Public Sector Earnings and Educational Planning¹

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PUBLIC SECTOR SALARIES are treated with considerable caution as a basis for labour market analysis. The absence of the incentive of profit maximisation means that civil servants' salaries are less likely to reflect the value of the marginal product of their services than those of employees in profit-maximising industries. Civil servants' salaries are, so the argument goes, determined arbitrarily on the basis of political considerations and are best left alone by labour economists.

This is a pity because more information is usually available about the salaries of civil servants than those of employees in the rest of the economy. Rejection of information on their pay means neglect of a wealth of information about salaries of different categories of labour that might be of value for educational and manpower policy.

However, quite apart from the question whether the salary scales of *permanent* civil servants do or do not have economic significance, there is the fact that the public administration in many countries also employs substantial numbers of people on a temporary, contractual basis, and there is good reason to believe that the salaries of these persons, which are not complicated by the non-pecuniary benefits such as job security and promotion expectations that affect the interpretation of current salaries of permanent civil servants at any point in time, reflect their current opportunity cost.

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The earnings of temporary civil servants according to their educational level would seem to be a useful indicator of the marginal productivity of workers of the same educational level in any economy with a reasonably well-developed private sector.

Moreover, in cases where the public sector is a significant employer of labour with a given educational background, it is reasonable to assume that earnings within this sector provide one of the signals influencing the private demand for education. This is an important consideration for the educational policy maker, for in this case the structure of earnings in the public sector could be manipulated as an instrument for implementing educational planning decisions.

This article takes the form of an empirical investigation of a number of issues related to public sector earnings and education.

The empirical analysis is based on data from the Iranian public sector. Iran, however, is not unique. The public sector plays a key role in the market for manpower with high educational qualifications in most countries and is particularly important in much of the developing world.

The data

The data on which the investigation is based refer to the great majority of public sector employees in Iran in 1971. The State Organisation for Administration and Employment Affairs (SOAEA) instituted in 1968 a data bank in which the particulars of all government employees are stored. Although primary and secondary school teachers are included in this data bank, university teachers, judges and members of the armed forces are excluded, and so are the employees of mixed enterprises like the National Iranian Oil Corporation and Iran Air.

The public and mixed sector employees in Iran total about 300,000. The present analysis was based on 241,000 persons (the difference being the excluded categories mentioned above).

The following employee characteristics were obtained: (1) basic salary; (2) allowances; (3) age; (4) sex; (5) educational level; (6) status.

In order to be certain of retaining the confidential character of the data, salaries and allowances were given as averages for three-year age groups. The last variable (status) has two dimensions: "official" (i.e. permanent) or "unofficial" (i.e. contract) employee, and old or new employee. A new employee is one who has been added to the data bank since its institution in 1968.

Over-all sample characteristics

Table 1 shows the mean basic salary, allowances and earnings for each type of employee.¹

¹ In what follows, earnings equal basic salary plus allowances.

Status	Salary	Allowances	Earnings	Number of observations
All employees	7 905	3 904	11 809	241 106
Permanent	9 593	1 658	11 251	156 022
Contract	7 131	7 295	14 426	53 527
New	5 868	2 227	8 095	31 557

 TABLE 1. AVERAGE MONTHLY BASIC SALARY AND ALLOWANCES BY STATUS

 (in rials)

There are several points worth mentioning in this table. It shows that the earnings of unofficial employees are higher than those of official employees. However, the basic salaries of the official employees are higher. The difference is due to the substantially higher amounts of the allowances enjoyed by unofficial employees. Whereas the allowances of official employees amount to about 17 per cent of their basic salary, those of unofficial employees amount to more than 100 per cent. Children's allowances play a small part in explaining the differential (the average being 100 rials per month per child). The others are premiums for overtime, research, holding a director's position and "technical capacity".

As the last row of table 1 shows, the earnings of "new" employees are lower than those of the other categories, usually because of the young age of these persons. Yet, as can also be seen from the table, these young "new" employees command substantially higher allowances than their well-established official colleagues.

One possible explanation of this differential system of allowances (and therefore earnings) is the differing educational level of employees by status. Table 2 shows the average basic salary and earnings of the three categories of employees by educational level.

