BANK OF GREECE
EUROSYSTEM

Economic Bulletin
ISSN 1105 - 9729 (print)
ISSN 2654 - 1904 (online)

DETERMINANTS OF THE WAGE RATES IN GREECE WITH AN EMPHASIS ON THE WAGES OF TERTIARY EDUCATION GRADUATES*

Theodoros Mitrakos
Bank of Greece
Economic Research Department

Panos Tsakloglou
Athens University of Economics and Business

Ioannis Cholezas
Center of Planning and Economic Research (KEPE)

1 INTRODUCTION

In a previous study the authors established that, despite the increase in graduate unemployment over the last two decades and the high unemployment rates of tertiary education graduates during the first years after completion of their studies, graduation from a tertiary education institution provides a certain security against unemployment in the long run, at least in comparison to the lower levels of the education system (Mitrakos, Tsakloglou and Cholezas, 2010). However, lower unemployment rates alone cannot be taken as conclusive evidence of whether tertiary education is a good investment. To answer such a question, one also needs to know the rate of return to each level of education, or otherwise the wages that can be expected after graduation from a specific branch of the education system.

The literature on returns to education in our country (briefly reviewed below) is quite extensive. However, mainly on account of insufficient appropriate statistical information, so far no attempt has been made in the available empirical studies to estimate (private) returns to education for small homogeneous groups of graduates by field of study. The present study aims to fill this gap by using the wage data included in the Labour Force Surveys (LFSs) conducted in Greece in the period from the first quarter of 2004 to the third quarter of 2007 (2004 I – 2007 III).

The following section briefly reviews the findings of the available earlier empirical studies on returns to education in Greece. The third section describes the LFSs used in the empirical analysis, while the fourth section presents its major results. The last section summarises the study's conclusions, while detailed information is included in the Appendices.

2 LITERATURE REVIEW

The issue of wage differentials between various education levels in Greece has been examined mainly in the context of exploring returns to education (primarily "private" returns). In comparison to other countries, studies calculating returns to education in Greece are limited in number, as well as partly in depth, owing mainly to limitations of the available statistical information. The question of returns to education in Greece was first explored by Leibenstein (1967). Since then, relevant research work has been prolific.[1]

Published studies cover the time period from 1957 until today and draw on many different databases. Relying mostly on data collected by the Hellenic Statistical Authority (ELSTAT) – from Household Budget Surveys, European Community Household Panel, European

* The views expressed in this study do not necessarily reflect those of the Bank of Greece. The authors would like to thank H. Gibson, N. Kastis, I. Kalogirou, E. Kikilias, D. Nikolitsas, E. Papapetrou, T. Politis and G. Psacharopoulos for their useful comments. The present paper was supported by the cultural project "Protovoulia" (Educational and Development Initiative), as an earlier version formed part of a broader action of Protovoulia ("Education and Development: Connecting Education and Employment").

1 For a detailed review of the literature on private returns to education in Greece, see Cholezas and Tsakloglou (1999) and Cholezas (2005).

Union Statistics on Income and Living Conditions, etc.– they also use wage data collected by public and private enterprises, or even private researchers. Thus, it is not always easy to assess the quality and suitability of the information included in each database. All datasets used in the existing studies are cross-sectional.

As regards methodology, most earlier studies apply the Ordinary Least Squares (OLS) method to estimate Mincer's (1974) 'classical' semi-logarithmic human capital equation and calculate the effect of education on earnings. In general, the "education" variable is expressed either in years or in education levels with the use of dummy variables, while additional explanatory variables (such as potential experience and its square, or the age and education level of the father) are often used to improve the model's explanatory power. Heckman's two-step method for correcting the sample bias or selection error is used by Kanellopoulos (1997) to determine the returns for individuals working in the public sector, as well as by Kanellopoulos and Mavromaras (2002) who attempt to explain wage differentials between men and women. In addition, Papapetrou (2004) uses the quantiles regression method, which allows an estimation of the independent variables' effect on the dependent variable along the distribution of the latter. Finally, Leibenstein (1967), Psacharopoulos (1982), Magoula and Psacharopoulos (1999), and Kanellopoulos, Mavromaras and Mitrakos (2003) calculate social returns to education using cost-benefit techniques.

Almost all results of the available empirical studies are consistent with human capital theory, as they confirm a positive effect of education and potential experience on earnings. Returns to education levels increase with the years of schooling, and all additional variables have the expected signs. Of course such returns may in fact differ considerably among individuals, depending on, e.g., their mental abilities, or the particular institution they studied at (in terms of its quality and reputation in the labour market), but these hypotheses cannot be tested using the available statistical information. A further point of concern is that the widespread use of potential (rather than actual) work experience as an explanatory variable may lead to a possibly overestimated contribution of experience, since it takes no account of periods of unemployment, or non-participation in the labour force due to pregnancy or other reasons, or transition between jobs, etc. Moreover, given that many studies use additional independent variables, returns to education are no longer comparable when these variables affect the estimated contribution of education to earnings. On the other hand, these variables enhance the model's explanatory power and enable an exploration of the factors that affect earnings, often also revealing overestimated returns to education.[2] Finally, another important consideration relates to sample selection error. For instance, as regards women, only employed ones are included in the sample. However, if not chosen at random, i.e. if these are, e.g., primarily women with more years of schooling, or unmarried, then the sample is biased (not representative of all women) and, as a result of this selection error, estimates need to be corrected using appropriate econometric techniques.

A comparative analysis of the results of the available studies in light of the above considerations shows that, overall, returns to education in Greece follow a downward path until the late 1980s and increase in the course of the 1990s. Thus, the return to one additional year of schooling starts from 7.8% in 1964 (Kanellopoulos, 1985), falls to 5.8% in 1977 (Patrinos, 1992) and to 2.5% in 1985 (average for men and women, Patrinos and Lambropoulos, 1993), before rising again to 7.6% in 1994 (Magoula and Psacharopoulos, 1999) and then to even higher levels in 1999

2 Hence, the use of additional variables must be examined on a case-by-case basis, considering all positive and negative corollaries.

(Cholezas, 2005).[3] This 'recovery' of returns to education in the 1990s is attributed to the observed steady growth path of the Greek economy and the ensuing higher demand for skilled personnel, in parallel with the abandonment of the specific indexation policy pursued in the 1980s that led to the compression of earnings. In most studies, the return to each individual education level reveals an almost linear relationship to the years of schooling, with the possible exception of tertiary, particularly university, education. For example, in 1994, the respective returns per year are 6.7% for higher secondary (general) education, 6.3% for technical education of the same level, 6.9% for Technological Educational Institutes (TEI) and 8.7% for Universities (AEI) (Magoula and Psacharopoulos, 1999), whereas, in 1999, the corresponding figures for men (women) are 9.3% (12.5%), 9.6% (7.9%), 11.1% (21.2%) and 14.5% (16.3%) (Cholezas, 2005). In comparison with other EU Member States, according to evidence from European Community Household Panel (ECHP) data, in the second half of the 1990s returns appear higher in South European countries, and Greece ranks at one of the top positions (Cholezas, 2005). Opposite conclusions are drawn by other studies (Harmon, Walker and Westergaard-Nielsen, 2001; OECD, 2010) using, however, different databases for each country.

As regards the gender differential of return to education, although women often enjoyed lower rates of return in the past, more recent data imply a reversal of the situation, as returns to education for women today markedly surpass those for men. Thus, in 1964, the return to one additional year of schooling stood at 6.6% (6.5%) for male (female) employees (Kanellopoulos, 1982), while the corresponding rates for men (women) were 7.1% (11.4%) in 1974, 5.2% (6.4%) in 1988, 6.7% (7.8%) in 1994, and 7.2% (8.9%) in 1999 (Cholezas, 2005).

The exploration of returns to education by field of employment seems to yield more constant results, since returns are usually higher in the private sector (Hadjidema, 1998). This does not mean that the wages of women or private sector employees are higher than those of men or civil servants; on the contrary, their returns to education are higher mainly because the earnings of their reference group (i.e. women or private sector employees with low qualifications, accordingly) are exceptionally low (Cholezas, 2005). For example, the wages of women working in the private sector are 37% lower than those of women working in the public sector, while the wage differential between these two groups depends on the level of earnings and seems to decrease as earnings increase (Papapetrou, 2003).

The coefficient of potential experience (including tenure or not) is always positive and demonstrates the importance of past professional experience in the wage-setting process. The coefficient of tenure (included only in a few studies) is positive and higher than the coefficient of experience. This implies that employers are likely to value more the experience gained inside the enterprise at issue, deeming job-specific experience more important than general experience. In fact, including tenure among the independent variables lowers the return to one additional year of schooling by roughly one percentage point (Kanellopoulos, 1985). All the other variables used have the expected signs. Of particular interest is the higher return to one additional year of schooling observed for individuals whose fathers have attained a higher education level (Patrinos, 1992, 1995), as evidence of transmission of wage inequalities across generations.

The empirical literature also explores other individual questions somehow related to

3 Based on Household Budget Survey data for the period 1974-1999, Kanellopoulos, Mavromaras and Mitrakos (2003) describe a similar path of returns to education. In particular, as regards men, the authors find that returns to all education levels fell considerably between 1974 and 1988, increased significantly from 1988 to 1994, and then remained unchanged or decreased slightly between 1994 and 1999. In the case of women, the respective returns decreased considerably in the period from 1974 to 1982, before rising thereafter (during 1982-1999).

returns to education. Thus, although human capital theory posits that positive returns to education result from higher productivity, filter theory claims that they may be stemming from the fact that education signals to employers their employees' higher skills. In such cases education may actually represent a waste of resources, since it does not lead to increased worker productivity. The results of a number of studies on the Greek labour market (Lambropoulos, 1992; Magoula and Psacharopoulos, 1999; Cholezas, 2005) are not always consistent and tend to be influenced by the methodology adopted for the investigation of the problem.

Another point of interest related to returns to education is gender discrimination in the labour market. The existing studies show that wage differentials between men and women in Greece can largely be attributed to discrimination in the labour market, since 71.5% (53.8%) of their wage differentials in 1988 (1994) cannot be explained based on differences in terms of male and female human capital (Kanellopoulos and Mavromaras, 2002).[4] Between 1988 and 1999, the gender wage gap in the private sector slightly increases but, regardless of the methodology used, most of this differential cannot be explained by differences observed in the respective human capital stocks of men and women (Cholezas, 2005). In addition, although an important differentiation emerges between the earnings of men and women when the workers' position along the earnings distribution (Papapetrou, 2008) and their level of education (Papapetrou, 2007) are also taken into account, in most cases wage differentials cannot be explained by differences in the workers' productive characteristics.

As mentioned above, so far none of the available studies has estimated returns to education for individual groups of graduates within a specific level of education (e.g. engineers, physicians, economists, etc.) and, moreover, none has used LFS data. The present study, although not primarily concerned with the estimation of private returns to education but with an examination of wage differentials between groups of workers, nevertheless attempts to fill this gap.

3 LABOUR FORCE SURVEY: BRIEF DESCRIPTION AND FIRST DESCRIPTIVE RESULTS

For the purposes of this study we used the micro-data of the quarterly LFSs conducted by the Hellenic Statistical Authority (ELSTAT) between 2004 I and 2007 III. This period was chosen because (i) the LFS data collection methodology was radically revised in 2004 and (ii) ELSTAT microdata for this period are available in the form of a rotating panel, as each member of the sample participates in the LFS for six consecutive quarters ("waves").

