of these workers is also substantial $p_{WI} = \pi_{WI} = .256$.

Occupational preparation functions here just about as it does among the engineers. The direct effect is: $p_{WE} = .131$ and the total effect is $\pi_{WE} = .185$. Education and age affect one's occupational influence level about equally: $p_{IE} = .209$ and $p_{IA} = .189$.

The pattern of means, standard deviations, and coefficients of variation is not very different from that of engineers (Table 1). These workers are about 2 yr younger, their positions are a bit less influential, and they have not attained quite as much schooling. Yet their occupational experience pattern is about the same.

Here again, under severely controlled conditions we have found that small increments in education are rewarded, and that age and an influential position have an even greater pay-off.

Basic scientists. The sample size of these workers is small compared to that of the others. Although we use it only as a very rough guide we have calculated the probability that a given empirical beta value could be due to chance. More important, given the small sample, we may use the calculated path coefficients only as approximate guides to the actual influence. Here we find as before that J counts negatively if at all. Unlike the previous cases, age (A) appears to have a rather small direct effect ($p_{WA} = .116$), and its indirect effects apparently diminish its total influence even further. As in the case of age, it is hard to pin down the effect of seniority because there are several "nonsignificant" paths. Its direct effect seems noteworthy: $p_{WS} = .255$. Yet the indirect paths, especially $\pi_{WS(J)}$, apparently diminish it to $\pi_{WS} = .136$. The effect of I is quite substantial, as previously found: $p_{WI} = .252$.

Advanced occupational preparation apparently counts most among basic scientists. Its direct effect is $p_{WE} = .216$, which is considerably augmented to $\pi = .322$, because of its indirect effect by way of its strong influence on I ($p_{IE} = .419$).

Table 1 shows only minor differences between these workers and the others. They are slightly older, and have been out of school a year or two longer. They have been with their firm about 2 yr longer. They have held their present job a bit longer—about 1 yr. They are not quite as well educated ($\bar{X}$ = 14.29 yr) and they are paid slightly less. They rank just a bit higher in occupational influence than the economists/business-administrators, but lower than the engineers.

The main conclusion is that among scientists advanced education pays both in and of itself and because of its impact on occupational influence level which also pays.

DISCUSSION

Comparative multivariate analyses of different occupations—especially when they are based upon adequate samples of incumbents—are rare indeed and they are difficult to carry out. Yet this is exactly what a scientific understanding of occupations requires. We must determine the effects of a series of antecedent variables on the dependent variables which describe similarities and differences among incumbents of a given occupation, among occupations within a given society, and among the same occupations in different societies. This presumes that an adequate set of techniques exists by which to make the appropriate comparisons. The present paper is only a beginning. In it we have illustrated the use of one such method, path analysis. We have selected an important dependent variable, hourly wages, and have applied the method to a comparable set of antecedent variables within each of three strategic occupational families, using data from a sample of Brazil's most advanced industries. The need for conceptual clarity becomes especially evident when one uses path analysis, because it requires a clear specification of a causal model. Interoccupational comparisons, not to mention intersocietal comparisons, make even more obvious the need for conceptual clarity. Specifically, obscure methods of operationalizing variables impede comparison. In the paper, we have applied a single model to three different occupations and have used variables which may be readily interpreted. The variables are drawn from the economic literature on income differentials and the socio-logical literature on social stratification. They are measured in comprehensible ways and the original metrics are maintained so as to avoid obscurity. Nonlinear relations are often difficult to interpret. Fortunately, path analysis itself is built upon linear regression, and automatically assumes the best linear fit to the data.

As is often true in social research, the assumption of linear and noninteractive relations appears close to reality. (This is based upon a special analysis not reported herein, in which various transformations of the variables and combinations of dummy variables were compared. It showed that the coefficients of determination of the untransformed linear combinations were only slightly smaller than those yielded by the more complex manipulation of the variables.)

In general we find that occupational influence level has a substantial positive effect on wage differentials in all three occupational families, and we find that (net of age and seniority) the effect of years in the present job is, if anything, negative. Advanced education also has a notable positive effect in all three, especially among basic scientists, even though all employees in this analysis had completed a university education. The effects of age and seniority differ a bit among the three. The effect of the former is especially pronounced among economists/business-administrators and engineers, while the effect of the latter is especially strong among engineers.

Clearly much work needs to be done before full-scale comparative interoccupational and intersocietal generalizations may be drawn. Other dependent variables, such as those describing the role requirements of different occupations, as well as those describing other types of rewards, must be delineated and subjected to clear measurement. Surely, too, other independent and intervening variables must be specified, measured, and incorporated. Also comparable analyses—perhaps building upon this one—must be conducted upon other occupational families in societies at various levels of economic development.

Yet we may hazard a few substantive generalizations about these occupations in the Brazilian context; after all, though but three in number they are especially crucial in industry. Brazil's authoritarian government has opted for capitalistic economic development, and it actively encourages technical competency and efficiency. It is not surprising, then, that variables reflecting competency and responsibility (advanced education and occupational influence level in the firm) should yield monetary rewards. Equally unsurprising is the fact that the one variable describing one's experience in his current job, net of wider occupational experiences, (seniority and age) should be negatively rewarded. We do not know why age should count among economists/business-administrators and engineers but be unimportant among basic scientists, nor why seniority should count among the latter and engineers, but be negligible among economists/business-administrators.

Comparative occupational analysis is in its infancy. We hope that this paper may provide some leads as to how it might be developed in the future.

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