

# Education and private versus public sector pay/

by George Psacharopoulos \*

## Introduction

The theory and practice of public sector employment along non-profit maximising principles has received considerable attention in the economics literature. Thus there exist models attempting to link the pay behaviour of the non-private sector to a set of factors ranging from the wishes of voters to the possibility of bribery by civil servants.<sup>1</sup> And the empirical comparison between public and private wage structures has been conducted using a variety of data bases in a number of countries.<sup>2</sup>

What has received scant attention, however, is the relationship between education and public-versus-private sector pay. The educational pay differential by economic sector is of great importance because it links to an array of theoretical, empirical and policy labour market issues. For example, public-private pay differentials by education can have an efficiency interpretation on the utilisation of qualified labour in the economy. Similarly, public versus private pay differentials could act as signals affecting private behaviour regarding the demand for given types of education. To go one step further, civil service pay scales could be used as a policy instrument towards the spontaneous creation of a desired educational structure of the population.

Beyond efficiency, the relative dispersion of earnings in the two sectors of the economy relates to the issue of the contribution of the public sector to equity. Differential pay by economic sector further links to a series of issues raised by the dual labour market and screening theories. And public versus private sector hiring practices could be interpreted in the context of the job competition model.<sup>3</sup>

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Table 1. The over-all public-to-private sector mean earnings differential

Country	Earnings ratio
United Kingdom	1.20
Greece	1.19
Portugal	1.49
Brazil	1.75
Colombia	1.49
Malaysia	0.91
Over-all	1.34

Source: Sample bases described in Appendix A.

A latent consideration to those listed above is what sector is dominant in the wage determining process. The importance of this issue is becoming clearer as recent statistics show that in both advanced and poor countries the public sector employs well over one half of highly educated manpower.<sup>4</sup>

The purpose of this article is to investigate empirically and interpret the public versus private pay differential by education in six countries using individual data. Three countries belong to the more industrialised group (the United Kingdom, Greece and Portugal) and the other three to the less industrialised group (Brazil, Colombia and Malaysia). The individual data used have an advantage over previously used grouped (already tabulated) data in that they permit standardisation for *other* characteristics of the employees in the two sectors (such as sex, age and education) and in that they preserve personal variations in pay between employees.

The data base is presented in Appendix A and the definition of the "public" and "private" sectors in each country case is explained in Appendix B. In order to avoid issues of sex discrimination the analysis concentrates only on males. The second section of the article presents the basic pay differentials, and the third section gives the results of a regression standardisation procedure. The final section discusses the findings.

### The basic differentials

Pay differentials in the economic sector - education nexus can be examined from different angles such as, first, over-all public-private sector differences without reference to education. Second, horizontal, i.e. between-sector pay differences by education. And, third, vertical, i.e. within-sector pay differences by education. This is the order we shall follow in this section using mean earnings ratios.

By way of introduction, table 1 gives the over-all earnings differential in the six countries. With one, rather minor, exception the public sector pays well above the private sector. The six country simple average indicates that the public sector employees' earnings advantage over the private sector is of the

order of 34 per cent. Caution, however, is in order in interpreting such aggregate statistics not only because of the absence of standardisation for non-homogeneous labour quality utilised in the two sectors, but also because of differential fringe and non-monetary benefits enjoyed by employees of the two sectors. Whereas in the following section we shall be able to standardise to some extent for differential labour quality by sector, the issue of non-pecuniary or other fringe benefits will have to remain a qualification.

Turning to the horizontal dimension of the comparisons, table 2 presents the earnings differential between the two sectors by level of educational attainment. The picture here is a clear decline of the public sector pay advantage by ascending educational level. To put it differently, less educated employees are better treated in the public sector whereas highly educated employees (in three out of the six country cases) receive less pay in the public sector than their counterparts in the private sector (Greece, Brazil and Malaysia). In the other three cases the public and the private sectors virtually pay equal wages to university educated employees (the United Kingdom, Portugal and Colombia).