Since 1998 ELSTAT has been conducting the LFS on a quarterly basis (previously only in the second quarter of each year). The main purpose of this survey is to collect detailed data on the employment and unemployment status of household members aged 15 or over. The LFS quarterly sample of the country's total population includes approximately 30,000 households (an average sampling fraction of 0.85%), with one sixth of it rotated (replaced) every quarter, which implies at least 120,000 interviews each year.

A final question in the LFS questionnaire – addressed only to household members working as employees – relates to their monthly earnings. Its exact wording is the following: "What are the total monthly earnings from your main job including extra payments paid monthly? (Data should refer to last-month payments)". Responses can be given on the basis of nine income brackets: less than €250, €251-500, €501-750, €751-1,000, €1,001-1,250, €1,251-1,500, €1,501-1,750, €1,751-2,000 and €2,000 or more. The present study makes use of these data, although grouped information is not so

4 According to Kanellopoulos, Mavromaras and Mitrakos (2003) this share of unexplained differential came to 87.9% in 1999 (1994: 70.7%, 1988: 46.3%).

suitable for an econometric analysis of wage differentials between members of the sample.

Initially, we attempted to use the panel data of the LFS by applying appropriate econometric techniques in order to isolate the influence of non-observable individual characteristics and calculate the "net" effect of specific education system components on the level of the employees' hourly wages. This proved unfeasible, however, since the variation of the dependent variable (and of many independent variables to an even greater extent) per unit of observation (individual) was extremely limited over time. In other words, in the vast majority of cases the income bracket showed only a slight change even after six consecutive quarters, and all other characteristics of the employees usually remained unchanged throughout their participation in the LFS. Therefore, for the purposes of the analysis, we used cross-sectional LFS data. More specifically, we used the first observation of each employee in the LFS over the period 2004 I – 2007 III. Table 1 presents the corresponding monthly wage distributions by employee education level. About 15% of the employees included in the sample did not answer the abovementioned question (replied: "Do not know/Do not answer") and thus were excluded from the analysis. This share does not seem to be closely related to the employees' education level, although it is slightly higher in the groups of very low and very high education levels.

For the purposes of the analysis, in the case of the "closed" income brackets we assumed that the employee's wage was the mean of the range, while for the corresponding values of the two "open" brackets (on the top and bottom ends of the distribution) we used the detailed data of the Household Budget Survey conducted by ELSTAT between February 2004 and January 2005, which collects information on the level of net wages without the use of income brackets. Given that the LFS sample utilised in the analysis of the wages covered the period 2004 I – 2007 III on a quarterly basis, the median value of each income bracket in each quarter of the LFS was adjusted for inflation, based on the Consumer Price Index data published by ELSTAT, in order for all wage data to be expressed in constant prices of the third quarter of 2007. Finally, to convert monthly wages into hourly earnings we used the employees' answers to the question of how many hours per week they

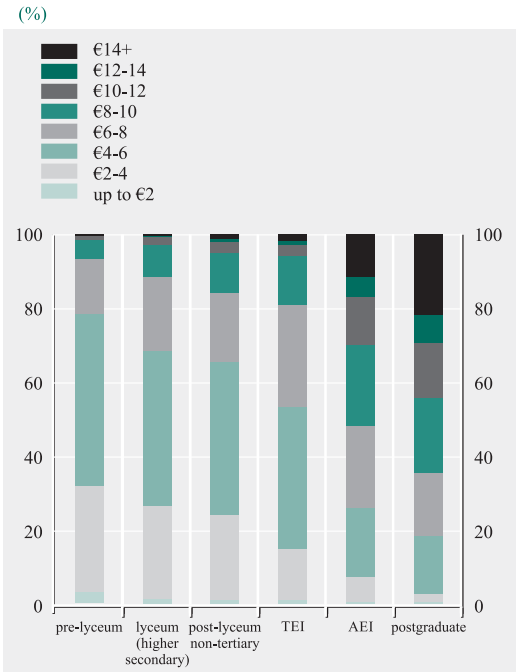
Table 1 Distribution of employees in income brackets per education level (percentages, all LFSs, not adjusted for inflation)

	Education level					
Net monthly earnings (€)	Pre-lyceum education	Lyceum	Post-lyceum non-tertiary education	TEI	AEI	Postgraduate studies
Up to 250	1.5	0.7	0.6	0.4	0.5	0.2
251-500	7.4	5.6	5.3	3.1	2.5	1.3
501-750	26.8	23.7	23.8	14.9	8.6	4.5
751-1,000	30.7	28.8	26.7	29.6	18.2	12.5
1,001-1,250	12.8	16.5	15.1	23.6	25.1	19.0
1,251-1,500	4.2	7.3	7.4	10.3	16.5	15.4
1,501-1,750	1.5	2.1	2.5	2.4	5.3	9.0
1,751-2,000	0.4	0.6	1.0	0.9	2.6	6.9
2,000+	0.2	0.4	1.5	1.1	3.3	11.9
No answer	14.6	14.3	16.3	13.6	17.3	19.3

usually work in their main job. This led to the exclusion of some additional responders who stated that "they cannot define the hours they usually work, because these differ significantly from one week to the other or from one month to the other". The resulting distributions appear in Chart 1 for six categories of employees grouped according to their level of education and reveal a clear positive relationship between hourly wages and education level. The next section analyses this relationship in detail.

As regards the definition of education groups, the LFS divides the population into a large number of education categories (often rather arbitrarily, in terms of the details provided). Given that this study focuses on tertiary education graduates, we chose to group AEI and TEI graduates with as much detail as possible. In many cases, however, this was unfeasible due to the limited number of employees in the groups at issue. In the end, the criterion for keeping or merging tertiary education groups was, apart from the homogeneity of the disciplines, the existence of a minimum number of observations (around 100 men or women) spread over a large number of years after graduation. For the lower education levels, fewer groups were formed. Moreover, it was decided to exclude from the sample a few groups with either a rather small number of observations or specific problems (graduates of special needs schools, of Open University and inter-disciplinary selection programmes, of military and law enforcement academies, of the School of Pedagogical and Technological Education (SELETE/ ASPETE) and of pedagogic academies with a two-year duration of studies). The precise equivalence between LFS education categories and those of the present study is presented in Mitrakos, Tsakloglou and Cholezas (2010) Annex II, with two exceptions due to the small number of male and female employees. The first exception involves the group of "Structural Engineering" TEI graduates, which has been merged here with the group of "Mechanical and Computer Engineering" technical school graduates (TEI). The

Chart 1 Distribution of employees into hourly wage brackets per education level (all LFSs, adjusted for inflation)



Source: Calculations based on LFS and ELSTAT data.

second exception refers to the group of IT graduates (AEI), which has been merged with the group of "Mechanical Engineering" graduates that also includes the relevant branch of "Computer Engineering".

4 ECONOMETRIC RESULTS

For the purposes of this study we estimate the hourly wages of the employees included in the sample according to human capital theory. This theory – originally developed by Mincer (1958, 1974), Schultz (1961), Becker (1964), Becker and Chiswick (1966) and Ben-Porath (1967) based on the ideas of Adam Smith – attributes labour wage differentials to the different human capital stock of the individual workers. Human capital stock determines their productivity, which, in a competitive market, determines in turn the level of their wages. Human capital consists of the knowledge, skills and abilities that individuals acquire through

formal or informal education and previous work experience (OECD, 1998), in addition to their inherent abilities. These assumptions formed the basis for the elaboration of the Mincerian wage equation (Mincer, 1974), extensively used in the literature on education economics. The empirical estimates of many such studies, as brought together by Psacharopoulos (Psacharopoulos, 1973, 1981, 1985, 1994; Psacharopoulos and Patrinos, 2004), confirm the existence of a strong positive correlation between education and earnings, but also of considerable differences in the level of – mainly private – returns to education across various countries and time periods.

Our analysis covers both broad education groups, such as those in Table 1, and narrow ones, strictly defined by the employees' field of study. In light of the literature reviewed in the second section, we opted to estimate econometric equations separately for men and women (considering that even if the variables affecting their respective wage levels are the same, the effect exerted is quantitatively different). The analysed sample consists of 29,317 men and 20,851 women, whose educational qualifications are presented in Table 2.

Two further points need to be made here. First, that self-employment is widespread in Greece: 41.0% (26.1%) of all employed men (women) in the sample are self-employed. Self-employment is particularly common among those with low educational qualifications (mostly in the agricultural sector) and within specific groups of individuals with high educational qualifications. Indicatively, only 25.2% of male law school graduates included in the sample are employees. Very low shares of salaried employment are also observed for male graduates of the structural engineering school (35.3%) and the medical school etc. (46.6%). The corresponding shares for the sample's female graduates are 44.0%, 54.7% and 45.1%. With respect to these groups, a slight risk may be involved in drawing conclusions for all graduates of the corresponding schools based on employees alone.[5] The second point to be made is that some groups are very small, or heterogeneous, or both. This holds for "Other TEI" and "Other AEI", and male graduates of "Languages" (as well as, to a lesser extent, for male graduates of "Social Sciences" and female graduates of "Horticulture and Forestry"). The results for these groups are not discussed.

The results reported in Table 2 could suggest that the sample of employees may not be random, thus calling for a two-step estimation method, i.e. an initial estimation of the probability of an individual's participation in the sample of employees, and then a subsequent estimation of the employees' wage rates, once the relevant correction term (Inverse Mills Ratio) has been included among the explanatory variables. However, as in all two-step estimation trials the relevant correction term was always statistically not significant, the results presented below were estimated using the least squares method.

Traditionally, econometric estimations of private returns to education use as dependent variable the logarithm of employees' hourly wages, and two main explanatory variables that proxy the human capital accumulated in the employee: education and work experience. In the main part of the analysis, the dummy variables we use for education represent the highest education level and specialty attained by the employee according to the detailed information of Table 2. For work experience, we use the years since graduation and their square. The quadratic term, expected to have a negative sign in the econometric estimations, indicates that the accumulation of experience increases an individual's earnings (albeit at a decreasing rate) and may have a negative marginal effect beyond a certain point (due to the depreciation of knowledge and skills). This variable used for work experience is not ideal,

5 It should be noted that these groups of graduates feature a small number of employees and not of observations in general. Thus, although they are used as independent groups, results need to be interpreted with caution, since a large share of these graduates are not employees.

Table 2 Percentages of employees in the total of employed persons aged 15-64 the first time they are included in the LFS sample (2004 I – 2007 III)

Education level	Men		Women	
	Percentage of employees	Number of employees	Percentage of employees	Number of employees
Pre-lyceum education	*49.6*	*10,090*	*53.6*	*4,218*
Primary	44.4	5,988	46.6	2,645
Lower secondary	58.6	4,102	68.7	1,573
Lyceum	*63.5*	*10,797*	*79.4*	*7,141*
General lyceum	62.3	7,503	78.9	6,249
Technical lyceum	69.8	1,629	88.0	642
Post-gymnasium technical school	63.0	1,665	72.2	250
Post-lyceum non-tertiary education	*69.5*	*2,501*	*83.6*	*2,903*
IEK	69.5	2,145	84.5	2,608
Other post-lyceum education	69.6	356	76.4	295
TEI	*69.7*	*1,506*	*89.7*	*1,803*
Structural, Mechanical & Computer Engineering	71.4	774	85.5	200
Agricultural & Food Technology	71.8	139	81.0	105
Economics & Management	68.6	416	88.4	578
Medical Sciences	65.8	146	93.0	809
Other TEI	55.2	31	89.6	111
AEI	*61.9*	*3,949*	*78.2*	*4,467*
Structural Engineering	35.3	260	54.7	149
Mechanical Engineering & IT	69.3	486	89.1	132
Physical Sciences	77.4	368	82.1	198
Mathematics & Statistics	75.3	281	88.9	160
Medical School etc.	46.6	417	45.1	287
Horticulture & Forestry	67.3	220	90.8	97
Law School	25.2	104	44.0	235
Economics & Management	68.9	880	88.8	795
Social Sciences	72.6	64	83.2	178
Humanities	82.3	386	90.2	1,071
Languages	57.4	27	81.2	327
Physical Education & Sports	80.4	267	91.4	167
Pedagogics	96.5	144	97.3	581
Other AEI	73.4	45	81.0	90
Postgraduate studies	*74.9*	*474*	*79.4*	*319*
Postgraduate degree	73.1	286	77.6	221
Doctorate	78.2	188	85.4	98
TOTAL	**59.0**	**29,317**	**73.9**	**20,851**

since it only approximates actual work experience (overlooking any periods of unemployment or withdrawal from the labour market, as well as of any work combined with stud-

ies).[6] This can lead to an overestimation of actual experience and, consequently, of its effect on wages. However, compared to the corresponding variable used in most of the works mentioned in the second part of this study (i.e., age minus the minimum years of study required for obtaining the degree minus 6), it is undoubtedly a much better proxy of the actual work experience. Given that theory suggests no reason to expect that the relationship between experience and earnings would be the same for all education levels and specialties, we included as independent explanatory variables in the estimated equation multiplicative terms introduced between the dummy variables of education levels and years since graduation and their square.

