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PRIVATE RETURNS TO EDUCATION IN GREECE

Abstract

Private returns to education in Greece are investigated using the data of three Household Budget Surveys (1974, 1988 and 1994). Returns to schooling are found to be higher for females than for males, they declined between 1974 and 1988 and then rose in 1994 and, further, returns to education are increasing as the level of education rises. Sensitivity tests show that the hypothesis of selectivity bias for female employees is rejected, whereas when potential experience is replaced by age as an explanatory variable, the estimated returns decline by around two percentage points. No significant differences are found between rates of return of private and public sector workers, while education was found to act as a screening device, at least in the case of male employees.

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1. Introduction

The first attempts to estimate private returns to education in Greece go back to the 1960s [Leibenstein (1967)]. However, the subject has not been examined in as much a depth in Greece as in other European countries, in part due to data limitations. The existing studies cover the period from the late 1950s to the early 1990s, rely on a variety of data sources (not always representative of the entire labour force and/or consistent with each other) and use both standard Mincerian and cost-benefit techniques.¹ The aim of the present paper is to estimate private returns to education in Greece using the data of three Household Budget Surveys (1974, 1987/88 and 1993/94). These are the only data sets available which cover in a consistent way the entire labour force over the last twenty five years and contain income information.²

The structure of the paper is the following. Section 2 presents the data used in the paper, Section 3 reports the main estimates of earnings functions, while Section 4 performs a number of sensitivity tests and Section 5 provides the conclusions.

2. Data

The three Household Budget Surveys (HBSs) used in the paper were carried out by the National Statistical Service of Greece.³ They cover the entire non-institutional population of the country and their sampling fractions are 3% for the 1974 HBS and 2% for the other two HBSs. They contain detailed information about consumption expenditures, incomes and socio-economic characteristics of the households and their members. The income component reported in the surveys and used in the paper is “earnings net of income taxes and social insurance contributions” which is well-suited for the purposes of the paper. It includes wages, salaries, overtime payments, bonuses, holiday payments, and related benefits received from the main and secondary employer, normalised on a monthly basis. Further, the surveys report the number of hours normally worked by each worker per week. Division of monthly income adjusted on a weekly basis by this figure yields “net hourly earnings” which is used as the dependent variable in our analysis. Due to the fact that during the periods of the surveys inflation was high in Greece, all earnings figures were expressed in mid-year prices (1974, 1988 and 1994, respectively). Information on education is

1. Leibenstein (1967), Kanellopoulos (1982, 1985, 1986, 1997), Psacharopoulos (1982), Kioulafas et al (1991), Lambropoulos (1992), Lambropoulos and Psacharopoulos (1992), Patrinos (1992, 1995), Patrinos and Lambropoulos (1993), Magoula and Psacharopoulos (1997); for a survey see Cholezas and Tsakloglou (1999).

2. Another Household Budget Survey carried out in 1981/82 did not collect information for hours worked and, therefore, cannot be utilised for the purposes of the present paper. A comparison of rates of return to education using monthly data unadjusted for hours worked for the four surveys is provided in Appendix I.

3. Since the second and the third of these surveys were carried out mostly in 1988 and 1994, we will refer to them as the 1988 and the 1994 HBS, respectively.

provided in grouped form in the HBSs - "highest level of education completed" - while there is no information on actual working experience and, thus, in line with many studies we calculate potential experience as "age-years in education-6". The categorical variable "education" reported in the HBS is converted into a continuous one assuming that primary education lasts six years, lower secondary, upper secondary and technical tertiary education three years each and University education four years.

The samples used in the paper consist of employees outside the agricultural sector aged 14-64. Thus, self-employed, employers, unpaid family members and apprentices are excluded. Males working less than 35 hours per week were also excluded from the analysis on the grounds that their less than full employment was probably involuntary. Further, two more small groups were excluded from the analysis. Firstly, persons who declared as "normal" working time more than 84 hours per week and, secondly, persons with incomes from self-employment as well as paid employment, since it is not possible to separate the proportion of their working time devoted to paid employment. Estimates of returns to education are reported separately for males and females, since it is believed that the two groups of workers follow different age-earnings paths - an assumption supported empirically by the data.