Table 3 presents vertical, i.e. within-economic-sector earnings differentials for adjacent educational levels. The picture revealed is one of increasing differentials by ascending educational level and also that for a given educational level the private sector pays more than the public sector at the margin. The earnings ratios given in table 3 are in fact very rough proxies for the relative private rate of return to different levels of education. But for more exact estimates one should use the information of the age-earnings profile of the employees as in the next section.

### The returns to education

The pay differentials presented above by means of ratios can be refined for differences in productive characteristics between employees of the two sectors. The standardisation procedure chosen is that of the human capital earnings function<sup>5</sup>

$$\ln Y_i = f(S_i, EX_i, EX_i^2)$$

where  $Y_i$  is the earnings of the  $i^{\text{th}}$  employee,

$S_i$  the number of years of schooling corresponding to the highest level of his educational attainment, and

$EX_i$  the years of labour market experience defined as  $AGE_i - S_i$  - School starting age in the particular country.

The experience-squared term is introduced as to catch the observed parabolic decline of earnings with age. The semi-logarithmic specification derives from human capital theory, where the coefficient on the years of schooling variable ( $S$ ) is interpreted as the private rate of return to education.<sup>6</sup>

Tables C.1 to C.6 in the Appendix present the detailed results of fitting the above earnings function within economic sectors in the six countries under

Table 2. Horizontal (between sectors) earnings differentials by educational level

Country	Less than primary	Primary	Secondary	Higher
United Kingdom	— <sup>1</sup>	1.11 <sup>2</sup>	1.09 <sup>3</sup>	1.05
Greece	— <sup>1</sup>	1.11	0.88	0.81
Portugal	1.61	1.43	1.16 <sup>4</sup>	1.00 <sup>5</sup>
Brazil	1.56	1.28	0.78	0.83
Colombia	1.49	1.06	0.84	1.04
Malaysia	1.75	0.98	0.95 <sup>6</sup>	0.58
Over-all	1.60	1.16	0.95	0.89

Notes: Figures are public-to-private sector mean earnings ratios. <sup>1</sup> Low cell frequency of employees with less than primary education. <sup>2</sup> Refers to fewer than five 0-levels. <sup>3</sup> Refers to A-level. <sup>4</sup> Refers to Lyceum. <sup>5</sup> Refers to University, five years. <sup>6</sup> Refers to 6th form.

Table 3. Vertical (within sector) earnings differentials by educational level

Country	Primary/ Less than primary		Secondary/Primary		Higher/Secondary	
	Public	Private	Public	Private	Public	Private
United Kingdom	—	—	1.29	1.31	1.51	1.56
Greece	—	—	1.22	1.55	1.30	1.41
Portugal	0.99	1.12	1.10	1.36	1.81	2.09
Brazil	1.59	1.92	2.67	4.37	2.26	2.14
Colombia	1.07	1.48	1.81	2.31	2.80	2.26
Malaysia	0.62	1.13	1.59	1.64	2.27	3.72
Over-all	1.07	1.41	1.61	2.09	1.99	2.20

Note: Figures are mean earnings ratios of employees with adjacent levels of educational attainment.

consideration. The findings could be summarised as follows: In terms of overall explanation ( $R^2$ ), the human capital model fits better to the public sector of the economy than the private sector (four out of six cases). Before one interprets this as a paradox (given the non-competitive behaviour of the public sector), it should be noted that the differences in  $R^2$ s are not very pronounced. Therefore, one could roughly conclude that the public sector pays at least as much attention (for whatever reason) to the productive potential of the employee.

What is of more interest, however, is that with no exception the returns to education are higher in the private sector of the economy. Table 4 presents the coefficient on years of schooling from the human capital earnings functions and shows that, regardless of economic sector, the returns to education are considerably higher in the less advanced group of countries under consideration. This could be interpreted as relative skill scarcities having an influence on the returns to education, as predicted by economic theory.