In addition to those that proxy the employee's human capital stock, the analysis also uses as explanatory variables some other variables associated with the employees' wage level. These are the region and degree of urbanisation of their place of residence, the sector (public/private) in which they work, their nationality and family status, the size of the local unit and the branch of economic activity of the firm for which they work, and the year and quarter of the LFS they took part in. Most results are illustrated in charts, where the dependent variable (hourly wage) is presented as a function of the years since graduation, separately for men and women. The reference group consists of single men or women (depending on the equation) who are general lyceum graduates, of Greek nationality, residents of Athens, employed in a business unit of 10 or less employees, in the private (retail or wholesale) sector, and have participated in the LFS in the third quarter of 2007. The detailed results and the description of the dependent and the independent variables used in the econometric analysis can be found in Appendix I. On account of heteroskedasticity, the coefficients' estimated standard errors were corrected using White's method (1980).

Before discussing the charts with the detailed results, it would be interesting to examine the corresponding results for six broad education groups, namely, individuals who have completed studies at pre-lyceum, lyceum (higher secondary), post-lyceum non-tertiary, TEI, AEI, and postgraduate levels. These results stem from estimations based on the variables

Chart 2 Estimated hourly wages per education level

(net hourly wages in euro, constant prices of 2007)

Source: Calculations based on LFS and ELSTAT data.

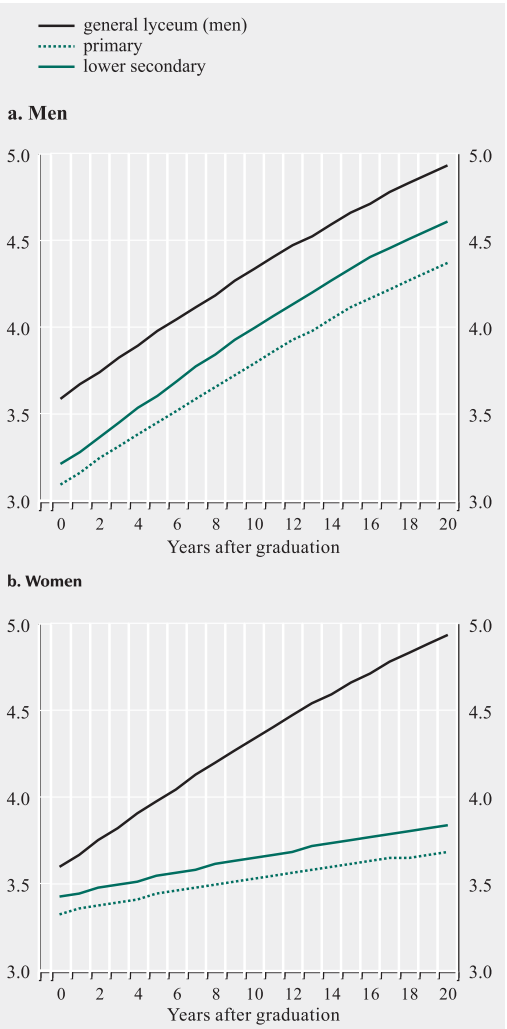
6 As already mentioned in the literature review, the use of potential experience as a proxy for actual work experience can lead to an overestimation of the latter's effect on hourly wages, given that tenure is not taken into account due to the lack of necessary information in the LFS sample.

mentioned above, but this time for broader groups of graduates. They are presented in Charts 2.a and 2.b for men and women respectively, which depict the estimated level of employees' hourly wages (vertical axis) as a function of the first 20 years since graduation from the highest education level completed (horizontal axis), once the effect of all other variables (family status, region, urbanisation, nationality, private or public sector, branch of economic activity, size of local business unit, quarter of the survey) has been checked. In all likelihood, twenty years after graduation is the maximum period that young people consider when deciding on the level and specialty of their studies. Similar charts are used in the rest of the study. These charts seem to fully confirm human capital theory (since the higher the education level, the higher the estimated level of earnings) and support our choice to introduce multiplicative terms between education level and years since graduation, as the slopes of the curves of the earnings/experience functions seem to differ considerably across education levels.

Charts 3.1.a to 3.7.b present similar results for homogeneous groups, usually within specific education levels, with an emphasis on the wages of tertiary education graduates. For comparison purposes, all charts also include the curve of the estimated wages of the men's reference group (male general lyceum graduates). Charts 3.1.a and 3.1.b show the estimated hourly wages of men and women with low educational qualifications (primary and lower secondary education graduates). Most members of these groups are of a relatively old age. The "primary education" category comprises as much persons who have not finished primary school, as primary school graduates or persons who have additionally attended a few years of gymnasium (high school). As expected, the earnings of both categories are lower than those of male lyceum graduates. What is surprising in Chart 3.1.b is the very small difference in the wages of these two groups of employees and the fact that these wages seem to register a minimal change over the years since graduation. In other words, the accumulation of work experience does not seem to substantially affect the wages of the employees belonging to these categories.

Chart 3.1 Estimated hourly wages of graduates of primary and lower secondary (compulsory) education

(net hourly wages in euro, constant prices of 2007)



Source: Calculations based on LFS and ELSTAT data.
Note: For comparability reasons, all charts in this section also depict the estimated hourly wages of male general lyceum graduates.

Charts 3.2.a and 3.2.b refer to lyceum (higher secondary) and post-lyceum non-tertiary graduates. Graduates of higher secondary education are grouped into three subcategories: general lyceum, technical lyceum and post-

gymnasium technical schools. The first subcategory also comprises persons who have not completed tertiary education studies; the second consists of graduates of Technical Vocational Lyceums (TEL), Unified Multidisciplinary Lyceums (EPL) and Technical Vocational Institutes (TEE); and the third comprises graduates of Technical Vocational Schools (TES), post-gymnasium foreman schools and post-gymnasium mercantile marine schools. Post-lyceum non-tertiary education graduates are grouped into two subcategories: graduates of (public or private) Institutes of Vocational Training (IEK) and graduates of other post-lyceum education institutes. The third category comprises graduates of colleges, dance schools, tourism, (non-university) foreign languages, mercantile marine officers, etc. In the case of men, the estimated wages of general lyceum graduates are slightly higher than those of technical lyceum and post-gymnasium technical school graduates, although differences almost disappear after a decade. The estimated wages of graduates of other post-lyceum education institutes are clearly higher than those of IEK graduates. Indeed, the wages of the latter during the first five years after graduation do not differ from the corresponding wages of general lyceum graduates; however, the gap widens later on in favour of IEK graduates. In the case of women, the picture is slightly different. For a number of years after graduation, the wages of general lyceum and post-gymnasium technical school graduates are almost identical, whereas those of technical lyceum graduates are lower. In the case of women, the wages of graduates of other post-lyceum education institutes of non-tertiary education are higher than those of IEK graduates, but differences between the two groups are not as large as in the case of men.

Charts 3.3.a and 3.3.b show the estimated hourly earnings for graduates of TEI (or, previously, KATEE, i.e. Centres of Higher Technical and Vocational Training). These graduates have been grouped into five subcategories. The first has a technical orientation ("structural engineering, mechanical and computer engineering"), the second results from merging the graduates of agricultural technology and food technology schools ("agricultural and food technology"), the next two relate respectively to graduates of "economics and management" and "medical (or paramedical)" sciences, while the last one ("other TEI") comprises graduates of schools for librarians, social workers and applied arts. As mentioned earlier, due to the heterogeneity of

Chart 3.2 Estimated hourly wages of graduates of lyceum (higher secondary) and post-lyceum non-tertiary education

(net hourly wages in euro, constant prices of 2007)

Source: Calculations based on LFS and ELSTAT data.

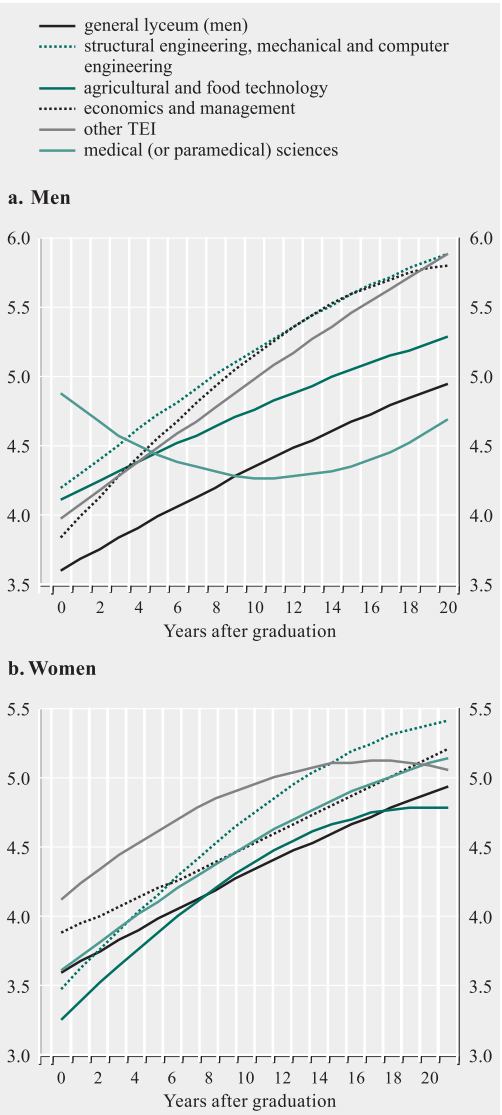
the latter and the small number of observations, results concerning the "other TEI" category should be interpreted with extreme caution and are not discussed in detail (see also the group's wage curve in Chart 3.3.a). For both men and women, the estimated wages of agricultural and food technology graduates are lower than those of other TEI graduates. As for the rest of the categories, structural engineering, mechanical and computer engineering graduates seem to hold a small advantage, but differences are not significant.

Because of the classification of AEI graduates (excluding postgraduates) into a large number of subcategories, the relevant results have been grouped and are presented in three sets of charts. Charts 3.4.a and 3.4.b show estimates of the hourly wages of science graduates. More specifically, estimates are presented for the groups of "structural engineering", "mechanical engineering and IT", "natural sciences" and "mathematics and statistics" graduates. Under "structural engineering" we have included graduates from schools such as civil engineering, architecture, topography, etc. "Mechanical engineering and IT" includes graduates from schools of naval engineering, electrical engineering, chemical engineering, mineralogy, etc. Under "natural sciences" we have included graduates from schools of physics, chemistry, biology (excluding medical biology) and geology. Due to the large number of self-employed "structural engineering" graduates, it might not be possible to generalise the results for all graduates of the schools that belong to this group.