The main characteristics of the three samples used in the paper are reported in Table 1. In all surveys male workers enjoy higher average earnings than female workers. Between 1974 and 1988, average hourly earnings rose considerably for both males and females. In the case of the latter, the rise is particularly steep, 57.6%, and should be partly attributed to the enactment of "equal pay" legislation. Unlike the first sub-period, hourly earnings declined marginally during the second sub-period. Throughout the period under examination the average education level of both male and female workers was rising and, in fact, in all surveys the average years of education were higher for female rather than male employees. The latter may be partly due to the fact that in all surveys the average female worker is younger than her male counterpart, as implied by the fact that, on average, females have lower potential experience than males or, perhaps, to selectivity bias, an issue investigated below.⁴

4. Some estimates of Table 1 may seem paradoxical at first sight - especially the rather high average number of years of education and the fact that female workers appear to be better educated than male workers. The former is probably consequence of the fact that Greece has the highest rate of self-employment in the EU and a very considerable proportion of the self-employed are farmers whose educational qualifications are substantially lower than those of the urban workers. The latter should be attributed to the fact that many of the better-educated males are self-employed in the non-agricultural sector of the economy.

Table 1. Basic descriptive statistics

	Sample Size		Mean net hourly earnings (1994 prices)		Average years of education		Average years of potential experience	
	Males	Females	Males	Females	Males	Females	Males	Females
1974	2267	982	995.4 (618.1)	706.4 (617.4)	7.83 (4.27)	8.18 (4.98)	23.19 (12.80)	17.06 (13.33)
1988	1860	1191	1203.8 (615.3)	1113.3 (787.2)	9.96 (4.30)	10.71 (4.71)	21.54 (12.43)	18.02 (12.04)
1994	2096	1504	1194.8 (657.3)	1068.4 (722.4)	10.15 (4.07)	11.21 (4.11)	21.75 (11.97)	18.13 (11.38)

(standard deviations in parentheses)

A more detailed picture of the evolution of the educational composition of the employees is provided in Table 2. In this table, each sample is subdivided into five groups according to the highest level of education completed. For both males and, particularly, females, the proportion of those with primary education or less declined spectacularly between 1974 and 1994, while the shares of tertiary and upper secondary education graduates rose constantly.

Before proceeding to the estimation of earnings functions, it is worth devoting a few words to the developments of the Greek economy during the period under examination, with emphasis on labour market developments. Before the first oil crisis, Greece was one of the fastest growing economies in the world. Incomes policies were used extensively, trade unions were under the firm control of the government, unemployment was low and there was a very high migration from the rural areas, both internal to the cities of Athens and Salonica and international to Western Europe (particularly Germany) and Australia. After the first oil crisis, which almost coincided with the collapse of a seven-year military dictatorship, the economy entered a period of relatively slow growth. Trade unions enjoyed new freedoms, there was a rise in union membership and militancy and the share of wages in GDP rose fast. International migration was halted and a considerable number of immigrants returned to Greece, especially after the second oil crisis and the recession that hit several West European countries. Regarding education, in 1976 compulsory education was increased from 6 to 9 years and, further, the first institutes of technical tertiary education were established. The 1980s were marked by Greece's accession to the, then, EC and the first ever socialist governments in Greece's history. During the early years of the socialists' administration a number of redistributive measures were introduced – among them, generous increases in the minimum wage, wage indexation policies, etc – and, further, public sector employment expanded rapidly (a trend that had already started in the 1970s). Effectively, in the 1980s and the early 1990s the economy stagnated and unemployment rose almost continuously – it now stands at levels higher than the EU average. The macroeconomic history of this period is characterised by stop-and-go policies and, in the framework of these policies, incomes policies featured prominently.⁵ During the 1990s the economic climate changed drastically. Markets were liberalised, incomes policies were abandoned and, after the mid-1990s, the Greek economy started growing at satisfactory rates after a very long period. The other important development of the 1990s was the massive influx of legal and, particularly, illegal immigrants (mostly from Eastern European countries) in the Greek labour market. It has been estimated that in the late 1990s they were accounting for over 10% of the Greek labour force. Even though detailed data do not

5. For a survey of macroeconomic developments in Greece during the post-war period, see Alogoskoufis (1995).

Table 2. Distribution of employees per level of education in Household Budget Surveys (%)

	All			Males			Females		
	1974	1988	1994	1974	1988	1994	1974	1988	1994
Primary not completed	12.7	4.2	4.3	11.0	3.5	4.6	16.7	5.3	3.9
Primary	44.9	31.5	23.1	48.8	34.1	25.8	35.9	27.3	19.5
Lower Secondary	8.2	10.5	12.9	9.6	13.1	15.6	4.9	6.3	9.2
Upper Secondary	24.8	34.7	35.3	22.1	32.8	34.3	31.0	37.7	36.6
Tertiary	9.4	19.2	24.4	8.5	16.5	19.8	11.5	23.4	30.8

exist, it is believed that the wages received by these immigrants are considerably lower than those received by the indigenous workers [Lianos et al (1996), Markova and Sarris (1997)]. Finally, apart from the improvement in the average educational qualifications of the labour force that was mentioned earlier, another characteristic of the labour market during the period under examination is the continuous increase in female labour force participation, although the corresponding participation rate is still much lower than that encountered in most EU member-states.

