CHAPTER 7

Private Returns to Education in Greece: A Review of the Empirical Literature

Ioannis Cholezas*

&

Panos Tsakloglou**

* Athens University of Economics and Business
and CERES, Greece
ichol@dias.aueb.gr

** Athens University of Economics and Business,
IMOP and CERES, Greece
panos.tsakloglou@hermes.aueb.gr

1   Introduction

The purpose of this survey is to review the empirical literature on the relationship between private earnings and education in Greece. Although the first attempt to examine this relationship can be dated back to the 1960s, the topic has not been examined in as much depth in Greece as in most other European countries, in part due to data limitations. The existing studies cover the period from the early 1960s to the early 1990s. However, due to data heterogeneity, few accurate conclusions regarding inter-temporal changes in private returns to education can be drawn. Almost all the surveyed studies estimate simple Mincerian functions using OLS.[1] Apart from returns to education in general, wage differentials between males and females, public and private sector employees as well as versions of the screening hypothesis have also been investigated.

The structure of the paper is as follows. Section 2 reports the data sources used in the studies surveyed and the estimation methods used by the researchers, while the main findings on the relationship between earnings and education are reported in Section 3. Section 4 provides a brief overview of the impact of a number of other explanatory variables on the process of earnings determination and Section 5 presents the conclusions.

2   Data and estimation techniques

The papers surveyed in the present study use a variety of data sets collected between 1957 and 1994. Different methods of information collection were employed and a number of institutions or even individual researchers were responsible for their collection. Some data sets rely on information provided by the individuals surveyed, while others use information provided directly by the firms' personnel departments; some of them cover the entire population, while others cover only the Greater Athens area or particular firms.

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[1]   Rates of return to education have also been estimated using cost-benefit techniques; see, for example, Leibenstein (1967), Psacharopoulos (1982) and Magoula and Psacharopoulos (1997).

In many cases it is not easy to assess the accuracy of the collected information and, moreover, the information collected is not always the most appropriate for the examination of the relationship between earnings and education. A common feature shared by all data sets used in the surveyed studies is that they are cross-sectional, since no relevant panel information is available.

The most widely used sources of information are, probably, the *Household Budget Surveys* (HBSs) which are carried out by the National Statistical Service of Greece (NSSG) in regular intervals. They cover the entire population of the country with relatively large sampling fractions (2–3%) and, among other variables, they collect information on net disposable incomes (after direct taxes and social security contributions) and a number of socio-economic and labour market characteristics of the population members. The main purpose of the HBSs is the collection of information for the construction of the weights used in the Retail Price Index. As a consequence, according to the NSSG, their income information is not as accurate as the corresponding consumption expenditure information, although the information on earnings is considered reliable. Four such surveys covering the entire population of Greece have been carried out: in 1974, 1981/82, 1987/88 and 1993/94. The earnings data of the 1974 HBS were used by Kanellopoulos (1986), those of the 1987/88 HBS by Kanellopoulos (1997), while Magoula and Psacharopoulos (1997) and Magoula (1998) include in their sample the employees as well as the self-employed of the 1993/94 HBS.

A second source of information is a *Special Wages and Salaries Survey* (SWSS) carried out by the NSSG in 1977, which covered all urban areas and all (non-farm) sectors of economic activity. The sample included almost 9,000 wage and salary earners in twelve big cities and the information collected is very suitable for investigating returns to human capital. This data set was used by Psacharopoulos (1982) and Patrinos (1992a, 1992b, 1995).

Payroll data for the early 1960s and two small scale surveys carried out by Leibenstein (1967) were used, subsequently, by Psacharopoulos (1982) and Kanellopoulos (1980, 1982, 1985). Likewise, payroll data for small samples of employees working in a few large private sector firms, two Ministries and a state-controlled bank for 1975, 1981, 1982, 1985, 1986 and 1987 were used by Kioulafas,

Donatos and Michailidis (1991), Lambropoulos (1990, 1992), Lambropoulos and Psacharopoulos (1992) and Patrinos and Lambropoulos (1993). Even though the information contained in some of these data sets is very rich, it is doubtful whether the picture that emerges from them regarding private returns to education is representative of all wage and salary earners in the corresponding years.