Contrary to the charts concerning TEI graduates, these charts, as well as the next two sets of charts (concerning AEI graduates), reveal significant wage differentials over male general lyceum graduates. However, differences between men and women are also large. In the case of men, after the first five years "mechanical engineering and IT" graduates and "natural sciences" graduates seem to earn the highest wages among these four groups of AEI graduates, while the wages of "mathematics and statistics" graduates are somewhat lower. In the case of women, the estimated hourly wages of "natural sciences" graduates start at a relatively low level and in the first ten years after graduation lag behind the wages of technical university school graduates, but thereafter seem to be the highest among the four groups in the chart. For both men and women, "mathematics and statistics" graduates appear to earn the lowest wages among

Chart 3.3 Estimated hourly wages of TEI graduates

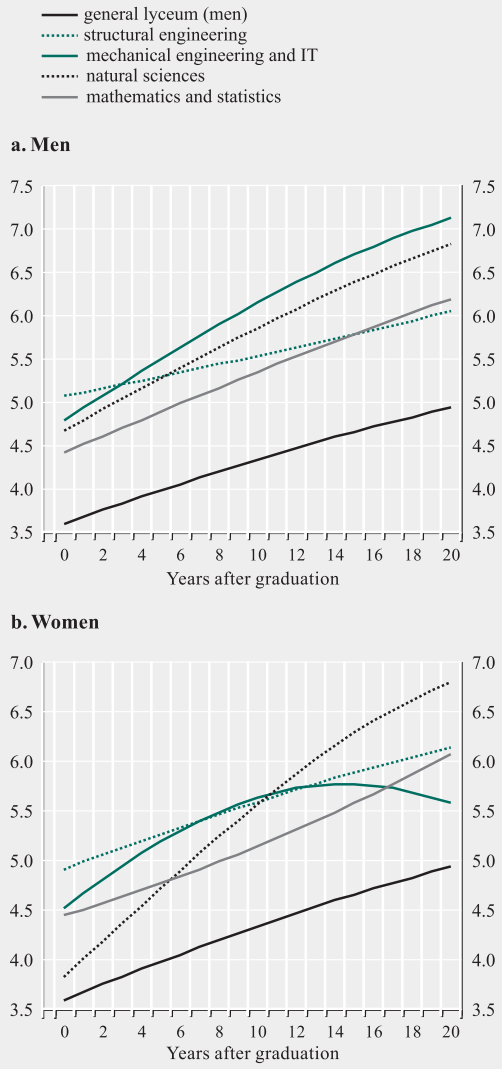
(net hourly wages in euro, constant prices of 2007)



Source: Calculations based on LFS and ELSTAT data.

Chart 3.4 Estimated hourly wages of AEI graduates (I)

(net hourly wages in euro, constant prices of 2007)



Source: Calculations based on LFS and ELSTAT data.

Chart 3.5 Estimated hourly wages of AEI graduates (II)

(net hourly wages in euro, constant prices of 2007)

Source: Calculations based on LFS and ELSTAT data.

the four groups in the first twenty years after graduation.

Charts 3.5.a and 3.5.b illustrate the estimated hourly wages for five groups of AEI graduates: "medical school, etc.", "horticulture and forestry", "law school", "economics and management" and "social sciences". Apart from medical doctors, the group "medical school, etc." includes graduates from dentistry, pharmaceutical and veterinary schools, while the "social sciences" group includes graduates from schools of sociology, psychology, anthropology, etc. Due to the high shares of self-employed among medical school and particularly law school graduates, it might not be possible to generalise these results for all graduates of these groups.

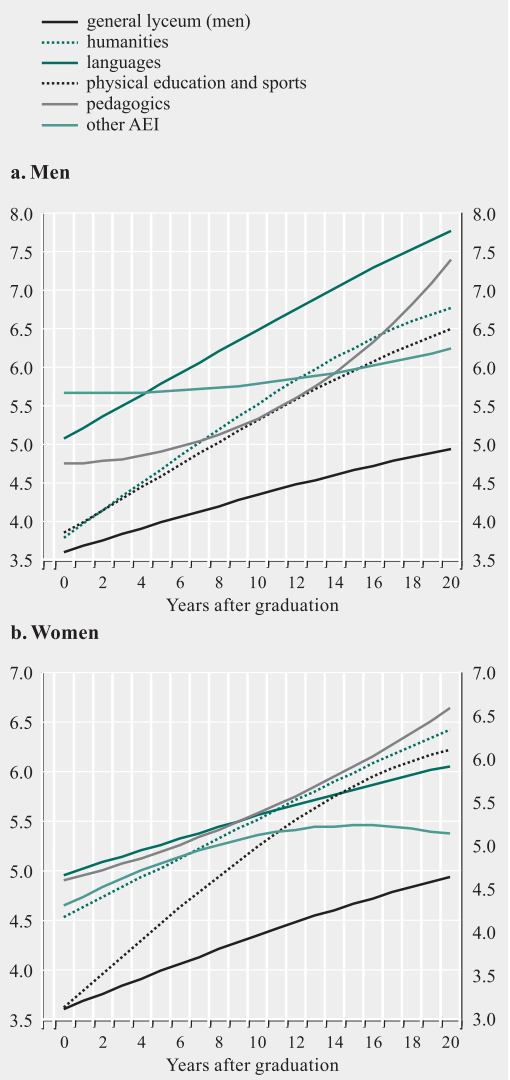
It is worth noting how the wages of "law school" graduates evolve as a function of years since graduation. Owing probably to the

mandatory traineeship that graduates of this group have to complete, their estimated hourly wages during the first years after graduation are exceptionally low, but then rapidly increase and, after a period of 12 years for women and 20 years for men, they are the highest among the groups examined. The wages of "medical school" graduates are also high, while those of female graduates of "horticulture and forestry" and of male graduates of "social sciences" range at relatively low levels. For men and women alike, the wages of the large group of "economics and management" graduates appear to start at satisfactory levels and evolve at a relatively fast pace (especially for men).

The third group of AEI graduates consists mainly of "instructor" school graduates and the relevant results are shown in Charts 3.6.a and 3.6.b, for five groups of schools: "humanities", "languages", "physical education and sports", "pedagogics" and "other AEI". As the "other AEI" group refers to graduates from schools of fine arts, medical biology, nursing, nutrition, journalism, librarianship, home economics, etc., due to its high heterogeneity and small size the corresponding estimates are not discussed. The same applies to the results for male graduates of "languages", because the relevant estimates are derived from very few observations (a problem also observed, to a lesser extent, among male social science graduates). Finally, the "humanities" group includes graduates from schools of Greek literature, philosophy, history, archaeology, theology, music, theatre, etc. It is worth noting that the estimated wages for (both male and female) graduates of "pedagogics" schools seem to rise at an increasing pace the further we move away from the year of graduation. However, given that this group includes very few graduates with extensive work experience (as studies in the corresponding schools and departments were only upgraded to AEI level roughly two decades ago), this result should be interpreted with caution. Equally noteworthy is that the estimated wages for (both male and female) graduates of "physical education" and male graduates of "humanities" start at relatively low levels but rapidly pick up as the years after graduation pass.[7]

Chart 3.6 Estimated hourly wages of AEI graduates (III)

(net hourly wages in euro, constant prices of 2007)



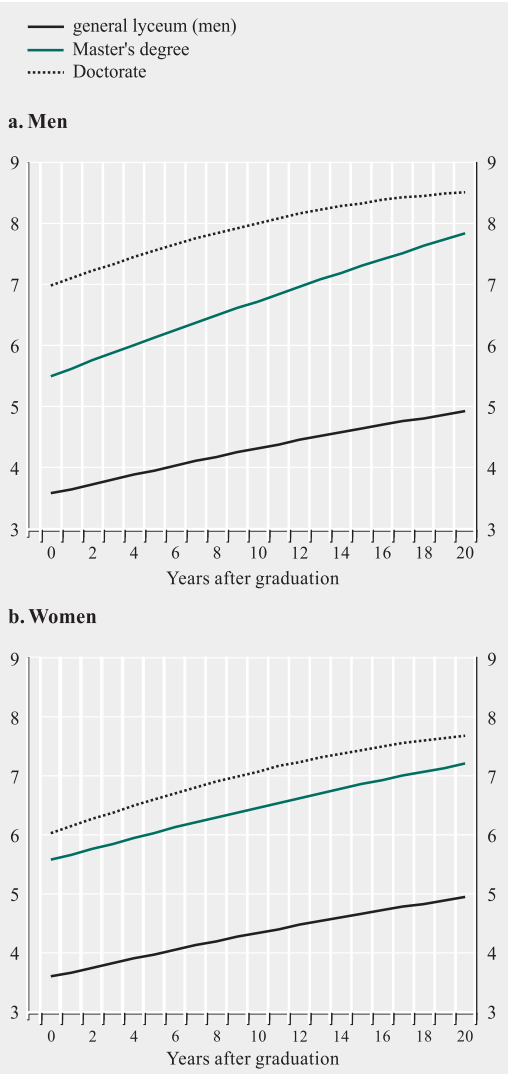
Source: Calculations based on LFS and ELSTAT data.

Finally, Charts 3.7.a and 3.7.b show the results for individuals with postgraduate studies, sep-

7 It should also be noted that, based on the experience drawn from many countries, a significant share of teachers (a group overrepresented in the above groups of graduates), when asked about their usual working hours often state just the teaching hours, overlooking any hours of preparation, etc., and so their estimated hourly wages are often overrated.

Chart 3.7 Estimated hourly wages of graduates of postgraduate studies

(net hourly wages in euro, constant prices of 2007)



Source: Calculations based on LFS and ELSTAT data.

arately for Master's degree and doctorate holders.[8] In both cases, the estimated earnings start at relatively high levels and increase further with time. For both men and women, the wages of doctorate holders are clearly higher. However, in the case of women the gap between the two groups is relatively small and seems to remain unchanged throughout the horizontal axis (years after they completed their studies), while men's wages differ considerably early on, but gradually converge.

Charts 4.1.a to 4.2.b present some additional econometric results for male and female AEI graduates separately. In particular, Charts 4.1.a and 4.1.b illustrate the development of the two genders' wages over time as we move further away from graduation, for individuals working in the public and the private sector, once the impact of all other factors has been isolated. Moreover, our estimation includes among the explanatory variables multiplicative terms for the sector of employment and the years since graduation. The results are quite interesting. For both men and women, the estimated hourly wages are higher in the public sector. Indeed, for both genders, though more markedly for women, public and private sector wages diverge as we move further away from the year of graduation.

Charts 4.2.a and 4.2.b show the corresponding differences on the basis of the employees' nationality. Among both men and women, the estimated hourly wages of Greek nationals and of nationals from other EU countries are practically the same and considerably higher than those of the employees who are non-EU nationals. This could be the result of discrimination and, at the same time, a serious indication of the fact that the educational qualifications these persons have most probably acquired in their home countries are not particularly valued in the labour market.

The results of the econometric estimations broken down by degree of urbanisation and region of the place of residence of the employees are likely to also reflect differences in the cost of living in the various areas of the country (relevant charts available on request). Estimations for both men and women show that, *ceteris paribus*, wages in the urban centres, and particularly in the greater area of Thessaloniki, are higher than in the country's semi-urban and rural areas. As regards the development of the estimated hourly wages of male and female AEI graduates across the country's regions, the

8 Owing to these graduates' higher earnings, the vertical axis in these charts covers a wider range of wages than in all other charts.