**Table 4. The returns to schooling by economic sector and country group**

Country	Per capita income (\$US)	Public	Private
United Kingdom	4 098	6.3	8.7
Greece	2 822	6.2	7.0
Portugal	1 670	4.9	8.0
(DC average)		(5.8)	(7.9)
Brazil	760	14.9	19.3
Colombia	760	13.4	14.6
Malaysia	970	17.7	22.5
(LDC average)		(15.3)	(18.8)
Over-all		10.6	13.4

Notes: Figures refer to  $(\delta \ln Y / \delta S) \cdot 100$  from the earnings functions reported in appendix tables C.1 to C.6. Per capita incomes refer to the nearest year of the surveys, from OECD: *National Accounts, 1980*, Vol. I (DCs) and World Bank: *World Bank Tables, 1976 and 1980* (LDCs).

**Table 5. The coefficient on years of experience by economic sector**

Country	Public	Private
United Kingdom	5.6	7.2
Greece	5.5	5.6
Portugal	2.7	5.7
Brazil	3.4	4.9
Colombia	4.1	7.0
Malaysia	3.4	9.9
Over-all	4.0	6.7

Note: figures derive from the coefficient on *EX* in tables C.1 to C.6, times 100.

Turning to the second form of human capital, i.e. post-school investments, table 5 shows that the coefficient on experience is consistently higher in the private sector of the economy.<sup>7</sup> This again could be interpreted as a higher recognition of a productive characteristic by the sector where productivity matters. No clear pattern emerges regarding the coefficient on *EX* between more and less advanced countries, perhaps because there do not exist substantial relative endowment differentials of OJT (on-the-job training).

That the earnings determining process is different in the two sectors of the economy has been statistically tested by performing a Chow-test to the sector-specific and pooled earnings functions.<sup>8</sup> In all cases the F-statistic had highly significant values indicating that public sector employees received different prices for their productive characteristics relative to private sector employees.

A casual interpretation of this finding could be treated as evidence for labour market segmentation.<sup>9</sup> But beyond the objections already raised in the literature regarding the use of truncating earnings functions for testing the dual labour market hypothesis, the fact that education is more highly rewarded in the private (read, less structured) sector of the economy runs against a basic prediction of labour market segmentation theory.<sup>10</sup>

## Discussion

The contrast between public and private sector individual pay in six countries leads to the following propositions and interpretations:

(a) Although the public sector pays on the average more than the private sector, the two sectors pay roughly equal wages to the highly educated. Hence the public sector cannot be assumed to be setting "wrong signals" regarding the social demand for education or introducing a major non-competitive element in the market for highly qualified manpower.

(b) The higher average pay associated with the public sector is due to the fact less qualified labour is better treated in the public than private sector. Evidently, whatever non-competitive element is introduced by this policy, the higher pay of the less educated in the public sector could be rationalised in terms of an effective minimum wage in that sector.

(c) The pay determination in both public and private sectors is consistent with the human capital model. However, the effect of education on earnings is stronger in the private sector, a finding to be interpreted as a recognition of the higher productivity of the educated where profit matters.

(d) The higher pay of the more educated in the private sector of the economy casts doubts on the validity of the job competition model.<sup>11</sup> This is because the educational level of the worker seems to have a productivity counterpart and is not only being used for obtaining a job in the first place.

(e) Although the prices commanded by similarly educated employees in the two sectors are different (as judged from the coefficients of the earnings function), this difference is in the opposite direction of the one predicted by the dual labour market hypothesis.

(f) The higher rate of return to schooling in the private sector of the economy points against the screening hypothesis, as it is very unlikely for profit maximising employers to keep paying irrational wages above the real productivity of the workers. On the contrary, one might expect the public sector to be able to sustain wages unrelated to productivity using education as a screening device, a case that is not supported by the data.

Perhaps the major conclusion of the foregoing analysis is that the data do not support a public sector salary dominance in the market for highly qualified labour. On the contrary, it is more reasonable to assume that it is the private sector that sets the correct wage signal which is tacitly transmitted to the public sector.

Of course this conclusion derives from a limited set of six country cases. Further evidence from other countries might help to clarify the role of the public sector as an employer of educated labour.