Within each status group basic salary increases with educational level. From the last column it can be seen that total earnings grow much faster than basic salary. The level of both basic salary and earnings of new employees is below those of the other two because new employees are generally young. In all educational categories the basic salary level of unofficial employees is below that of official employees. However, when allowances are taken into account the picture changes considerably. Total earnings of university-educated unofficial employees are substantially higher than those of official employees.

There are two points worth noting in this context: first, the allowances of the university-educated unofficial employees represent more than

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Status	Educational level	Salary only	Earnings (salary and allowances)
	Illiterate	6 717	7 128
	Primary	8 202	9 244
	Secondary	7 817	8 485
Permanent	Bachelor's	11 776	14 951
	Master's	12 652	16 172
	Doctorate	13 546	17 136
ł	Illiterate	5 003	6 116
	Primary	6 008	7 488
	Secondary	6 1 99	7 542
Contract	Bachelor's	8 953	17 762
	Master's	9 676	22 901
	Doctorate	10 287	22 660
	Illiterate	4 716	5 87 6
	Primary	4 009	4 573
N.T.	Secondary	5 573	6 249
New	Bachelor's	7 171	10 714
	Master's	7 237	13 104
	Doctorate	7 903	13 349
Source: SOAEA.			

TABLE 2. CIVIL SERVANTS' (MALE AND FEMALE) AVERAGE MONTHLY EARNINGS BY EDUCATIONAL LEVEL AND STATUS

(in rials)

100 per cent of their basic salary, compared with 30 per cent in the case of official employees of the same educational level (see table 3). It is reasonable to interpret these data as showing that unofficial employees of a high educational level are attracted to public service via a generous allowance system.

However, and this is the second point, the earnings of unofficial employees are *not* higher than the earnings of official employees for *all* educational levels, as might be expected if higher allowances were merely intended to compensate contract employees for not having the job security of the permanent members of the civil service. At the lower educational levels official government workers have higher earnings than unofficial ones (see figure opposite). The cross-over of the two types of earnings occurs somewhere at the university drop-out level. If we assume that the dotted line in the figure (relating to unofficial employees) approxi-

Educational level	Permanent	Contract
Illiterate	1.1	1.2
Primary	1.3	1.2
Secondary	1.1	1.2
Bachelor's	1.3	1.9
Master's	1.3	2.4
Doctorate	1.3	2.2

TABLE 3. RATIO OF EARNINGS TO BASIC SALARY FOR OFFICIAL AND UNOFFICIAL EMPLOYEES

RELATIONSHIP BETWEEN THE EARNINGS OF OFFICIAL AND UNOFFICIAL EMPLOYEES BY YEARS OF SCHOOLING



mates the value of the marginal product of labour, then official government salaries seem to offer a higher return from work than would otherwise be the case to those with low educational qualifications and less than their opportunity cost to employees with higher educational qualifications.¹

If this is so, the question, of course, arises of why it is possible to recruit any graduates into the permanent civil service. One reason may be that the permanent posts offer greater security and possibly other nonpecuniary benefits. Aside from this, the observed salaries may not represent an equilibrium situation. It may be because the salaries of graduate official employees are too low to attract adequate numbers of recruits that it is necessary to engage a greater number of unofficial employees than would otherwise be needed and to offer them very high earnings. We return to this topic in the concluding section.

The determinants of earnings

By means of tabulations we have now formed some impressions of the determinants of earnings differences between different categories of public sector employees. The two variables considered were status and education. In this section we start again from the same position but introduce the additional explanatory variables of age and sex.

In order to do this reasonably concisely an earnings function was fitted to the data by means of multiple regression.² The basic model was

Earnings = f(age, sex, education, status)

and several specification variants of it were tried.

VARIANT A. AGE AND EDUCATION AS CONTINUOUS VARIABLES

The first experiment consisted in running separately basic salary, allowances and earnings as the dependent variable in an exploratory way so as to discover the over-all behaviour of each variable. For this experiment, age and education were included as continuous variables.³ Sex was entered as a dummy variable, having the value of 1 if male.

¹ This hypothesis could be tested according to whether persons with low educational qualifications have a high propensity to become civil servants whereas highly qualified persons avoid government positions. However, this would require data on applications for the civil service by educational level of the applicants and is beyond the scope of this study.