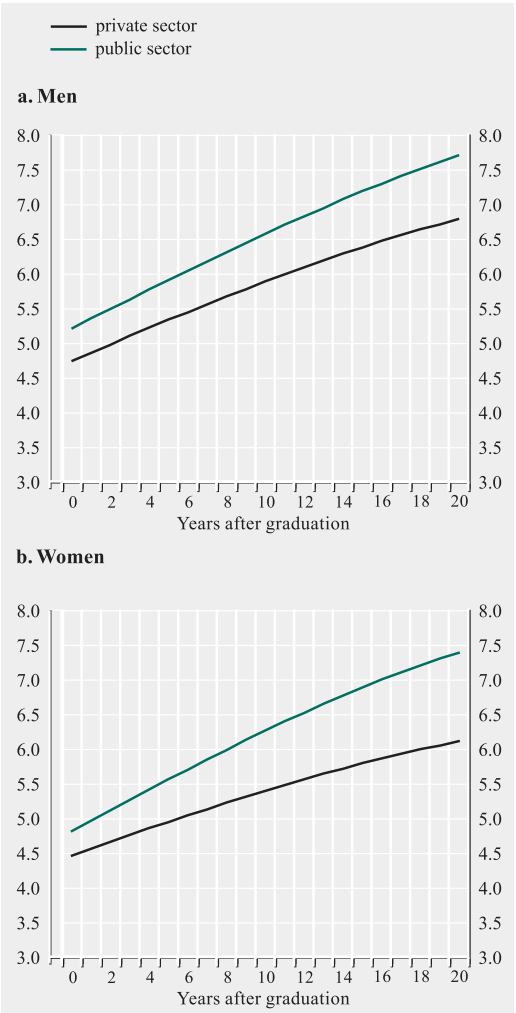
results of the estimations show certain differences between the samples of men and women. However, *ceteris paribus*, for both genders the estimated wages earned by employees are higher in the South Aegean region and lower in the regions of Central Macedonia, the Ionian Islands, and East Macedonia-Thrace.

Many empirical studies show that, *ceteris paribus*, larger enterprises pay higher wages than smaller ones. This phenomenon has been given many alternative interpretations. In Greece, the vast majority of enterprises are either small or very small. The LFS does not provide information on the size of the enterprise the employees work for, but only on the size of the local unit in which they are employed. This variable helps us classify under one category all the enterprises that are not too small (local unit with more than 10 employees), although of course the other category may thus include individuals working in small units of large enterprises. At any rate, the study's results regarding the effect of the size of the local enterprise unit on the estimated hourly wages are clear: employment in small units is associated with a rather large wage disadvantage.

The estimated econometric equation includes additional explanatory variables. Among the various branches of economic activity, wages differ greatly. Having isolated the impact of all other factors, "education", "extraterritorial organisations and bodies" and "mining and quarrying" are the branches that seem to offer higher wages, while employees in the branches of "agriculture and animal breeding", "domestic services" and, to a lesser extent, "retail and wholesale trade" seem to receive lower wages. Also, the wages of married persons are higher (more so of married men), something that can be attributed either to a greater effort made by them or, most likely, to the fact that family allowances are recorded together with wages. Finally, the wage levels show seasonality and, particularly, a trend over time – a fact expected since real wages increased significantly during the time period covered by the LFS waves used in the present analysis.

Chart 4.1 Estimated hourly wages of AEI graduates in the public and the private sector

(net hourly wages in euro, constant prices of 2007)



Source: Calculations based on LFS and ELSTAT data.

The model explains 44.3% of the dependent variable's variation in the case of the equation for men, and 46.7% in the case of the one for women. These proportions are deemed to be quite satisfactory for the specific cross-sectional estimations of the present study.

Table 3 summarises the information included in Charts 3.1.a to 3.7.b in a more comprehensible way. It presents estimated hourly wages by education level and specialty, the first year after graduation, as well as 3, 5 and 10 years after graduation, separately for men and women of

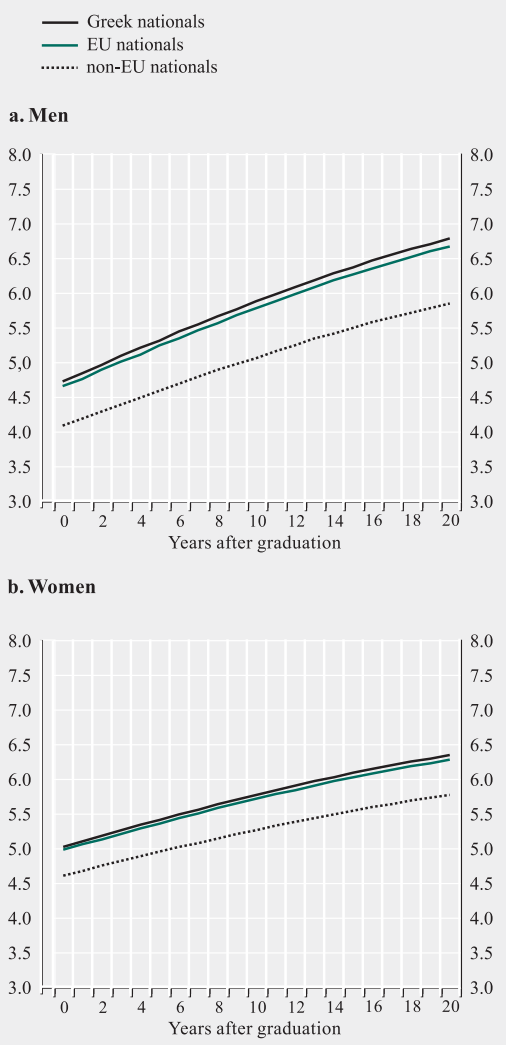
the reference group (single persons of Greek nationality that reside in Athens, work in a private sector enterprise with 10 or less employees, and have participated in the LFS in the third quarter of 2007). As regards tertiary education in particular, during the first decade after graduation, the graduates of "structural engineering, mechanical and computer engineering", followed by those of "economics and management", enjoy the highest estimated wages among TEI graduates. In some cases, the estimated wages of these groups are higher than the estimated wages of certain groups of AEI graduates. As regards AEI graduates, during the first decade after graduation, for both men and women, the highest estimated wages are observed among graduates of "medical school etc." and of the two types of engineering schools ("structural engineering" and "mechanical engineering and IT"), whereas, as already mentioned, the estimated wages of doctorate holders are higher than the estimated wages of Master's degree holders.

However, can the estimated hourly wages listed in Table 3 *a priori* reflect the wage that can be expected by an employed graduate of a specific education level and specialty? The answer is negative, since every stage in a person's career involves the possibility of unemployment. In fact, as Mitrakos, Tsakloglou and Cholezas (2010) demonstrate, the estimated rates of unemployment differ significantly across education levels and specialties, and change dramatically as we move further away from the year of graduation. Therefore, in order to calculate the expected wage, the estimations of Table 3 should be multiplied by the probability of employment of the corresponding education group at the specific time interval from the year of graduation, as this appears in Table 4 of that earlier study (Mitrakos, Tsakloglou and Cholezas, 2010).

The resulting estimations of the present study, shown in Table 4, are evidently lower than the corresponding ones in Table 3. In several education categories, especially during the first years after graduation when the estimated rates of unemployment are high, and more so for women than men, the estimations are much lower than those in Table 3. Nevertheless, particularly after the first few years since graduation, the higher the education level is, the higher the expected wage (adjusted for the probability of unemployment), with the differentials over the lowest education levels constantly increasing. Most of the results in Table 4 are not substantially different from those in Table 3 as to the ranking of the various specialties as far as tertiary education is con-

Chart 4.2 Estimated hourly wages of AEI graduates by nationality

(net hourly wages in euro, constant prices of 2007)



Source: Calculations based on LFS and ELSTAT data.

Table 3 Estimated hourly wages 0, 3, 5 and 10 years after graduation

(euro, 2007 constant prices)

	Men				Women			
	Years after graduation				Years after graduation			
Education level	<1	3	5	10	<1	3	5	10
Pre-lyceum education								
Primary	3.10	3.32	3.46	3.80	3.33	3.40	3.44	3.53
Lower secondary	3.21	3.46	3.62	4.00	3.42	3.50	3.54	3.65
Lyceum								
General lyceum	3.60	3.83	3.98	4.34	3.41	3.57	3.67	3.91
Technical lyceum	3.40	3.66	3.82	4.22	3.22	3.34	3.43	3.64
Post-gymnasium technical school	3.33	3.62	3.82	4.28	3.45	3.59	3.68	3.92
Post-lyceum non-tertiary education								
IEK	3.54	3.86	4.06	4.55	3.46	3.70	3.85	4.22
Other post-lyceum education	4.65	4.90	5.06	5.44	3.94	4.24	4.43	4.83
TEI								
Structural, Mechanical & Computer Engineering	4.18	4.50	4.71	5.18	3.48	3.90	4.16	4.75
Agricultural & Food Technology	4.10	4.31	4.44	4.76	3.26	3.65	3.89	4.39
Economics & Management	3.83	4.27	4.54	5.15	3.88	4.07	4.20	4.53
Medical Sciences	3.96	4.27	4.47	4.97	3.61	3.91	4.11	4.55
Other TEI	4.87	4.57	4.43	4.27	4.13	4.44	4.62	4.96
AEI								
Structural Engineering	5.07	5.21	5.30	5.54	4.91	5.13	5.26	5.59
Mechanical Engineering & IT	4.79	5.22	5.50	6.15	4.52	4.94	5.19	5.63
Physical Sciences	4.67	5.04	5.28	5.86	3.83	4.37	4.72	5.57
Mathematics & Statistics	4.42	4.71	4.89	5.35	4.45	4.64	4.77	5.14
Medical School etc.	5.10	5.52	5.79	6.42	5.10	5.25	5.35	5.58
Horticulture & Forestry	4.15	4.51	4.74	5.30	4.78	4.71	4.68	4.70
Law School	3.02	3.69	4.16	5.36	3.13	3.81	4.28	5.41
Economics & Management	4.22	4.63	4.90	5.56	4.04	4.39	4.61	5.12
Social Sciences	4.26	4.41	4.53	4.86	3.99	4.28	4.48	4.98
Humanities	3.79	4.32	4.67	5.53	4.52	4.82	5.02	5.51
Languages	5.08	5.50	5.79	6.49	4.95	5.14	5.26	5.55
Physical Education & Sports	3.84	4.29	4.59	5.31	3.62	4.13	4.46	5.24
Pedagogics	4.75	4.81	4.90	5.34	4.90	5.06	5.19	5.57
Other AEI	5.67	5.67	5.69	5.79	4.64	4.91	5.07	5.35
Postgraduate studies								
Postgraduate degree	5.52	5.89	6.14	6.74	5.57	5.84	6.02	6.45
Doctorate	6.99	7.34	7.56	8.02	6.03	6.37	6.59	7.06

Table 4 Estimated hourly wages 0, 3, 5 and 10 years after graduation adjusted for unemployment probability

(euro, 2007 constant prices)