### Appendix A

#### *The data bases*

*United Kingdom.* General Household Survey 1975. For a description of this survey see OPCS (1975). For a previous analysis using this data set see Psacharopoulos (1981a).

*Greece.* The 1977 special Wages and Salaries Survey conducted by the National Statistical Service of Greece on behalf of the Post-secondary Education Study Team, Ministry of Education. For a description of this survey see Psacharopoulos and Kazamias (1978), and, for another analysis using this data set, Psacharopoulos (1982a).

*Portugal.* A 3 per cent random sample of the non-agricultural labour force from the 1977 Personnel Records (Quadros de Pessoal) of the Ministry of Labour. For a previous analysis using this data set, see Psacharopoulos (1981b).

*Brazil.* A 1 per cent random sample of the 1970 Census. For a previous analysis using this sample, see Psacharopoulos (1982b).

*Colombia.* The 1975 DANE urban labour market survey. For a previous analysis using this data set see Bourignon (1980).

*Malaysia.* The urban 1978 sample raised by Professor Kiong Hock Lee of the University of Malaya. For a previous analysis using this data set, see Lee (1980).

### Appendix B

#### *The public-private sector distinction*

#### *United Kingdom*

Public: Employees in public administration.  
Private: Employees in distributive trades.

#### *Greece*

Public: Employees in public administration and the social services.  
Private: Employees in manufacturing.

#### *Portugal*

Public: Employees in firms 100 per cent controlled by the State.  
Private: Employees in firms with zero public control.

#### *Brazil, Colombia and Malaysia*

Explicit government versus private employee distinction in the questionnaire.

### Appendix C

#### *Earnings functions within economic sectors*

Table C.1	United Kingdom
Table C.2	Greece
Table C.3	Portugal
Table C.4	Brazil
Table C.5	Colombia
Table C.6	Malaysia

All results are for males only. Numbers in parenthesis in tables C.1 to C.6 are *t*-ratios.

Table C.1 Within sector earnings function and mean earnings by education level, United Kingdom, 1975

Variable/educational level	Public	Private
Constant	6.661	6.119
Years of schooling, <i>S</i>	0.063 (5.8)	0.087 (6.2)
Experience, <i>EX</i>	0.056 (7.9)	0.072 (11.5)
<i>EX</i> <sup>2</sup>	-0.0009 (7.2)	-0.0012 (10.0)
<i>R</i> <sup>2</sup>	0.174	0.256
<i>N</i>	379	452
Fewer than five O-levels	2 623	2 359
Five or more O-levels	3 788	2 992
A-level	3 380	3 097
Degree	5 103	4 835
Over-all (£ per year)	3 159	2 629

Table C.2 Within sector earnings function and mean earnings by education level, Greece, 1977

Variable/educational level	Public	Private
Constant	10.619	10.772
Years of schooling, <i>S</i>	0.062 (23.3)	0.070 (20.7)
Experience, <i>EX</i>	0.055 (22.9)	0.056 (12.9)
<i>EX</i> <sup>2</sup>	-0.0008 (14.0)	-0.0010 (10.3)
<i>R</i> <sup>2</sup>	0.400	0.326
<i>N</i>	2 557	1 265
Primary	154	139
Secondary	188	215
University	244	303
Over-all (thousands of drachmas per year)	232	194



Table C.3 Within sector earnings function and mean earnings by education level, Portugal, 1977

Variable/educational level	Public	Private
Constant	8.675	7.797
Years of schooling, <i>S</i>	0.049 (62.2)	0.080 (69.0)
Experience, <i>EX</i>	0.027 (25.2)	0.057 (71.4)
<i>EX</i> <sup>2</sup>	-0.0003 (19.5)	-0.0008 (57.7)
<i>R</i> <sup>2</sup>	0.246	0.255
<i>N</i>	12 484	28 010
Less than primary	12 078	7 471
Primary	11 940	8 356
Secondary, Lyceum	13 120	11 324
University, three years	18 198	14 938
University, five years	23 753	23 686
Over-all (escudos per month)	12 974	8 645