3. Basic empirical results

We start by estimating the standard Mincer (1974) equation:

$$\ln W = a + bS + c\text{EXPER} + d\text{EXPER}^2 + f\text{PARTTIME} + u$$

where W , S , EXPER and PARTTIME denote, respectively, net hourly earning, years of schooling, potential experience and a dummy variable for females working less than full-time (less than 35 hours per week).

The results are reported in Table 3. The coefficients of interest have the expected signs and are statistically significant. In all surveys returns to education are considerably higher for females than for males; 7.6% against 5.7% in 1974, 6.5% against 5.0% in 1988 and 8.6% against 6.3% in 1994. The relationship between log-earnings and potential experience is bell-shaped for both sexes. Nevertheless, few workers are located in the descending leg of the curve. For example, in 1994 the turning point for males was 38.2 years and for females 37.3 years of potential experience. Taking into account that in the mid-1990s the median retirement age in Greece was around 57 years, it is not surprising to find that in the 1994 HBS only 10.6% of the males and 6.9% of the females are found in the descending leg of this curve. Further, as demonstrated in Graph 1, the earnings-potential experience profiles of males and females differ considerably, with those of females being much flatter than those of males.⁶ Finally, the fact that the value of the constant term is higher for males, indicating that an individual with no schooling and potential experience need only be male in order to earn more, may be considered an indication of discrimination against females in the labour market.

Private returns to education declined between 1974 and 1988 and, then, rose again in 1994. The finding that returns to education declined between the 1970s and the 1980s is in line with the findings of a number of other studies [Kioulafas et al (1991), Lambropoulos (1992), Lambropoulos and Psacharopoulos (1992)] which rely on different data sources. The interpretation offered in these studies is that the rapid

6. Further disaggregation of the sample shows that it is especially the earnings-potential experience of private sector male workers that exhibits a steep bell-shaped pattern.

Table 3. Private returns to education in Greece – Standard Mincer equation

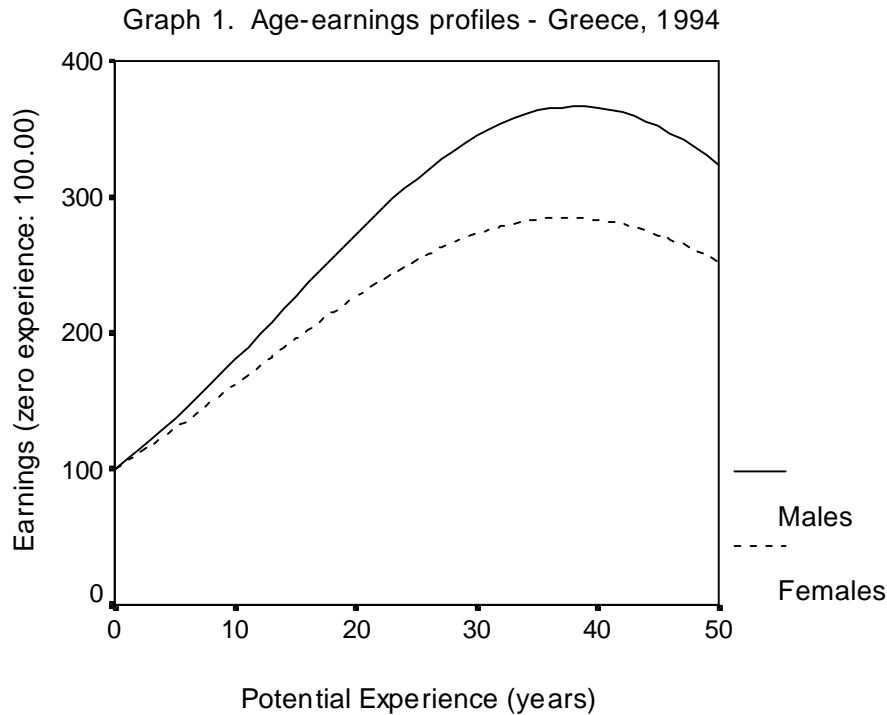
	1974		1988		1994	
	Males	Females	Males	Females	Males	Females
Constant	2.294 (0.045)	2.059 (0.053)	4.939 (0.055)	4.769 (0.057)	5.363 (0.072)	5.066 (0.095)
Years of schooling	0.057 (0.002)	0.076 (0.004)	0.050 (0.003)	0.065 (0.004)	0.063 (0.003)	0.086 (0.006)
Potential experience	0.068 (0.003)	0.041 (0.004)	0.053 (0.003)	0.036 (0.003)	0.068 (0.005)	0.056 (0.006)
Potential exper. sq./100	-0.105 (0.006)	-0.063 (0.008)	-0.073 (0.005)	-0.046 (0.008)	-0.089 (0.009)	-0.075 (0.012)
Part-time		0.522 (0.045)		0.426 (0.032)		0.229 (0.047)
R ² adjusted	0.358	0.433	0.310	0.437	0.274	0.248