	Men				Women			
	Years after graduation				Years after graduation			
Education level	<1	3	5	10	<1	3	5	10
Pre-lyceum education								
Primary	2.80	3.03	3.18	3.54	3.00	3.01	3.01	3.03
Lower secondary	3.05	3.29	3.45	3.83	3.13	3.18	3.20	3.29
Lyceum								
General lyceum	3.36	3.62	3.78	4.18	2.99	3.16	3.27	3.53
Technical lyceum	3.15	3.45	3.63	4.07	2.60	2.76	2.87	3.14
Post-gymnasium technical school	3.14	3.44	3.65	4.13	2.95	3.09	3.19	3.45
Post-lyceum non-tertiary education								
IEK	3.20	3.58	3.82	4.38	2.75	3.04	3.22	3.66
Other post-lyceum education	4.37	4.63	4.79	5.18	3.39	3.69	3.88	4.28
TEI								
Structural, Mechanical & Computer Engineering	3.75	4.21	4.49	5.06	2.53	3.26	3.67	4.48
Agricultural & Food Technology	3.59	3.95	4.15	4.58	2.38	2.84	3.13	3.73
Economics & Management	3.40	3.96	4.29	5.01	3.07	3.33	3.50	3.90
Medical Sciences	3.14	3.80	4.17	4.88	2.72	3.23	3.55	4.21
Other TEI	4.30	4.26	4.22	4.18	2.90	3.59	3.96	4.59
AEI								
Structural Engineering	4.75	4.99	5.13	5.45	3.95	4.51	4.81	5.36
Mechanical Engineering & IT	4.51	4.98	5.29	5.98	4.00	4.59	4.93	5.48
Physical Sciences	3.91	4.51	4.87	5.67	2.29	3.17	3.75	5.06
Mathematics & Statistics	3.34	4.18	4.57	5.26	2.49	3.44	3.95	4.84
Medical School etc.	4.66	5.11	5.43	6.23	4.15	4.61	4.86	5.33
Horticulture & Forestry	3.88	4.28	4.54	5.16	3.61	3.61	3.66	3.93
Law School	2.99	3.66	4.14	5.34	2.80	3.52	4.02	5.23
Economics & Management	3.76	4.32	4.66	5.43	3.30	3.79	4.09	4.76
Social Sciences	3.80	4.08	4.26	4.68	2.71	3.39	3.79	4.60
Humanities	3.30	3.93	4.34	5.33	3.29	3.84	4.19	5.00
Languages	4.13	4.82	5.33	6.41	4.30	4.61	4.79	5.19
Physical Education & Sports	3.34	3.83	4.15	4.96	3.29	3.64	3.88	4.62
Pedagogics	4.43	4.56	4.69	5.21	3.84	4.25	4.51	5.15
Other AEI	5.22	5.26	5.30	5.46	3.93	4.35	4.58	4.99
Postgraduate studies								
Postgraduate degree	5.03	5.53	5.85	6.55	4.60	5.16	5.48	6.13
Doctorate	6.49	7.02	7.33	7.95	4.93	5.62	6.00	6.73

cerned. Again, with respect to TEI, the graduates with the highest expected wages are those of "structural engineering, mechanical and computer engineering", followed by those of "economics and management" (and "medical sciences" in the case of women), while with respect to AEI, at least during the first ten years after graduation, the highest expected wages are observed among graduates of "medical school etc." and of the two types of engineering schools ("structural engineering" and "mechanical engineering and IT"). Things are less clear at the other end of the distribution, although graduates of "social sciences" schools feature almost invariably among the groups with the lowest expected wages.

However, the fact that graduates of one specialty of a specific education level may enjoy higher wages than those of another specialty of the same level does not necessarily imply that returns to education are higher for the former, as the years of study needed for the two specialties might differ. The data on which the estimations appearing in Tables 3 and 4 rely allow for a calculation of the internal rate of return to the completion of studies for each education level and specialty, adjusted (or not) for unemployment effects. This has never been attempted so far in the available Greek literature. Estimates of private returns to education for tertiary education graduates based on the information used in Tables 3 and 4 are presented in Table 5. Of course, as some of the groups of the sample at issue are relatively small, not adequately represented throughout the entire range of years since graduation, or showing high percentages of self-employment, the corresponding results should be treated with caution. The methodology applied is thoroughly described in Appendix II, including a detailed example (calculation of the annual marginal private returns to education in the years after graduation from lyceum for male and female AEI graduates of "economics and management" schools).

First of all, it should be noted that due to the use of multiplicative terms between education levels and specialties and years since graduation and their square, returns to education resulting from the analysis are not invariable, but change as we move further away from the year of graduation. The calculation of such returns relies on a number of assumptions.

As regards TEI graduates, we assume that they come mainly from technical lyceums, so their estimated wages are compared with those of technical lyceum graduates. Given that the latter are lower than the wages of general lyceum graduates, if TEI graduates actually come mainly from general lyceums, their returns are overestimated in the tables.[9] Until recently, studies in TEI (or formerly KATEE) lasted three years. However, since 2001 the required duration of studies for all TEI (for certain ones already since 1999) has been changed to four years. Thus, owing to the rather limited number of TEI graduates with four years of studies in our sample, the estimates presented below rely on the assumption that TEI studies have lasted three years for all TEI graduates. Obviously, the estimated internal rates of return would be lower had we assumed a four-year duration of studies. Similarly, we assumed that studies in technical university as well as "horticulture and forestry" schools last five years. Returns for "medical school etc." graduates were also calculated based on the assumption of five-year-long studies because, although medical school studies last six years, other schools of that group are completed in only five or even four years. Again here the estimated internal rates of return would have been lower had we assumed a shorter duration of studies. For all other AEI graduates, the assumption made was that their studies lasted four years. For postgraduate degree holders it was assumed that studies after lyceum lasted five years; therefore, if postgraduate studies last mainly two years and most

9 It should be recalled that the return to each education level is derived by comparing the estimated coefficient of the dummy variable of the given level with the corresponding estimated coefficient of the dummy variable of the immediately preceding education level (marginal return). Therefore, the assumption about the specific kind of education level the individuals come from (e.g. technical or general lyceum) before finishing their highest level of studies (e.g. TEI) is quite significant for the calculation, since it is one of the equation's terms.

Table 5 Estimated private returns to education

(percentages)

Education level	Not adjusted for unemployment probability		Adjusted for unemployment probability	
	Men	Women	Men	Women
TEI				
Structural, Mechanical & Computer Engineering	6.8	7.2	7.0	8.4
Agricultural & Food Technology	3.9	3.4	3.6	1.0
Economics & Management	5.4	7.5	5.5	6.9
Medical Sciences	6.1	6.4	5.8	7.8
Other TEI	3.6	8.8	3.7	9.2
AEI				
Structural Engineering	5.2	7.4	5.5	7.9
Mechanical Engineering & IT	7.0	5.7	7.1	6.9
Physical Sciences	7.8	8.2	7.4	7.3
Mathematics & Statistics	5.7	7.8	5.3	7.0
Medical School etc.	7.9	7.4	7.9	8.0
Horticulture & Forestry	4.0	4.7	4.2	3.9
Law School	5.5	7.0	6.2	8.1
Economics & Management	6.4	6.6	6.5	6.9
Social Sciences	4.1	6.7	3.8	6.2
Humanities	5.8	8.9	5.7	8.3
Languages	10.5	9.2	9.9	9.8
Physical Education & Sports	5.3	6.5	4.8	6.8
Pedagogics	8.7	10.0	8.9	9.9
Other AEI	8.6	6.9	7.9	7.1
Postgraduate studies				
Postgraduate degree	9.3	10.5	9.3	11.5
Doctorate	7.8	7.4	8.0	8.0

of the graduates come from schools with five or more years of bachelor studies, then the corresponding returns are overestimated in the tables. Finally, it was assumed that eight years of studies after lyceum are required in order to obtain a doctorate.

Needless to say, estimates in Table 5 focus on the pecuniary private returns to education, ignoring other (non-pecuniary) benefits students may enjoy thanks to their participation in higher levels of the education system. In order to calculate the returns listed in these tables, we assume that the individuals' working life is 35 years. This is most likely realistic for men, but could be somewhat exaggerated for women, at least currently (although recent developments in retirement age limits point to this direction). In the literature, working life is often estimated based on a person's (theoretical) graduation year and (theoretical) retirement age. In the case of Greece, however, this would translate into lyceum graduates with up to 46 years of work experience as employees. However, our sample includes very few workers (and almost no employees) with such characteristics.

In the literature, estimates such as those listed in Table 5 are usually called "private returns

to education". The results of Table 5 show the annual estimated returns to education, separately for men and women, by category of tertiary education graduates. Even though —as shown by the results in Table 3— women's wages are much lower than those of men, for both AEI and TEI graduates, in most cases returns to education are higher for women than for men. Of course this is mainly attributable to the fact that the gap between lyceum and tertiary education graduates is, respectively, even greater for women than for men. Also, returns to AEI studies seem to be higher than those on TEI studies, although vast differences appear between groups of schools within the two types of tertiary education. In general, the level of returns can be considered satisfactory. The highest returns are observed for graduates of "pedagogics" (a result that, as mentioned earlier, should be treated with caution), "foreign languages" (mostly women), "natural sciences" and, to a lesser extent, "medical school etc.", while at the opposite end we find those of "horticulture and forestry" and "social sciences" (only men). The returns of Master's degree and doctorate holders are particularly high.

If we consider that investment in human capital is really a form of investment, in estimating its return one should also take into account the cost of the potential risks involved. Most probably, the greatest risk is that of unemployment, which could wipe out (at an individual level) or considerably decrease (at a collective level) expected returns. Hence, we consider that real private returns to education are those resulting from the estimations shown in Table 4 and presented in Table 5. The calculation of the returns in question has taken into account the probability of unemployment for a specific number of years after graduation, as much for individuals in the reference group (general or technical lyceum graduates) as for graduates of every group of tertiary education.

Differences between the estimates of Table 5 are not very pronounced. The estimated annual returns to education may increase in some cases or decrease in others, but all such changes are usually small. Among the groups of TEI graduates, the highest returns seem to correspond to "structural engineering, mechanical and computer engineering" and the lowest to "agricultural and food technology", as regards both men and women. Among AEI graduates, returns increase in the case of the two categories of technical university graduates, "medical school etc.", "law school" and, to a lesser extent, "economics and management".

The ranking of schools according to the associated expected returns to education does not change significantly. Graduates of "pedagogics", "foreign languages" (women), "medical school etc.", "law school", "physical sciences" and the two categories of technical university graduates, i.e. "structural engineering" and "mechanical engineering and IT", show the highest returns, while the lowest returns are found in the groups of graduates of "horticulture and forestry" and "social sciences" (men). The returns for both Master's degree and doctorate holders appear to be even higher, while once again annual returns are remarkably higher for Master's degree holders than for doctorate holders (despite the highest earnings of the latter).

5 CONCLUSIONS

The present study contains several findings regarding particular groups of tertiary education graduates. Some of these findings are consistent with the results of previous studies, while others appear for the first time in the literature. The relationship between labour remuneration and education level is unquestionably positive. The wages of tertiary education graduates are considerably higher than those of graduates of lower levels of the education system at a comparable point of their career (years since graduation). However, some very important differences are detected within various groups of graduates. Despite the

limitations of the analysis stemming from the nature of the data used in this study (grouped wage data, samples with a small number of observations with unsatisfactory dispersion in terms of work experience for specific groups of graduates, high and differing rates of self-employment in various groups of specialties, etc.), certain conclusions can safely be reached. University graduates of medical and engineering faculties, as well as Master's degree and doctorate holders enjoy high hourly earnings, although this does not always entail higher internal rates of return compared with other specialties.