All the surveyed studies use simple OLS techniques – the standard Mincerian semi-logarithmic human capital earnings function – for the investigation of the impact of education on earnings. Education is measured both in terms of years and in terms of levels and a number of other explanatory variables are also examined (potential experience, age, socio-economic background, etc.). The only study that attempts a Heckman-type correction for selectivity bias concerning the choice of being employed in the public sector of the economy is that of Kanellopoulos (1997). Surprisingly, no study attempts a corresponding correction regarding the employment probabilities of female workers.

3   Variables and results

3.1   Dependent variable

As noted above, the dependent variable in all studies is the natural log of earnings. However, different concepts of "earnings" are used by different authors. Most of those who employ payroll data use gross monthly earnings (including overtime payments) before tax, social security contributions and other deductions or, in a few cases, gross annual earnings. Due to data limitations, those who rely on the information of the HBSs use net monthly earnings. In some studies earnings are divided by the number of hours worked, while in others hours worked enter the equation as an independent variable and in a few papers there is no standardisation at all for the hours worked. Furthermore, in some studies the sample is restricted to male employees only and in others to full-timers. Naturally, under these circumstances, it is quite difficult to compare the results reported by various authors and to draw firm conclusions regarding a number of issues.

3.2   Independent variables

Each study uses a number of explanatory variables in line with the questions it sets out to investigate. The standard variables are those included in the typical Mincer equation; that is, years of schooling, potential experience and potential experience squared, since, in almost all cases, information on actual experience is not available. In addition, dummy variables for successive levels of education are employed in a number of studies in order to distinguish between the differential impact each level of education has on the earnings determination process. Then, using this information, a number of tests are performed aiming to investigate the effect of sex, public/private sector employment, etc. on returns to education A number of studies use sets of additional explanatory dummy variables in order to capture the influence of factors such as marital status, part-time employment, firm size, firm growth rate, occupation, sector of economic activity, etc.

3.2.1   Schooling

No data set contains detailed information on actual years of schooling attended by each worker. Instead, they report the highest level of education completed.[2] However, the number of educational levels included varies considerably across data sets; in some data sets these levels are as few as three, in others they are as many as eight. Using this information, many authors transform this categorical variable into a continuous one, by assigning to each worker the minimum number of years of education that would have been required in order to complete the highest level of education actually achieved.[3] The corresponding results are reported in Table 1.

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[2] A number of data sets contain information on "some years of primary education" and "some years of tertiary education".

[3] Further, it should be noted that in all such transformations, it is assumed that university education lasts four years, even though in some faculties the minimum is five (engineering) or six (medicine) years and, in recent years, a considerable proportion of tertiary education graduates proceed to post-graduate studies (no separate "post-graduate" group is reported in any data set). Therefore, the relevant studies are likely to overestimate returns to tertiary education.

Table 1.   Estimates of returns per year of schooling in Greece

Author / reference year	Years of schooling			Marginal return per year of schooling per level of education		
	Males	Females	All	Males	Females	All
Kanellopoulos (1982)[1] / 1960, 1964	0.066	0.065		L.sec. 0.027 U.sec. (gen) 0.080 Tert. 0.092	L.sec. 0.016 U.sec. (gen) 0.111 Tert. 0.065	
Kanellopoulos (1985) / 1960, 1964			0.078			L.sec. 0.029 U.sec.(gen) 0.075 Tert. 0.095
Psacharopoulos (1982) / 1960, 1964, 1977	0.092// 0.086// 0.058			Sec. 0.045 Tert. 0.149// Sec. 0.038 Tert. 0.144// Sec. 0.056 Ter. 0.067		
Kanellopoulos (1986) / 1974	0.069	0.077		Prim. 0.036 L.sec. 0.099 U.sec. 0.041 Tert. 0.084	Prim. 0.026 L.sec. 0.005 U.sec. 0.149 Tert. 0.187	
Kioulafas, Donatos & Michailidis (1991)[2] / 1975, 1981, 1982, 1985						Sec. 0.004/- Tert.0.12/0.11// Sec. 0.028/- Tert. 0.092/0.04// Sec. 0.025/0.025 Tert.0.075/0.037// Sec. 0.021/0.015 Tert. 0.080/0.022
Lambropoulos (1992)[2]/ 1977, 1981, 1985			0.062/ 0.070// 0.040/ 0.049// 0.033/ 0.039			
Patrinos (1992)[3] / 1977	0.058 (0.048) (0.054) (0.057)					
Patrinos (1995)[3] / 1977	0.056 (0.050) (0.051) (0.054)					
Lambropoulos & Psacharo-poulos (1992)[2] / 1975, 1981, 1985						Sec. 0.008/-0.008 Tert.0.158/0.151// Sec. 0.023/-0.001 Tert.0.107/0.137// Sec. 0.009/0.005 Tert. 0.074/0.101