² There exist about 50 applications of earnings functions in the literature. For a typical example see D. Metcalf and J. Bibby: "Salaries of recruits to university teaching in Britain", in *Higher Education* (Amsterdam), Vol. 1, No. 3, 1972. None, however, was concerned exclusively with the public sector.

⁸ The following number of years of schooling were assumed for each of the eight categories distinguished: illiterate = 0; primary drop-out = 3; primary completed = 6; secondary drop-out = 9; secondary completed = 12; Bachelor's = 16; Master's = 18; and Ph.D. = 20.

		Dependent variable	
Independent variable	Salary	Allowances	Earnings
Constant term	7.761	3.059	7.749
Age	.012 (.001)	.046 (.006)	.013 (.001)
Sex	.025 (.015)	.604 (.146)	.114 (.024)
Education	0.40 (.001)	.127 (.012)	.057 (.002)
Official	.405 (.021)	*	.280 (.034)
Unofficial	.165 (.021)	.993 (.152)	.319 (.034)
R ²	.882	.530	.813

TABLE 4. BASIC SALARY AND TOTAL EARNINGS AS A FUNCTION OF AGE, SEX, EDUCATION AND STATUS

Notes: (1) Regression base is all employees.

(2) Age and education are continuous variables (measured in years).

(3) Sex and status variables are dummies (female and new employees are incorporated in the constant term).

(4) Dependent variable is logged.

(5) Numbers in parentheses are standard errors.

* f level insufficient for the variable to be included in the regression.

Official and unofficial employees were also entered as dummy variables, "new employee" being the excluded category to avoid matrix singularity. In all regressions in this study the dependent variable was in the form of the natural log of the original variable.

Table 4 presents the results of the first experiment. Let us start from the last row of this table, referring to the coefficient of determination. A word of caution is in order in this connection: because of the confidential nature of individual data, salary averages for three-year age groups were used in the regression; this averaging of course removed some of the individual variations of earnings and therefore the R^2 s are excessively high. In other words, the coefficient of determination should not be interpreted as explaining 88 per cent of the variance of individual salaries; in practice the proportion would be rather less than that.

In view of this it is better to concentrate on the regression coefficients and their standard errors. Since the dependent variable is logged, any coefficient when multiplied by 100 gives the percentage change in salary/ allowances/earnings when a continuous variable (like age or education) is increased by one year.

After having standardised for age and sex, the variables to look for are education and status. Whereas one extra year of education increases basic salary by 4 per cent, its effect on allowances is to increase them by nearly 13 per cent. The over-all effect of one year of education on earnings is an increase of nearly 6 per cent. The fact of being an "official" employee adds about 41 per cent to basic salary but nothing to allowances. On the other hand, the fact of being an "unofficial" employee adds almost 100 per cent to allowances but only 17 per cent to basic salary.

It is also interesting to note that the coefficients for "sex" show that whereas being male adds only 2.5 per cent to basic salary it adds 60 per cent to allowances. One way of interpreting this is that there is virtually no discrimination against women in official pay scales, but the operation of the labour market means that in terms of earnings men receive considerably more than women.

By way of summary, the order of entry into the step-wise regression of independent variables in explaining earnings is (1) education; (2) age; (3) unofficial status; (4) official status; (5) sex.

After this preliminary analysis the following experiment concentrated only on the explanation of earnings and ignored the basic salary/allowances dichotomy.

VARIANT B. AGE AND EDUCATION AS DUMMY VARIABLES

In this experiment age and education entered the regression as dummy variables in order to allow for possible non-linearities (for instance, the effect of one extra year of university education may be different from that of one extra year of primary education). The possible differential effect of education on income cannot be detected by the regressions presented in table 4, which impose a log-linear form on the data.

Table 5 gives the results of the second experiment. Four sets of regressions were run, one for all employees and one for each status category. The non-linear effects mentioned above can be seen by reading vertically the coefficients for any dummy group of variables. The earnings functions in relation to age appear to be "S" shaped, rising only slowly up to the mid-twenties and subsequently rising steeply up to the mid-forties, after which the growth tapers off.