(standard errors in parentheses)

expansion of the education system resulted in an increased supply of better-educated workers, while at the same time slow economic growth contributed to a negligible rise in demand for such workers, thus producing a decline in returns to education. Although these factors undoubtedly played an important role in the decline of private returns to education, this interpretation neglects a number of institutional factors. As noted earlier, throughout the 1980s incomes policies played an important role in Greece. Between 1981 and 1982 real hourly earning rose by 10.4% while productivity and GDP per capita were declining [IMF (1987, p. 104)]. This rise was driven by the rise in the minimum wage was even more spectacular, 17.3%.⁷ At the same time, wage indexation policies were introduced. However, indexation was full only up to a particular wage level and less than complete above it. These developments, coupled with high inflation rates lead to a very compressed wage structure. In the two years prior to the 1988 HBS severe austerity measures were introduced which reversed the earlier gains of wage and salary earners, but left the wage structure largely unchanged. As a consequence of this compressed wage structure, returns to education appear to decline substantially in the 1980s. These policies were reversed in the 1990s and, even though the education system continued to expand and economic growth continued to be anaemic, returns to education rose substantially between the late 1980s and the early 1990s.

The standard Mincer equation implies that each additional year of schooling has the same impact on the rate of return irrespective of the level or type of education. This

7. As demonstrated by the estimates of Appendix 1, which are derived from monthly data unadjusted for hours worked, in 1982 marginal rates of return for secondary and tertiary



assumption has been questioned in several empirical studies. In order to estimate rates of return to each separate level of education we use a model with dummy variables that take the value of (1), when a level is completed and (0) otherwise. Thus, the so-called extended Mincer equation takes the form:

$$\ln W = a + \sum b_i L_i + c \text{EXPER} + d \text{EXPER}^2 + f \text{PARTTIME} + u$$

where the L_i s are dummies for different levels of education: Primary education not completed (control group), primary, lower secondary, upper secondary (general), upper secondary (technical), some years of tertiary, technical tertiary and university tertiary education.

The corresponding results are reported in Table 4 and the implied average and marginal annual rates of return in Table 5. The clear conclusion that can be drawn from these estimates is that private returns to education in Greece are not a linear function of years/levels of education. This conclusion holds for all survey years, irrespective of the worker's sex. Unlike standard investment models, which assume that the rate of return is declining as the level of investment rises, the estimates reported in these tables imply that marginal private returns to schooling in Greece are increasing. This is also evident in Graph 2, which depicts average and marginal rates of return for male employees in 1994. In fact, the rates of return to schooling reported in Table 5 are relatively high in comparison with estimates for other countries at a level of economic development similar with that of Greece, reported in Psacharopoulos

education were the lowest recorded in any of the four HBSs available. These low rates of return

Table 4. Private returns to education in Greece – educational levels

	1974		1988		1994	
	Males	Females	Males	Females	Males	Females
Constant	2.496 (0.051)	2.297 (0.069)	5.114 (0.089)	5.017 (0.084)	5.577 (0.081)	5.604 (0.131)
Primary	0.118 (0.036)	0.180 (0.063)	0.076 (0.084)	0.107 (0.073)	0.125 (0.062)	-0.169 (0.121)
Lower secondary	0.232 (0.045)	0.352 (0.081)	0.275 (0.089)	0.265 (0.093)	0.309 (0.069)	0.137 (0.137)
Upper secondary	0.495 (0.040)	0.674 (0.066)	0.376 (0.087)	0.495 (0.082)	0.515 (0.067)	0.412 (0.132)
Upper secondary (technical)					0.496 (0.075)	0.493 (0.148)
Some years tertiary, no degree	0.629 (0.079)	0.535 (0.126)	0.536 (0.093)	0.650 (0.104)		
Tertiary technical					0.706 (0.074)	0.691 (0.138)
Tertiary	0.867 (0.045)	1.151 (0.070)	0.624 (0.088)	0.816 (0.081)	0.863 (0.069)	0.827 (0.137)
Potential experience	0.068 (0.003)	0.042 (0.004)	0.057 (0.003)	0.041 (0.003)	0.071 (0.005)	0.067 (0.006)
Potential exper. Squared/100	-0.108 (0.006)	-0.073 (0.008)	-0.082 (0.006)	-0.061 (0.008)	-0.097 (0.009)	-0.107 (0.013)
Part-time		0.476 (0.045)		0.406 (0.034)		0.194 (0.049)
R ² adjusted	0.380	0.459	0.318	0.448	0.283	0.269