Patrinos & Lambropoulos (1993)[1] / 1981, 1985	0.032// 0.023	0.031// 0.028				
Kanellopoulos (1997)[1,2] / 1988				Prim. 0.005/0.022 L.sec. 0.056/0.043 U.sec. 0.044/0.008 Tert.0.054/0.030	Prim. 0.007/0.029 L.sec. 0.040/0.008 U.sec. 0.008/0.049 Tert. 0.048/0.039	
Magoula & Psacharopou-los (1997) / 1994	0.069	0.090	0.076			Prim.drop 0.162 L.sec. 0.082 U.sec. (gen) 0.067 U.sec. (tec) 0.063 Tech. Tert. 0.069 Tert. 0.087

Notes: [1] Estimate derived from "extended" Mincer equation (including other explanatory variables apart from years of schooling and potential experience).

[2] Estimates refer to public/private sector.

[3] Estimates in parentheses refer to persons whose fathers were, respectively, illiterate, primary education graduates and secondary or tertiary education graduates.

As anticipated, all studies report a positive and statistically significant relationship between years of schooling and (log) earnings. The estimates reported in Table 1 are not strictly comparable across studies, since, apart from differences in the dependent variable, there are also differences in the number of factors that are controlled for in each case. The general picture that emerges from the estimates reported in the first three columns of Table 1 (for males, females and all workers, respectively) is that the private rate of return per year of education in Greece declined between the early 1960s and the late 1980s and rose again in the early 1990s.[4] These findings are further confirmed by the estimates reported in the last three columns of Table 1 which display marginal rates of return per one additional year of education at each successive educational level. Moreover, these estimates imply that in all years under examination, considerable non-linearities could be observed in educational returns. In all studies, private returns per year of education appear to be higher in tertiary education than in secondary or primary education – sometimes substantially so.

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[4] Nevertheless, the only estimate for the early 1990s is that of Magoula and Psacharopoulos (1997) who include in their sample the self-employed along with the employees, thus, potentially biasing their results.

Much work has been done concerning the effect that the sector of employment has on the earnings determination process. The issue is very important in Greece because, apart from the large number of civil servants, the state has a controlling stake in a considerable number of secondary and tertiary sector firms.[5] Pay structures as well as requirements for entering, are likely to differ between the public and the private sector. The evidence with respect to the rates of return to education in the two sectors is mixed, however. Lambropoulos (1992) reports higher returns to education in the private sector for 1977, 1981 and 1985 and the reported differential does not seem to change over time. Kioulafas, Donatos and Michailidis (1991) in contrast, who carry out their analysis in terms of levels rather than years of schooling, report higher returns in the public sector at both the secondary and the tertiary level of education, with the differential being larger in the case of tertiary education. In line with Lambropoulos (1992), though, they report declining rates of return in both sectors between the mid-1970s and the mid-1980s. Slightly different results are obtained by Lambropoulos and Psacharopoulos (1992) who use data for 1975, 1981 and 1985 and find that returns are consistently higher in the public sector for secondary education, while the opposite is true for tertiary education for the last two years under consideration.