The coefficients for education increase with each level, with the exception of Ph.D. All education coefficients for unofficial employees are above the ones for official employees.

A way of summarising the information in table 5 is to present the order of entry of the most important independent variables in the regression in explaining the variation of earnings for official and unofficial employees (table 6).

TABLE 5. EARNINGS AS A FUNCTION OF AGE, SEA, EDUCATION AND STATU	TABLE	5.	EARNINGS	AS	А	FUNCTION	OF	AGE,	SEX,	EDUCATION	AND	STATUS
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	Sample					
Independent variable	All employees	Permanent	Contract	New		
Constant term	8.186	8.567	8.102	8.316		
Ages 19-24	.048	089	.406	.031		
	(.084)	(.069)	(.222)	(.118)		
25-33	018	160	.196	.114		
	(.080)	(.063)	(.214)	(.114)		
34-45	.176	.123	.440	.135		
	(.079)	(.062)	(.213)	(.114)		
46-57	.391	.428	.603	121		
	(.080)	(.062)	(.213)	(.130)		
58-65	.422	.480	.583	056		
	(.084)	(.065)	(.219)	(.222)		
Sex	.108	.062	.148	.133		
	(.023)	(.020)	(.047)	(.034)		
Primary drop-out	.139	.086	.257	.281		
	(.052)	(.045)	(.094)	(.213)		
Primary completed	.210	.243	.259	.034		
	(.046)	(.041)	(.091)	(.082)		
Secondary drop-out	.361	.276	.493	.256		
	(.046)	(.041)	(.091)	(.079)		
Secondary completed	.430	.417	.523	.326		
	(.046)	(.041)	(.092)	(.078)		
Bachelor's drop-out	.700	.633	.818	.505		
	(.050)	(.044)	(.100)	(.084)		
Bachelor's completed	.871	.798	1.051	.731		
	(.047)	(.042)	(.097)	(.079)		
Master's	1.104	.903	1.469	.827		
	(.052)	(.044)	(.110)	(.087)		
Ph.D.	1.060	.854	1.376	.926		
	(.051)	(.044)	(.111)	(.083)		
Official	.255 (.032)	—	_			
Unofficial	.300 (.033)					
R^2	.835	.931	.813	.885		

Notes: (1) Dependent variable in all cases is log (earnings).

(2) Numbers in parentheses are standard errors.

(3) The excluded age category is "18 or under".

(4) The excluded educational category is "illiterate".

Order of entry	Permanent employees	Contract employees
(1)	Age 46-57	Master's
(2)	Age 58-65	Ph.D.
(3)	Master's	Bachelor's
(4)	Ph.D.	Age 25-33

TABLE 6.	RELATIVE IMPORTANCE	OF INDEPENDENT	VARIABLES
I	N EXPLAINING THE VAR	IANCE OF EARNIN	IGS

In other words we can support the statement that, whereas the main determinant of earnings of official employees is age, the main determinant of earnings of unofficial employees is education, a finding which we may assume bears some relation to productivity elsewhere in the economy.

Public policy and educational priorities

Table 7 shows the educational distribution of public sector employees and of all employed persons in the economy. It reveals that the public sector in Iran employs one-third of the stock of persons with secondary school qualifications and nearly half of the stock of persons with university qualifications. We may therefore assume that public sector salaries are an important labour market indicator for young people who wish to take their educational decisions in the light of their implications for future employment.

Educational level	Public sector employees	Employed labour force	Per cent public (2): (3) \times 100
(1)	(2)	(3)	(4)
Illiterate	41 603	4 821 703	.9
Read only		185 693	
Literate without certificate		426 606	
Primary	43 669	960 542	4.5
Secondary	123 204	368 510	33.4
Higher	32 630	73 761	44.2
Not reported		21 581	
Total	241 106	6 858 396	

TABLE 7. DISTRIBUTION OF THE LABOUR FORCE BY EDUCATIONAL LEVEL

Note: Primary, secondary and higher categories include drop-outs of the respective levels. Source: SOAEA and 1966 Census.