(1985, 1994). Apart from this, most of the results of Table 3 are also reproduced in Table 4. The earning – potential experience profiles are bell-shaped for both sexes, the rates of return for most education levels were lower in 1988 than in the other two surveys and, in general, the results show that in the earlier surveys, for most levels of education, both average and marginal rates of return were higher for females than for males, but in the most recent survey the evidence is mixed. Further, in the case of males returns to general education are higher than returns to technical education at comparable levels of the education system (upper secondary, tertiary), whereas in the case of females, this holds only for tertiary education.

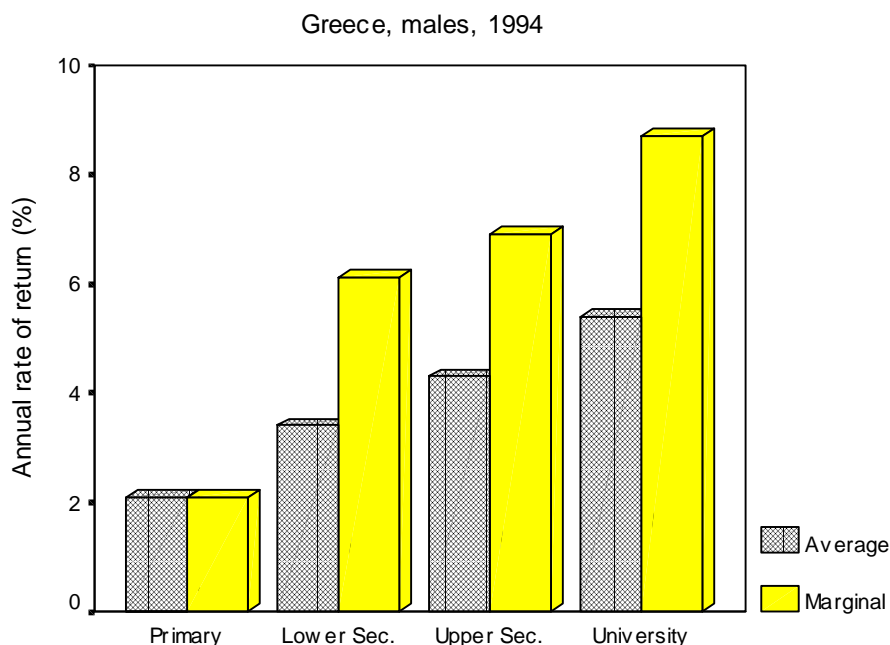
should be attributed to the above policies.

Table 5. Average and marginal annual private rates of return per educational level (%)

	Average rate of return						Marginal rate of return					
	1974		1988		1994		1974		1988		1994	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Primary	2.0	3.0	1.3	1.8	2.1	- *	2.0	3.0	1.3	1.8	2.1	- *
Lower secondary	2.6	3.9	3.1	2.9	3.4	-*	3.8	5.8	6.6	5.3	6.1	- *
Upper secondary	4.1	5.6	3.1	4.1	4.3	3.4	8.8	10.7	3.4	7.7	6.9	9.2
Upper secondary technical	na	na	na	na	4.1	4.1	na	na	na	na	6.3	11.9
Tertiary technical	na	na	na	na	4.7	4.6	na	na	na	na	7.0	6.6
Tertiary	5.4	7.2	3.9	5.1	5.4	5.2	9.3	11.9	6.2	8.0	8.7	10.4

* Coefficient statistically not significant

Graph 2. Average and marginal rates of return per level of education



4. Sensitivity tests

The estimates of returns to education derived from the basic Mincer equation reported in Table 3, were subjected to a number of alternative sensitivity tests. Four of these tests are reported in Table 6, using the data of the 1994 HBS.⁸