The fact that tertiary education graduates obtain higher wages does not necessarily imply that these individuals have become more productive because of their studies. It could simply mean that they are more capable of using their tertiary education qualifications as a 'signalling' mechanism vis-à-vis employers (an aspect not examined in the present study). Moreover, the returns to education examined in the present study are private returns. High private returns are not necessarily associated with high social returns, which would be indispensable in order to support the view that investment in tertiary education is profitable for society; even more so since no safe prediction can be made as to whether high private returns will carry on in the future as such, given that skilled and specialised labour supply in Greece is expected to increase significantly due to the observed rapid expansion of "mass" tertiary education attendance over the last ten years.

According to a recent study by Georganta, Kandilorou and Livada (2008), 58% of the second-year students in two specific AEI (Athens University of Economics and Business and University of Macedonia) reported that they had decided to pursue tertiary education studies in order to later find a better-paid job more easily. The findings of Mitrakos, Tsakloglou and Cholezas (2010) show that, indeed, graduation from a tertiary education institution shields against unemployment, at least in the long run. The findings of the present study also verify that tertiary education studies ensure a better-paid job and, consequently, satisfactory returns in the long run, especially in the schools and levels that seem to be most popular among applicants. In conclusion, according to the results of the analysis, Greek young people seem to be making totally rational choices as regards their education. However, a question that remains to be answered is whether it is equally rational for the Greek state to keep expanding tertiary education, by either establishing new AEI and TEI or creating new schools and departments in the existing institutions.

APPENDIX I
DETAILED ECONOMETRIC RESULTS

Estimation coefficients of the hourly wages logarithm

Dependent variable: logarithm of hourly wages at constant prices

Independent variables	Coefficient			
	Men		Women	
Primary	-0.1479	***	-0.0244	
Lower secondary	-0.1132	***	0.0031	
General lyceum	Reference group			
Technical lyceum	-0.0564	*	-0.0583	
Post-gymnasium technical school	-0.0785	**	0.0105	
IEK	-0.0151		0.0128	
Other post-lyceum education	0.2558	***	0.1447	
Structural, Mechanical & Computer Engineering (TEI)	0.1509	***	0.0206	
Agricultural & Food Technology (TEI)	0.1313	*	-0.0461	
Economics & Management (TEI)	0.0637		0.1292	***
Medical Sciences (TEI)	0.0970		0.0558	
Other TEI	0.3035	***	0.1896	
Structural Engineering	0.3433	***	0.3644	***
Mechanical Engineering & IT	0.2865	***	0.2798	***
Physical Sciences	0.2616	***	0.1163	
Mathematics & Statistics	0.2064		0.2650	
Medical School etc.	0.3479	***	0.4009	***
Horticulture & Forestry	0.1426	*	0.3369	***
Law School	-0.1755		-0.0852	
Economics & Management	0.1599	***	0.1690	***
Social Sciences	0.1680		0.1571	**
Humanities	0.0508		0.2819	***
Languages	0.3442		0.3719	***
Physical Education & Sports	0.0663		0.0578	
Pedagogics	0.2768		0.3613	***
Other AEI	0.4547	*	0.3065	***
Postgraduate degree	0.4283	***	0.4895	***
Doctorate	0.6638	***	0.5691	***

*** Statistically significant at the 1% level.
** Statistically significant at the 5% level.
* Statistically significant at the 10% level.

Estimation coefficients of the hourly wages logarithm *(continued)*

Dependent variable: logarithm of hourly wages at constant prices

Independent variables	Coefficient			
	Men		Women	
Years after graduation * Primary	0.0019		-0.0087	*
Years after graduation * Lower secondary	0.0042		-0.0083	*
Years after graduation * General lyceum	Reference group			
Years after graduation * Technical lyceum	0.0037		-0.0030	
Years after graduation * Post-gymnasium technical school	0.0081	**	-0.0024	
Years after graduation * IEK	0.0078	**	0.0079	**
Years after graduation * Other post-lyceum education	-0.0034		0.0106	
Years after graduation * Structural, Mechanical & Computer Engineering (TEI)	0.0044		0.0246	*
Years after graduation * Agricultural & Food Technology (TEI)	-0.0045		0.0250	
Years after graduation * Economics & Management (TEI)	0.0168		0.0004	
Years after graduation * Medical Sciences (TEI)	0.0040		0.0132	**
Years after graduation * Other TEI	-0.0462	**	0.0112	
Years after graduation * Structural Engineering	-0.0128		-0.0009	
Years after graduation * Mechanical Engineering & IT	0.0086		0.0182	
Years after graduation * Physical Sciences	0.0047		0.0305	***
Years after graduation * Mathematics & Statistics	-0.0003		-0.0020	
Years after graduation * Medical School etc.	0.0062		-0.0055	
Years after graduation * Horticulture & Forestry	0.0076		-0.0224	
Years after graduation * Law School	0.0489	**	0.0541	***
Years after graduation * Economics & Management	0.0107	**	0.0132	**
Years after graduation * Social Sciences	-0.0098		0.0084	
Years after graduation * Humanities	0.0249	***	0.0065	
Years after graduation * Languages	0.0062		-0.0027	
Years after graduation * Physical Education & Sports	0.0169	*	0.0314	**
Years after graduation * Pedagogics	-0.0203		-0.0051	
Years after graduation * Other AEI	-0.0224		0.0058	
Years after graduation * Postgraduate degree	0.0008		0.0012	
Years after graduation * Doctorate	-0.0039		0.0042	

*** Statistically significant at the 1% level.
** Statistically significant at the 5% level.
* Statistically significant at the 10% level.

Estimation coefficients of the hourly wages logarithm *(continued)*

Dependent variable: logarithm of hourly wages at constant prices

Independent variables	Coefficient			
	Men		Women	
Years after graduation sqrd./100 x Primary	-0.0022		0.0094	
Years after graduation sqrd./100 x Lower secondary	-0.0091		0.0102	
Years after graduation sqrd./100 x General lyceum	Reference group			
Years after graduation sqrd./100 x Technical lyceum	-0.0090		0.0164	
Years after graduation sqrd./100 x Post-gymnasium technical school	-0.0145	*	0.0141	
Years after graduation sqrd./100 x IEK	-0.0147		-0.0164	*
Years after graduation sqrd./100 x Other post-lyceum education	0.0049		-0.0407	
Years after graduation sqrd./100 x Structural, Mechanical & Computer Engineering (TEI)	-0.0164		-0.0719	*
Years after graduation sqrd./100 x Agricultural & Food Technology (TEI)	0.0062		-0.0885	
Years after graduation sqrd./100 x Economics & Management (TEI)	-0.0600	*	0.0121	
Years after graduation sqrd./100 x Medical Sciences (TEI)	-0.0009		-0.0368	**
Years after graduation sqrd./100 x Other TEI	0.1423	**	-0.0642	
Years after graduation sqrd./100 x Structural Engineering	0.0290		0.0011	
Years after graduation sqrd./100 x Mechanical Engineering & IT	-0.0224		-0.0974	**
Years after graduation sqrd./100 x Physical Sciences	-0.0075		-0.0686	***
Years after graduation sqrd./100 x Mathematics & Statistics	0.0067		0.0291	
Years after graduation sqrd./100 x Medical School etc.	-0.0174		0.0094	
Years after graduation sqrd./100 x Horticulture & Forestry	-0.0184		0.0705	*
Years after graduation sqrd./100 x Law School	-0.1010	**	-0.1318	***
Years after graduation sqrd./100 x Economics & Management	-0.0182		-0.0315	**
Years after graduation sqrd./100 x Social Sciences	0.0443		-0.0004	
Years after graduation sqrd./100 x Humanities	-0.0577	***	-0.0041	
Years after graduation sqrd./100 x Languages	-0.0031		0.0047	
Years after graduation sqrd./100 x Physical Education & Sports	-0.0323		-0.0803	**
Years after graduation sqrd./100 x Pedagogics	0.1337		0.0429	
Years after graduation sqrd./100 x Other AEI	0.0572		-0.0515	
Years after graduation sqrd./100 x Postgraduate degree	0.0044		-0.0013	
Years after graduation sqrd./100 x Doctorate	-0.0101		-0.0201	
Years after graduation	0.0216	***	0.0155	***
Years after graduation sqrd./100	-0.0287	***	-0.0184	***

*** Statistically significant at the 1% level.
** Statistically significant at the 5% level.
* Statistically significant at the 10% level.

Estimation coefficients of the hourly wages logarithm *(continued)*

Dependent variable: logarithm of hourly wages at constant prices

Independent variables	Coefficient			
	Men		Women	
Greek nationals	Reference group			
Other EU nationals	-0.0172		-0.0057	
Third country nationals	-0.1392	***	-0.1189	***
Eastern Macedonia – Thrace	-0.0963	***	-0.0626	***
Central Macedonia	-0.1024	***	-0.0995	***
Western Macedonia	-0.0514	***	-0.0169	
Epirus	-0.0151		-0.0092	
Thessaly	-0.0672	***	-0.0259	
Ionian Islands	-0.0687	***	-0.0355	
Western Greece	-0.0146		0.0005	
Central Greece and Euboea	-0.0095		-0.0195	
Attica	Reference group			
Peloponnese	-0.0560	***	-0.0369	**
North Aegean	0.0353	**	0.0105	
South Aegean	0.0346	***	0.0709	***
Crete	-0.0045		0.0055	
Capital region – Attica	Reference group			
City complex – Thessaloniki	0.0728	***	0.0950	***
Other urban areas	0.0022		-0.0031	
Semi-urban areas	-0.0259	***	-0.0197	
Rural areas	-0.0371	***	-0.0457	***
First year of survey (2004)	-0.0073		-0.0009	
Second year of survey (2005)	-0.0296	***	-0.0039	
Third year of survey (2006)	-0.0278	***	-0.0146	
Fourth year of survey (2007)	Reference group			
1st quarter	-0.0115	*	-0.0175	**
2nd quarter	-0.0261	***	-0.0259	***
3rd quarter	Reference group			
4th quarter	0.0105		0.0225	**

*** Statistically significant at the 1% level.
** Statistically significant at the 5% level.
* Statistically significant at the 10% level.

Estimation coefficients of the hourly wages logarithm *(continued)*

Dependent variable: logarithm of hourly wages at constant prices

Independent variables	Coefficient			
	Men		Women	
Agriculture, animal husbandry, hunting and forestry	-0.1414	***	-0.1221	***
Fishing	-0.0245		0.1955	***
Mining and quarrying	0.2171	***	0.1737	***
Manufacturing	0.0556	***	0.0642	***
Electricity, gas and water supply	0.1787	***	0.1399	***
Construction	0.0962	***	0.1376	***
Wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods	Reference group			
Hotels and restaurants	0.0051		0.0193	
Transport, storage and communication	0.0864	***	0.0894	***
Financial intermediation	0.1359	***	0.1542	***
Real estate, renting and business activities	0.0234	*	0.0663	***
Public administration and defence, compulsory social security	0.1072	***	0.1236	***
Education	0.3150	***	0.2901	***
Health and social work	0.0612	***	0.1124	***
Other community, social and personal service activities	0.0637	***	0.0500	***
Private households with employed persons	-0.1571	***	-0.1698	***
Extra-territorial organisations and bodies	0.3139	***	0.3588	*
Local business unit with 10 persons or less	Reference group			
Local business unit with more than 10 persons	0.0807	***	0.0794	***
Single	Reference group			
Married	0.0313	***	0.0165	**
Private sector	Reference group			
Public sector	0.0757	***	0.0689	***
Public sector x Years after graduation	0.0025		0.0092	***
Public sector x Years after graduation sqrd./100	-0.0004		-0.0161	***
Constant term	1.2514	***	1.1754	***
Number of observations	*29,256*		*20,826*	
R-squared	*0.4432*		*0.4658*	

*** Statistically significant at the 1% level.
** Statistically significant at the 5% level.
* Statistically significant at the 10% level.