	Employee categories		ies
	All	Permanent	Contract
Primary (over illiteracy)	27 (*)	30 (*)	28 (*)
Secondary (over primary)	5 (5)	3 (4)	7 (8)
Bachelor's (over secondary)	9 (12)	8 (11)	10 (14)
Master's (over secondary)	9 (13)	7 (10)	13 (16)
Ph.D.			
(over secondary)	6 (9)	4 (7)	9 (11)
¹ Based on zero tuition costs. * Infinite value because of zero forgone	earnings.		
Source: Based on the earnings functions in	n table 5.		

TABLE 8. SOCIAL (AND PRIVATE ') RATES OF RETURNTO INVESTMENT IN EDUCATION

Next, we needed a criterion for assessing the country's priorities as regards educational investment. Among the several criteria available we selected cost-benefit analysis based on estimated rates of return to different levels of education. One of the reasons for selecting this criterion was that information was easily obtainable through an extension of the earnings functions presented in the earlier sections.

Basing ourselves on the earnings function with age and education as dummy variables (table 5) we constructed age-earnings profiles for six educational categories: illiterates, primary school graduates, secondary school graduates, Bachelor's degree, Master's degree, and Ph.D. These estimated age-earnings profiles, when combined with unit costs, based on average public expenditure per student year of 3,150 rials for primary education, 3,825 rials for secondary education and 54,175 for higher education, produced a set of social and private rates of return for completed educational levels which are shown in table 8.

A few points are worth noting here regarding the method of estimation and interpretation of the results. First, the only adjustment made to these rates of return was the one implicit in the earnings function from which they were derived. The meaning of various adjustments to rates of return is very dubious and we therefore chose to show only crude private and social rates of return which differed to the extent that it was assumed that all direct tuition costs were covered by the public sector.¹

¹ On this matter see G. Psacharopoulos: *Returns to education: an international comparison* (Amsterdam, Elsevier, 1973).

Educational level	Percentage unemployed	Educational level	Percentage unemployed
Illiterate	10.0	University drop-out	2.2
Read only	8.0	Bachelor's	2.6
Primary drop-out	8.1	Master's	7.5
Completed primary	8.1	Engineer Doctorate	1.2
Secondary drop-out	7.6	Literacy or certificate	5.6
Completed secondary	13.0	not reported	
Source: 1966 Census.			

TABLE 9.	UNEMPLOYMENT	BY EDUCATIONAL LEVEL.	1966

One adjustment that could be justified is for unemployment of secondary school graduates, which, as table 9 shows, is very high. The effect of this adjustment would be to reduce further the already low rate of return to secondary education. However, the estimates presented here are intended to be rough orders of magnitude only, and interpretation of them should concentrate primarily on their ranking; even the unemployment adjustment is superfluous when using this information as an educational policy indicator.

Policy interpretation

What policy interpretations can be given to this examination of public sector salaries in relation to the cost of acquiring various qualifications? First, we may note the differences in estimated rates of return depending on whether they were calculated with respect to salaries of permanent or contract employees. This is the result of differences in their earnings streams already noted. Next, we observe the usual differences between private and social rates of return, with the social rate in all cases below or equal to the private one. This is because tuition costs are met by the public authorities. Third, we may note that the rates of return are much higher for primary education than for all the other levels and that they are particularly low for secondary education.

It is of considerable significance that the low rates of return to secondary and higher education respectively are due to entirely different reasons. As indicated above, the direct costs of secondary education are low. The reason for its low rate of return is to be found in table 2, where one can see that the earnings of secondary school-leavers are very little more than those of primary school-leavers. In the case of higher education the reverse is true. Graduates earn on average between two and three times as much as secondary school-leavers; however, each year of their higher education costs the public sector on average 14 times as much as a

Educational level	Distribution of expenditure		Average annual
	1964	1970	
Primary	65.0	58.0	9.0
Secondary	19.0	20.0	11.2
Higher	9.0	15.0	21.5
Other ¹	7.0	7.0	

TABLE 10. PERCENTAGE DISTRIBUTION AND RATE OF GROWTH OF PUBLIC EXPENDITURE IN EDUCATION, BY LEVEL (1964-70)

¹ Technical education and teacher training.