The issue of differential returns to education for males and females has been dealt with in a number of studies but, once again, the evidence appears to be mixed. According to Kanellopoulos (1982), in the early 1960s returns to education were fairly similar across sexes, with females enjoying relatively higher returns to secondary education. On the contrary, Kanellopoulos (1986) reports that in the mid-1970s females had higher returns to tertiary education than males, while returns to education were higher for males at the rest of the educational levels. Patrinos and Lambropoulos (1993), after controlling for training, marital status and sector of employment (public/private), report higher returns for males in 1981 and for females in 1985, although the differences between sexes are small. The only study that reports substantially higher returns to education for females than for males is that of Magoula and Psacharopoulos (1997), which refers to the early 1990s. Finally, Kanellopoulos (1997) examines wage differentials by sex and sector of employment (public/private)

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[5]   The number of state-controlled firms was even higher in the 1980s.

simultaneously, using a correction for selectivity bias for those employed in the public sector. Even though the estimated coefficients do not change substantially after the correction, it appears that in the public sector males face higher returns to education than females, whereas, at most educational levels, females enjoy higher rates of return to education in the private than in the public sector.

3.2.2 Experience

As noted earlier, information on actual experience does not exist in any of the data sets used. As a consequence, all papers surveyed use potential experience (and its square) in the human capital earnings functions estimated, defined as age – 6 – years of schooling.[6] The corresponding estimates are reported in Table 2. As anticipated, in all cases the relationship between potential experience and (log) earnings is found to be bell-shaped, although few workers can actually be found in the descending leg of the curve. In general, potential experience is found to be less important than schooling in the earnings determination process and, like schooling, its effect tends to decline when additional variables enter the equation (Kanellopoulos, 1985). Psacharopoulos (1982) reports a decline in the effect of potential experience on earnings between the early 1960s and the late 1970s. At least in recent years, the effect of potential experience on earnings appears to be stronger in the case of males than in the case of females, irrespective of their sector of employment (Kanellopoulos, 1997; Magoula and Psacharopoulos 1997; Magoula 1998).

An interesting attempt to examine the differential impact of potential experience on the earnings of public and private sector employees is that of Kioulafas, Donatos and Michailidis (1991). Instead of using potential experience and its square in the earnings functions, they introduce three dummies for potential experience – 6-10, 11-20 and 21-30 years – and estimate separate functions for private and public sector employees. Even though in both

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6   It is interesting to note that since all Greek males spend two years in the Armed Forces, their potential experience is, certainly, lower than that implied in these studies.

Table 2.　Estimated coefficients of returns to potential experience in Greece (Mincer equations)

Author / reference year	Potential Experience			Potential Experience squared		
	Males	Females	All	Males	Females	All
Kanellopoulos (1982)[1] / 1960, 1964	0.019	0.012		-0.00016	-0.00014	
Kanellopoulos (1985) / 1960, 1964			0.045			-0.0005
Psacharopoulos (1982) / 1960, 1964, 1977	0.073// 0.059// 0.059			-0.0010// -0.0008// -0.0010		
Kanellopoulos (1986) / 1974	0.030	0.038		-0.0006	-0.0008	
Kioulafas, Donatos and Michailidis (1991)[2] / 1975, 1981, 1982, 1985			0.26/0.23 0.65/0.31 0.76/0.42// 0.22/0.17 0.56/0.29 0.76/0.40// 0.18/0.13 0.47/0.23 0.63/0.25// 0.18/0.14 0.45/0.27 0.60/0.31			
Lambropoulos (1992)[3] / 1977, 1981, 1985			0.055/0.056// 0.053/0.038// 0.045/0.049			-0.0008/ -0.0010// -0.0006/ -0.0006// -0.0008/ -0.0009
Patrinos (1992)[4] / 1977	0.059 (0.032) (0.061) (0.066)			-0.0010 (-0.0005) (-0.0010) (-0.0011)		
Patrinos (1995)[4] / 1977	0.060 (0.033) (0.061) (0.060)			-0.0010 (-0.0005) (-0.0011) (-0.0011)		
Lambropoulos and Psacharo-poulos (1992)[3] / 1975, 1981, 1985			0.070/0.044// 0.053/0.037// 0.045/0.039			-0.0011/ -0.0009// -0.0006/ -0.0006// -0.0006/ -0.0009
Patrinos and Lambropoulos (1993)[1] / 1981, 1985	0.045// 0.041	0.045// 0.041		-0.0005// -0.0006	-0.0006// -0.0005	

Kanellopoulos (1997)[2] / 1988	0.033/ 0.043	0.021/ 0.036		-0.0005/ -0.0007	-0.0002/ -0.0006	
Magoula and Psacharopoulos (1997) / 1994	0.063	0.042	0.054	-0.0009	-0.0006	-0.0008

Notes: [1] Estimate derived from "extended" Mincer equation (including other explanatory variables apart from years of schooling and potential experience).