It is frequently argued that in the case of females returns to education derived from standard Mincerian models may be biased – probably overestimated – because the females that participate in the labour force are not representative of all females. In order to correct for such a potential selectivity bias, we estimated a two-step Heckman (1978) model. In the first step, a probit model of the labour force participation probability of a female is estimated and, in the second step, the derived inverse Mills ratio is included in the earnings function as an additional explanatory variable. The corresponding estimates are reported in columns 6(a) and 6(b). In addition to earnings and potential experience, marital status and number of children aged below 6 and 6-13 are included in the probit model. All the variables have the expected signs. The three additional variables appear to affect negatively the participation probability

8. Furthermore, the standard Mincer equation was also re-estimated (a) including in the concept of earnings incomes-in-kind provided by the employers, in order to account for the fact that a few employees received non-pecuniary as well as pecuniary remuneration, (b) assuming that potential experience for males is equal to age-6-schooling-2, in order to account for the fact that all Greek males spend two years in National Service, (c) assuming that University education lasts for 5 years, since studies in Engineering last for five years, in Medicine for six years and a number of University graduates hold post-graduate degrees, and (d) interacting schooling with regional and locational dummies. Under these specifications, returns to education appeared marginally lower: by 0.1% under (a), by 0.2% (males only) under (b), by 0.5% under (c) and by 0.1% under (d). Further, in (d) the great majority of the dummy variables turned out to be statistically not significant. Results available from the authors on request.

Table 6. Sensitivity tests (Greece, 1994)

	Selectivity bias (females only)		Age instead of potential experience		Sector of employment				Returns to education for self-employed	
	Probit	Mincerian	Males	Females	Public		Private		Males	Females
					Males	Females	Males	Females		
	6(a)	6(b)	6(c)	6(d)	6(e)	6(f)	6(g)	6(h)	6(i)	6(j)
Constant	-1.433 (0.096)	4.795 (0.136)	3.848 (0.193)	3.485 (0.249)	5.861 (0.128)	5.578 (0.150)	5.362 (0.929)	5.327 (0.132)	6.030 (0.130)	5.933 (0.261)
Years of schooling	0.096 (0.006)	0.099 (0.007)	0.040 (0.003)	0.064 (0.005)	0.053 (0.005)	0.072 (0.010)	0.057 (0.005)	0.063 (0.009)	0.034 (0.006)	0.050 (0.014)
Potential experience	0.053 (0.006)	0.061 (0.005)			0.047 (0.008)	0.042 (0.010)	0.068 (0.061)	0.047 (0.069)	0.031 (0.007)	0.011 (0.012)
Potential exper. Squared/100	-0.135 (0.012)	-0.091 (0.011)			-0.056 (0.014)	-0.061 (0.021)	-0.089 (0.011)	-0.064 (0.014)	-0.041 (0.012)	-0.021 (0.022)
Age			0.120 (0.010)	0.119 (0.013)						
Age squared/100			-0.122 (0.012)	-0.128 (0.017)						
Part-time		0.002 (0.0004)		0.208 (0.047)		0.326 (0.052)		0.017 (0.078)		0.424 (0.136)
Marital status	-0.441 (0.052)									
Number of children below 6	-0.066 (0.044)									
Number of children 6-13	-0.093 (0.030)									
λ		0.092 (0.060)								
R ² adjusted			0.280	0.248	0.222	0.327	0.219	0.102	0.042	0.115

and are statistically significant, apart from the number of children below 6. However, when the inverse Mills ratio, λ , is included in the earnings function it turns out to be statistically not significant. Therefore, it can be argued that the estimates reported in Table 3 do not suffer from selectivity bias.⁹

It is often argued that age may be a more important determinant of earnings than potential experience, since it may be better able to capture elements of a worker's personality, such as maturity, that are valued by the employers. Moreover, in many award systems seniority plays a very important role – especially in the public sector and some large private sector corporations. For this reason in 6(c) and 6(d) the standard Mincer model is re-estimated using age instead of potential experience. The results differ substantially from the corresponding results reported in Table 3. The rates of return to schooling reported in 6(c) and 6(d) are lower by over two percentage points in comparison with those reported in Table 3 (declines, in relative terms, by 36.5% for males and 25.6% for females). As a result, even though in absolute terms the gap in the rates of return to education between males and females remains constant across models, in relative terms it rises considerably when we move from Table 3 to Table 6. Further, the estimates of Table 6 suggest that the peak of the age-earnings profile for male workers is reached at the age of 49.2, whereas for female workers it arrives earlier, at the age of 46.5.¹⁰