Table C.4 Within sector earnings function and mean earnings by education level, Brazil, 1970

Variable/educational level	Public	Private
Constant	7.080	6.586
Years of schooling, <i>S</i>	0.149 (65.9)	0.193 (118.4)
Experience, <i>EX</i>	0.034 (9.0)	0.049 (22.8)
<i>EX</i> <sup>2</sup>	-0.0004 (6.3)	-0.0007 (20.3)
<i>R</i> <sup>2</sup>	0.568	0.534
<i>N</i>	3 689	13 179
No schooling	2 796	1 806
Primary	4 441	3 461
Lower secondary	8 351	8 634
Upper secondary	11 871	15 138
University	26 834	32 454
Over-all (cruzeiros per month)	8 179	4 662

Table C.5 Within sector earnings function and mean earnings by education level, Colombia, 1975

Variable/educational level	Public	Private
Constant	6.381	5.884
Years of schooling, $S$	0.134 (44.2)	0.146 (73.8)
Experience, $EX$	0.041 (11.2)	0.070 (32.3)
$EX^2$	-0.0005 (7.3)	-0.0010 (23.3)
$R^2$	0.606	0.515
$N$	1 376	5 507
No education	2 210	1 491
Primary	2 354	2 202
Secondary	4 256	5 081
University	11 898	11 481
Over-all (pesos per month)	4 641	3 090

Table C.6 Within sector earnings function and mean earnings by education level, Malaysia, 1978

Variable/educational level	Public	Private
Constant	3.837	3.021
Years of schooling, $S$	0.177 (33.1)	0.225 (39.6)
Experience, $EX$	0.034 (4.4)	0.099 (10.2)
$EX^2$	-0.0007 (2.1)	-0.0012 (3.2)
$R^2$	0.699	0.676
$N$	482	794
No education	609	341
Primary	377	384
Lower secondary	471	433
Upper secondary	601	628
6th form	701	743
University	1 363	2 339
Post-graduate	1 676	3 081
Over-all (M\$ per month)	958	1 054

## Notes

<sup>1</sup> See Courant, Gramlich and Rubinfeld (1979), Fogel and Lewin (1974), Annable (1974), and Reder (1975).

<sup>2</sup> See Knight (1967, 1968), Smith (1976, 1977), Gunderson (1979), and Bennell (1980).

<sup>3</sup> The "job competition model", attributable to Thurow (1975), states that in contemporary labour markets workers compete for jobs rather than wages and that the more educated or trainable workers advance faster in the queue for filling job openings.

<sup>4</sup> According to unpublished statistics of the OECD and IIEP (International Institute of Educational Planning).

<sup>5</sup> The basic hypothesis of human capital theory is that education expenses incurred by the State or individuals represent a form of investment the yield of which is realised by means of increased productivity of the educated worker (see Becker, 1975).

<sup>6</sup> See Mincer (1974).

<sup>7</sup> For the difficulties associated with interpreting the coefficient on years of experience as the rate of return to training, see Psacharopoulos and Layard (1979).

<sup>8</sup> See Chow (1960). The test is

$$F_{k, N_p - 2k} = \frac{\sum U_p^2 - \sum U_1^2 - \sum U_2^2}{\sum U_1^2 + \sum U_2^2} \cdot \frac{N_p - 2k}{k}$$

where  $\sum U^2$  is the sum of squared residuals from the earnings function fitted to the data set denoted by the subscript, 1 = public sector, 2 = private sector and p = pooled sample (1 + 2).  $N$  is the total number of observations and  $k$  the number of independent variables used in the regression (including the constant).

<sup>9</sup> The dual or segmented labour market theory stipulates that there exist distinct clusters of workers employed under adverse or good job conditions, and that there exists little mobility between such segments (for a review and critique, see Cain, 1976).

<sup>10</sup> See Cain (1976) and McNabb and Psacharopoulos (1981).

<sup>11</sup> See Thurow (1975).

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