Source: Based on the Iran General Budget and information supplied by the Institute for Research and Planning in Science and Education.

year of secondary education. In other words the opportunity cost of every place provided in higher education establishments is equivalent to that of about 14 places in secondary schools.¹

There are at least two ways in which the public sector can influence educational priorities. The first is by its expenditure on various levels of education, the second is by the remuneration it offers to its own employees.

Table 10 shows that public expenditure on education has moved in a way very different from that suggested by the rate of return calculations. Expenditure on higher education has grown much more rapidly and expenditure on secondary schools slightly more rapidly than that on primary education. The policy implications for the future appear to be quite unequivocally in the direction of a more rapid growth of expenditure on primary education and of less rapid rates of growth of expenditure on secondary and higher education.

What is not quite so clear is whether this slower growth of expenditure on higher education should be achieved by reducing the growth rate of student numbers or by reducing expenditure per student. In the case of secondary education the answer appears to be clear. Its unit costs are already low—the low rate of return is due to small earnings differentials between secondary and primary school-leavers. The way to raise the rate of return, therefore, is surely to reduce the number of secondary schoolleavers trying to enter the labour force relative to the number of primary school-leavers. As regards higher education, the earnings differential between university graduates and secondary school-leavers is substantial. The reason for the rather low rate of return to higher education is its high

¹ This ratio is far from exceptional in developing countries. Normally higher education is even more expensive relative to other levels.

social cost. It would seem, therefore, that the policy to be aimed at in the first instance is a reduction in unit costs while maintaining growth rates of student numbers. Meanwhile the earnings and employment of graduates, which must be monitored in any case ¹, should be particularly carefully watched for indications of how far the lowering of the quality of graduates which would presumably accompany a reduction in the resources devoted to training them was leading to a reduction in their salaries. It could indeed be argued that a possible response to the low rate of return to *secondary education* combined with its low social cost might be an experimental *increase* in per unit costs to see if this would result in a more than proportionate increase in quality and subsequent higher earnings.

The second policy instrument available to the public authorities is the manipulation of salaries in the public sector. We may assume for this purpose that the salaries of permanent employees represent the administered pay scales and the earnings of unofficial employees their opportunity cost in the open labour market. We may argue, therefore, that where the pay of permanent officials is above that of contract employees, official salary policy is stimulating students to attain the level of education concerned to a greater extent than would be the case if earnings were determined entirely by the free play of market forces. Conversely, where the administered scales are below the free market rates this somewhat reduces the attraction of attaining a given level of education. Thus the Iranian Government, by raising the already high rate of return to primary education in terms of public sector salary scales is encouraging young people to complete primary education even more than would otherwise be the case. Conversely, by keeping down the earnings of permanent employees with secondary and higher education, the government as an employer may be doing something to help choke off the private demand for these levels of education. It may be argued, therefore, that in its public sector salary policy, the Iranian Government, possibly unwittingly, is acting more in accordance with the educational policy indicated by the rate of return information than it is in its educational expenditure policy.

Concluding comment

There are of course severe limits on the extent to which public sector pay scales can be used to influence private rates of return to education. If the salaries of permanent employees are kept too low, the public sector will not be able to recruit sufficient suitably qualified manpower. The strength of this weapon depends on the elasticity of demand for each type of labour in the private sector. If the arrival of only a few people from the public sector

¹ See M. Blaug: "Approaches to educational planning ", in *Economic Journal* (London), June 1967, pp. 262-287.

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salary policy is a potentially powerful weapon. If, conversely, the elasticity of demand in the private sector is high, governments must be concerned primarily with paying the wages necessary to get the manpower they require and can give little attention to a secondary use of public sector wage policy as an instrument of educational and training policy.

To examine these issues any further we would need information on movements over time in earnings by qualification.

However, while there are few who would claim that the indicators provided by rate-of-return calculations should be the only or even a major basis for the formulation of educational policy, it does seem that if used intelligently, and particularly if the costs and earnings constituents of the rates of return are distinguished, they would provide a useful addition to the armoury of educational planners. There are many reasons for being dubious about the empirical validity of the general equilibrium view of the economic system, of which rate-of-return calculations can form a part. However, this is not to deny their pragmatic usefulness as one among many other indicators of where a little more and where a little less could well be spent.

Finally, the need for such calculations to be made at frequent intervals cannot be over-stressed.