It is also argued that it may not be appropriate to mix public and private sector workers when estimating earnings functions, since the reward norms that are prevalent in the public sector may be different than those of the private sector. In the two most recent HBSs there is information on the worker's sector of employment. It should be noted, though, that in the HBS definition "public sector" includes, apart from government services, firms where the government held a controlling stake either directly or indirectly (utilities, banks, etc.). As noted earlier, public sector employment rose rapidly in the 1980s and, hence, it is not surprising to find that in 1994 38% of the workers in the sample were public sector employees. Estimates of returns to schooling for males and females disaggregated by sector of employment are reported in 6(e)-6(h). A number of interesting points can be made with respect to these estimates. In both sectors returns to education are higher for females than for males. However, in the case of males these returns are higher in the private sector, whereas in the case of females they are higher in the public sector. It should be noted, also, that for both

9. Similar results were also derived when the extended Mincer model was used. Further, note that the rate of return to schooling in 6(b) is higher, rather than lower, than that reported in the last column of Table 3.

10. In order to select between the two models, we employed a Davidson-McKinnon (1981) J-test for testing non-nested hypotheses. The test turned out to be inconclusive in the case of males but in the sample of female workers it rejected the model of Table 3 (with potential experience) in favour of the model of Table 6 (with age). This rejection has obvious implications for some of the results reported in the paper.

sexes and for either sector these returns are lower than those reported in Table 3, thus, calling into question whether it is appropriate to merge the two sectors when estimating returns to education. In addition, as noted earlier, the earnings – potential experience profiles are very different in the two sectors, with the private sector employees exhibiting far steeper profiles (particularly in the case of male employees).¹¹

Normally, returns to education are assumed to be the outcome of increased productivity. The objection of a number of scholars to this argument is that increased productivity may not really be the result of increased education, but the result of other, perhaps unobserved factors, like higher ability. Therefore, education is only acting as a “screening device”. Certainly, if valid, this hypothesis has serious implications for the estimation of social returns to education, but its implications for the estimated private returns to education are not clear. In order to investigate the signalling value of education we estimate the standard Mincer equation for self-employed persons, who face no signalling effects. If their returns to education are lower than those to employees, then the latter are likely to receive higher returns due to the fact that their employer expects higher productivity based on their educational attainment; hence their education is, indeed, used as a signalling device. The corresponding estimates are reported in 6(i) and 6(j) and they are statistically significantly lower than the relevant estimates of Table 3 for both males and females. Therefore, it can be concluded that education is used as a “screening device” in the Greek labour market and higher wages to those with higher educational qualifications may not be the result of higher productivity. This result is different than the corresponding results of other studies of the Greek labour market which test the “screening hypothesis” using alternative methodologies, such as Lambropoulos (1992) and Magoula and Psacharopoulos (1997) (in fact, the latter uses the same data set as the one used here]. For a number of reasons, the results of columns 6(i) and 6(j) should be interpreted with caution. On the one hand, the concept of income from self-employment used in the HBSs is “gross income”. Therefore, taking into account that the Greek income taxation is progressive, the private rates of return to education derived from income data net of taxes for the self-employed would, probably, have been even lower than those reported in Table 6; hence the screening “scenario” appears to be even stronger. However, since tax evasion among the Greek self-employed is considered to be rife, this claim may not be as strong as it looks at first sight. On the other hand, since the great majority of the self-employed work in

11. It can be noted also that the dummy variable for female part-time employment is statistically significant for public sector workers but not for private sector workers. This may be due to a number of arrangements applicable to particular groups of female public sector workers but not to their private sector counterparts – for example, shorter working hours without loss of pay for mothers of young children. However, it may also raise some questions about the validity of the replies of some public sector workers (for example, teachers) to the question of “normal working hours” of the HBS.

unincorporated firms, it is likely that their reported incomes incorporate returns to both labour and capital; hence, a priori, we would anticipate them to have lower returns to education than persons in paid employment. Further, we attempted to restrict our comparison of returns to education of the self-employed to returns to education of private sector workers only, since it is in the private sector that wages are more likely to be more closely related to productivity [a line of argument also followed in Magoula and Psacharopoulos (1997)]. In this case the results were slightly different, since the “screening hypothesis” is not accepted in the sample of females but it is still not rejected in the sample of males.¹²