[2] Coefficients of dummies for 6-10, 11-20 and 21-30 years of potential experience in public/private sector.

[3] Coefficients for public/private sector.

[4] Estimates in parentheses refer to persons whose fathers were, respectively, illiterate, primary education graduates and secondary or tertiary education graduates.

sectors, earnings rise with potential experience, the estimated co-efficients are strikingly different across sectors. Unsurprisingly, since pay structures in the public sector rely heavily on seniority, they report substantially higher returns to potential experience in the public than in the private sector of the economy.

3.2.3   Seniority/Tenure

Few of the data sets used provide information on seniority within the same firm and/or on-the-job training. Kanellopoulos (1982, 1985) reports that the effect of seniority on earnings is greater than the effect of experience, which is easily understood, if one takes under consideration that firms appreciate more experience within their own environment, instead of general experience. Furthermore, the author reports that this effect is greater for males than for females. Patrinos and Lambropoulos (1993) use a variable they call on-the-job training, which is very close to what Kanellopoulos calls seniority. They also report higher effects for males than for females but, in addition, they also report a declining trend for both males and females in the 1980s.

4   Other topics investigated

As mentioned earlier, many authors include in their earnings functions a number of other independent variables in order to im-

prove the explanatory power. Some of these variables, such as occupation, are closely associated with education, thus blurring the effects of education on earnings. Others, such as sets of regional dummies, frequently turn out to be statistically significant, but they may simply reflect the effect of regional cost of living differentials rather than differences in productivity. Earlier studies such as those of Kanellopoulos (1980, 1982, 1985), investigated the effects of firm size and firm growth rates on earnings and found them to be very significant.

Further, a number of studies suggest that marital status affects the earnings of males positively and those of females negatively (although, in the latter case, not always statistically significantly). This finding is frequently interpreted as an implication that married men as breadwinners display a stronger labour force attachment, while married women due to child bearing and upbringing are forced to interrupt their careers at least temporarily, thus lowering their productivity. However, in the case of Greece the positive effect of marital status on the earnings of male workers may by attributed to institutional factors since, until very recently, a number of benefits were paid to married male employees but not to their spouses.

The influence of family background on earnings is investigated by Patrinos (1992a, 1992b, 1995) who examines the effect of schooling on earnings according to the socio-economic background of the worker, approximated by the schooling of the worker's father. The author distinguishes between four educational levels of the worker's father and shows that returns to education are higher for those with better educated fathers. This finding has important implications and can be attributed to a number of factors. Of course, it can be interpreted as an indication that children from a higher socio-economic background acquire human capital of better quality and, thus, are more productive, even after controlling for their education. However, it is very likely that in the Greek labour market where contacts and connections matter a lot, the specific pattern is the outcome of the exploitation of superior contacts and connections that better educated fathers preserve and "transmit" to their children.

Finally, one of the topics investigated in the surveyed studies and which is directly linked to the returns to education is whether education is used as a screening device. Kanellopoulos (1985) examines the effect of schooling on earnings within three different

experience groups. The results indicate that schooling is extremely important in the first three years of experience, which reinforces the weak screening hypothesis. Returns decrease in the following years, since factors such as ability and skills influence earnings and reduce the importance of schooling. Lambropoulos (1992) further investigates the issue using mid-to-early career earnings ratios and fails to identify patterns of screening in the Greek labour market. Likewise, Magoula and Psacharopoulos (1997) and Magoula (1998) test the screening hypothesis through the use of experience-earnings profiles and the examination of the impact of an interactive term between tertiary education and potential experience on earnings and fail to identify any evidence of screening.