Finally, it should be noted that the estimates of returns to education reported so far do not take into account the impact of unemployment. As noted earlier, unemployment in Greece was rising rapidly during the period under examination and, further, it hit particularly hard women, younger persons and secondary education graduates. Therefore, leaving our results unadjusted for the probability of unemployment may bias a number of the paper’s conclusions (differential returns to males and females, trends, etc.). A rough attempt to provide such “corrected” rates of return to different levels of education for males and females is presented in Table 7. In this table, the estimates derived from Table 4 for each survey and level of education are multiplied by the employment probability corresponding to the relevant education level for male and female workers separately.¹³ The estimates of Table 7 should be compared with those of Table 5. The differences between the estimates of the two tables are not very large. Naturally, the average rates of return reported in Table 7 are lower than those in Table 5, especially in the most recent surveys, when unemployment was higher. Rates of return to schooling were higher for females in the two earlier surveys, but the opposite is true in the 1994 HBS. The most interesting results, though, concern the marginal rates of return in the most recent survey. Because unemployment was particularly high among upper secondary education graduates – especially females – the adjusted marginal rates of return to tertiary education are higher than those reported in Table 5, thus, suggesting that from a private point of view tertiary education is an even more profitable form of investment than implied before.¹⁴

12. The estimates reported in 6(i) and 6(j) are derived when the sample includes both self-employed and employers outside the agricultural sector. Even stronger results were obtained when the sample was restricted to the self-employed only. Further, note that even though all variables in 6(i) and 6(j) are statistically significant, they explain a very low proportion of the dependent variable’s variance.

13. Employment probability rates are calculated from the samples of the HBSs and are slightly different than those reported regularly by the National Statistical Service of Greece.

14. The method adopted here rests on the assumption that there are no unemployment benefits. Taking into account that unemployment benefits in Greece are very low in value, almost flat and, normally, last for six months only (twelve months in exceptional circumstances), this assumption is not particularly unrealistic. For example, in the 1994 HBS only 14% of the unemployed reported that they were receiving unemployment benefit.

Table 7. Average and marginal annual private rates of return per educational level adjusted for unemployment (%)

	Average rate of return						Marginal rate of return					
	1974		1988		1994		1974		1988		1994	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Primary	1.9	3.0	1.2	1.7	2.0	- *	1.9	3.0	1.2	1.7	2.0	- *
Lower secondary	2.5	3.9	2.9	2.6	3.1	-*	3.7	5.7	6.2	4.3	5.4	- *
Upper secondary	4.0	5.3	2.9	3.4	3.9	2.9	8.6	9.8	2.9	5.7	6.3	7.5
Upper secondary technical	na	na	na	na	3.8	3.3	na	na	na	na	5.9	9.3
Tertiary technical	na	na	na	na	4.4	4.2	na	na	na	na	6.6	7.8
Tertiary	5.3	6.7	3.7	4.6	5.2	4.8	8.9	10.7	6.3	8.2	9.1	10.6

* Coefficient statistically not significant

5. Conclusions

The aim of the paper was to investigate several aspects of private returns to education in Greece using the data of three HBSs (1974, 1988 and 1994). Using standard Mincerian earnings functions it was shown that returns to schooling are higher for females than for males, that for both sexes they declined between 1974 and 1988 and then rose in 1994, when they stood at 6.3% for males and 8.6% for females. When returns to particular levels of education were examined, it was found that returns to education are increasing as the level of education rises. A number of alternative sensitivity tests were also performed. The hypothesis of selectivity bias for the female members of the sample was not accepted, whereas when potential experience was replaced by age as an explanatory variable, the estimated returns declined by around two percentage points for both sexes. Returns to education were not found to be significantly different between public and private sector employees, but the corresponding age-earnings profiles were substantially different across sectors. Further, education was found to act as a screening device in the Greek labour market, at least in the case of male employees. Finally, average and marginal rates of return adjusted for the probability of unemployment per level of education were not found to be considerably different than those estimated in the extended Mincer model although, in general, they were lower than the latter.

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Appendix I.
Average and marginal annual rates of return without controlling for hours worked

	Average rate of return							
	Males				Females			
	1974	1982	1988	1994	1974	1982	1988	1994
Primary	3.1	2.6	1.2	2.0	6.0	2.7	2.8	-*
Secondary	4.6	3.7	3.3	3.9	6.7	4.1	4.2	3.6
Tertiary	6.0	3.9	4.2	5.0	8.1	5.0	5.3	4.6
	Marginal rate of return							
	Males				Females			
	1974	1982	1988	1994	1974	1982	1988	1994
Primary	3.1	2.6	1.2	2.0	6.0	2.7	2.8	-*
Secondary	6.0	4.8	5.4	5.7	7.4	5.4	5.7	3.6
Tertiary	10.0	4.6	6.8	8.4	12.3	8.0	8.3	7.7

* Coefficient statistically not significant