5   Conclusions

Due to a number of factors, particularly data limitations, it is not possible to draw firm conclusions regarding a number of issues related to private returns to education in Greece. Certainly, the findings of the studies reviewed here are in line with the basic predictions of the human capital theory. Earnings rise with education and the relationship between earnings and (potential) experience is bell-shaped. There is evidence that the rates of return per year of education vary by level of education and, in general, are higher in tertiary education, while experience matters more for the determination of earnings in the public than in the private sector of the economy. No general agreement exists regarding differences in the returns to education of males and females, whereas it appears that returns to education declined from the early 1960s to the mid-1980s and rose thereafter (although data limitations do not allow firm conclusions to be drawn). Further, marital status and socio-economic background have been found to influence earnings, whereas no strong evidence is reported in favour of the screening hypothesis.

One definite conclusion that can be drawn is that more work needs to be done in a number of areas. Trends in returns to education can be investigated more thoroughly using uniform concepts and exploiting homogeneous data sets which are already available (HBSs), issues of selectivity bias for the participation of women in the labour market need to be looked into if more effi-

cient and reliable estimates of returns to education are to be obtained, the estimates of returns to education need to be adjusted in order to reflect the different unemployment probabilities faced by various (educational) groups of workers, and issues related to ability should be investigated, provided appropriate data sets become available. Finally, panel information using the information of new data sets (such as the European Community Household Panel) can be exploited in order to investigate a number of issues from a "dynamic" perspective.

References

Kanellopoulos, C.N. (1980), *Individual pay, discrimination and labour mobility in Greece in the early 1960s.* Unpublished Ph.D thesis, University of Kent.

Kanellopoulos, C.N. (1982), Male-female pay differentials in Greece, *Greek Economic Review,* 4, pp. 222-241.

Kanellopoulos, C.N. (1985), Individual pay differentials in Greece, *Spoudai,* 35, pp. 109-125.

Kanellopoulos, C.N. (1986), *Incomes and poverty in Greece: Determining factors.* Center of Planning and Economic Research, Scientific Studies No 22, Athens (in Greek).

Kanellopoulos, C.N. (1997), Public-private wage differentials in Greece, *Applied Economics,* 29, pp. 1023-1032.

Kioulafas, K., G. Donatos and G. Michailidis (1991), Public and private sector wage differentials in Greece, *International Journal of Manpower,* 12, pp. 9-14.

Lambropoulos, H. (1990), *Human capital and the demand for education in post-war Greece: Incentive and rewards?* Unpublished Ph.D thesis, London School of Economics.

Lambropoulos, H. (1992), Further evidence on the weak and strong versions of the screening hypothesis in Greece, *Economics of Education Review,* 11, pp. 61-65.

Lambropoulos, H. and G. Psacharopoulos (1992), Educational expansion and earnings differentials in Greece, *Comparative Education Review,* 36, pp. 52-70.

Leibenstein, H. (1967), *Rates of Return to Education in Greece.* Economic Development Report No 94, Harvard University.

Magoula, T. (1998), *Education and economic growth: The Greek experience.* Unpublished Ph.D thesis, Athens University of Economics and Business (in Greek).

Magoula, T. and G. Psacharopoulos (1997), *Schooling and monetary rewards in Greece: Contributions to a debate.* Athens University of Economics and Business, Department of Economics Discussion Paper No. 90.

Patrinos, H.A. (1992a), *Education, earnings and inequality in Greece.* Unpublished Ph.D thesis, Institute of Development Studies, University of Sussex.

Patrinos, H.A. (1992b), Higher education finance and economic inequality in Greece, *Comparative Education Review,* 36, pp. 298-308.

Patrinos, H.A. (1995), Socioeconomic background, schooling, experience, ability and monetary rewards in Greece, *Economics of Education Review,* 14, pp. 85-91.

Patrinos, H.A. and H. Lambropoulos (1993), Gender Discrimination in the Greek Labour Market, *Education Economics,* 1, pp. 153-164.

Psacharopoulos, G. (1982), Earnings and education in Greece, 1960-1977, *European Economic Review,* 17, pp. 333-347.