APPENDIX II

METHODOLOGY APPLIED TO THE CALCULATION OF PRIVATE MARGINAL RETURNS TO EDUCATION

The marginal private rates of return to education appearing in Table 5 were estimated using the discount rate of the equation describing internal return to investment. For example, to calculate the private marginal internal rate of return to graduation from the schools of economics and management (AEI) for men and women (6.4% and 6.6% respectively) we used the data of Tables A and B on the basis of the following formula:

$$\sum_{t=0}^{39} \frac{E(w_{St})}{(1+r)^t} = \sum_{t=0}^{39} \frac{E(w_{Tt})}{(1+r)^t}$$

where $E(w_{St})$ and $E(w_{Tt})$ are, respectively, the expected hourly wage rates of lyceum graduates and graduates of AEI schools of economics and management in year *t*, i.e.:

$[E(w_{St}) = \hat{w}_{St}(1-\hat{u}_{St})$ and

$E(w_{Tt}) = \hat{w}_{Tt}(1-\hat{u}_{Tt})]$

where $\hat{u}_{St}$ and $\hat{u}_{Tt}$ are the estimated unemployment rates of lyceum graduates and graduates of AEI schools of economics and management in year *t*;

$\hat{w}_{St}$ and $\hat{w}_{Tt}$ are the respective estimated unemployment rates for lyceum graduates and graduates of the AEI schools of economics and management in year *t*;

and *r* is the discount rate.

Techniques for calculating the discount rate that equates the net present value of the expected hourly wage rates of lyceum graduates with those of graduates of the AEI schools of economics and management are readily available even in relatively simple statistical packages, such as Excel.

Table A Estimated unemployment rates (-Us), estimated hourly wages (-Ws) and expected hourly wages (E(Ws)) of male lyceum graduates and graduates of AEI Economics & Management schools

	Lyceum graduate				Graduate of AEI Economics & Management schools			
t	Years after graduation	U_S	W_S	$E(W_S)$	Years after graduation	U_T	W_T	$E(W_T)$
0	0	6.65	3.60	3.36	-	-	-	-
1	1	6.26	3.68	3.45	-	-	-	-
2	2	5.89	3.75	3.53	-	-	-	-
3	3	5.54	3.83	3.62	-	-	-	-
4	4	5.21	3.90	3.70	0	10.87	4.22	3.76
5	5	4.91	3.98	3.78	1	9.20	4.36	3.96
6	6	4.62	4.05	3.87	2	7.79	4.49	4.14
7	7	4.35	4.13	3.95	3	6.60	4.63	4.32
8	8	4.10	4.20	4.03	4	5.60	4.77	4.50
9	9	3.86	4.27	4.10	5	4.77	4.90	4.67
10	10	3.64	4.34	4.18	6	4.07	5.04	4.83
11	11	3.43	4.41	4.25	7	3.49	5.17	4.99
12	12	3.24	4.47	4.33	8	3.00	5.30	5.14
13	13	3.05	4.54	4.40	9	2.59	5.43	5.29
14	14	2.88	4.60	4.47	10	2.26	5.56	5.43
15	15	2.72	4.66	4.53	11	1.98	5.69	5.57
16	16	2.57	4.72	4.60	12	1.74	5.81	5.71
17	17	2.43	4.78	4.66	13	1.55	5.93	5.84
18	18	2.30	4.83	4.72	14	1.39	6.05	5.96
19	19	2.17	4.89	4.78	15	1.26	6.16	6.08
20	20	2.06	4.94	4.84	16	1.15	6.27	6.20
21	21	1.95	4.99	4.89	17	1.05	6.38	6.31
22	22	1.85	5.03	4.94	18	0.98	6.48	6.41
23	23	1.75	5.07	4.99	19	0.92	6.57	6.51
24	24	1.66	5.12	5.03	20	0.87	6.67	6.61
25	25	1.58	5.15	5.07	21	0.84	6.75	6.70
26	26	1.50	5.19	5.11	22	0.81	6.84	6.78
27	27	1.43	5.22	5.15	23	0.79	6.91	6.86
28	28	1.36	5.25	5.18	24	0.79	6.98	6.93
29	29	1.29	5.28	5.21	25	0.79	7.05	6.99
30	30	1.23	5.31	5.24	26	0.79	7.11	7.05
31	31	1.18	5.33	5.26	27	0.81	7.16	7.10
32	32	1.13	5.35	5.29	28	0.84	7.21	7.14
33	33	1.08	5.36	5.30	29	0.88	7.24	7.18
34	34	1.03	5.37	5.32	30	0.93	7.28	7.21
35	35	0.99	5.38	5.33	31	0.99	7.30	7.23
36	-	-	-	-	32	1.06	7.32	7.25
37	-	-	-	-	33	1.16	7.34	7.25
38	-	-	-	-	34	1.27	7.34	7.25
39	-	-	-	-	35	1.40	7.34	7.24

Table B Estimated unemployment rates (-Us), estimated hourly wages (-Ws) and expected hourly wages (E(Ws)) of female lyceum graduates and graduates of AEI Economics & Management schools

	Lyceum graduate				Graduate of AEI Economics & Management schools			
t	Years after graduation	U_S	W_S	$E(W_S)$	Years after graduation	U_T	W_T	$E(W_T)$
0	0	12.19	3.41	3.00	-	-	-	-
1	1	11.98	3.47	3.05	-	-	-	-
2	2	11.75	3.52	3.10	-	-	-	-
3	3	11.52	3.57	3.16	-	-	-	-
4	4	11.28	3.62	3.21	0	18.26	4.04	3.30
5	5	11.03	3.67	3.27	1	16.57	4.16	3.47
6	6	10.78	3.72	3.32	2	15.04	4.27	3.63
7	7	10.52	3.77	3.37	3	13.65	4.39	3.79
8	8	10.26	3.82	3.43	4	12.38	4.50	3.94
9	9	9.99	3.87	3.48	5	11.24	4.61	4.09
10	10	9.72	3.91	3.53	6	10.21	4.72	4.23
11	11	9.45	3.96	3.58	7	9.29	4.82	4.37
12	12	9.18	4.00	3.64	8	8.46	4.93	4.51
13	13	8.90	4.05	3.69	9	7.71	5.03	4.64
14	14	8.62	4.09	3.74	10	7.04	5.12	4.76
15	15	8.34	4.13	3.79	11	6.44	5.22	4.88
16	16	8.06	4.17	3.84	12	5.91	5.31	5.00
17	17	7.78	4.21	3.89	13	5.43	5.40	5.10
18	18	7.50	4.25	3.93	14	5.01	5.48	5.20
19	19	7.22	4.29	3.98	15	4.63	5.56	5.30
20	20	6.94	4.32	4.02	16	4.29	5.63	5.39
21	21	6.66	4.36	4.07	17	3.99	5.70	5.47
22	22	6.38	4.39	4.11	18	3.72	5.77	5.55
23	23	6.11	4.42	4.15	19	3.48	5.82	5.62
24	24	5.84	4.45	4.19	20	3.27	5.88	5.69
25	25	5.58	4.48	4.23	21	3.08	5.93	5.75
26	26	5.32	4.51	4.27	22	2.92	5.97	5.80
27	27	5.06	4.54	4.31	23	2.77	6.01	5.84
28	28	4.81	4.56	4.34	24	2.65	6.04	5.88
29	29	4.56	4.58	4.37	25	2.54	6.07	5.91
30	30	4.32	4.61	4.41	26	2.44	6.09	5.94
31	31	4.08	4.62	4.44	27	2.36	6.10	5.96
32	32	3.86	4.64	4.46	28	2.29	6.11	5.97
33	33	3.63	4.66	4.49	29	2.24	6.11	5.97
34	34	3.42	4.67	4.51	30	2.19	6.10	5.97
35	35	3.21	4.69	4.54	31	2.16	6.09	5.96
36	-	-	-	-	32	2.13	6.08	5.95
37	-	-	-	-	33	2.12	6.05	5.93
38	-	-	-	-	34	2.12	6.03	5.90
39	-	-	-	-	35	2.13	5.99	5.86

REFERENCES

Becker, G.S. (1964), *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*, The University of Chicago Press, 3rd ed., Chicago.

Becker, G.S. and B.R. Chiswick (1966), "Education and the Distribution of Earnings", *American Economic Review*, 56, 358-69.

Ben-Porath, Y. (1967), "The Production of Human Capital and the Life Cycle of Earnings", *Journal of Political Economy*, 75, 352-65.

Cholezas, I. and P. Tsakloglou (1999), "Private returns to education in Greece: A review of the empirical literature", in: R. Asplund and P. Telhado Pereira (ed.), *Returns to human capital in Europe*, 147-62, ETLA, Helsinki.

Cholezas, I. (2005), "Ιδιωτικές αποδόσεις της εκπαίδευσης στην Ελλάδα και την Ευρωπαϊκή Ένωση" [Private returns to education in Greece and the European Union], Athens University of Economics and Business, PhD Thesis [in Greek].

Georganta, Z., E. Kandilorou and A. Livada (2008), "Η έλλειψη δεξιοτήτων μάθησης αποτελεί τροχοπέδη στην πανεπιστημιακή γνώση" [The lack of learning skills is an obstacle to university knowledge], Athens University of Economics and Business, Department of Statistics, Technical Report 236 [in Greek].

Hadjidema, S.H. (1998), "Rates of Return on Higher Education in Greece", *Spoudai*, 48(1-4), 157-68.

Harmon, C., I. Walker and N. Westergaard-Nielsen (2001), "Introduction", in C. Harmon, I. Walker and N. Westergaard-Nielsen (ed.), *Education and earnings in Europe*, Edward Elgar, Cheltenham.

Kanellopoulos, C.N. (1982), "Male-Female Pay Differentials in Greece", *Greek Economic Review*, 4, 222-41.

Kanellopoulos, C.N. (1985), "Individual Pay Differentials in Greece", *Spoudai*, 35(1-2), 109-25.

Kanellopoulos, C.N. (1997), "Public-Private Wage Differentials in Greece", *Applied Economics*, 29, 1023-32.

Kanellopoulos, C.N. and K.G. Mavromaras (2002), "Male-Female Labour Market Participation and Wage Differentials in Greece", *Labour*, 16(4), 771-801.

Kanellopoulos, C.N., K.G. Mavromaras and Th. Mitrakos (2003), "Εκπαίδευση και Αγορά Εργασίας" [Education and Labour Market], Study No. 50, Centre of Planning and Economic Research (KEPE), Athens [in Greek].

Lambropoulos, H.S. (1992), "Further Evidence on the Weak and Strong Versions of the Screening Hypothesis in Greece", *Economics of Education Review*, 11(1), 61-5.

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

Magoula, T. and G. Psacharopoulos (1999), "Schooling and Monetary Rewards in Greece: An Over-Education False Alarm", *Applied Economics*, 31, 1589-97.

Mincer, J. (1958), "Investments in Human Capital and Personal Income Distribution", *Journal of Political Economy*, 66(4), 281-302.

Mincer, J. (1974), *Schooling, Experience and Earnings*, Columbia University Press, New York.

Mitrakos, Th., P. Tsakloglou and I. Cholezas (2010), "Determinants of youth unemployment in Greece with an emphasis on tertiary education graduates", Bank of Greece, *Economic Bulletin*, 33, 21-62.

OECD (1998), *Human Capital Investment: An International Comparison*, OECD, Paris.

OECD (2010), *Jobs for the Youth: Greece*, OECD, Paris.

Papapetrou, E. (2003), "Wage differentials between the public and the private sector in Greece", Bank of Greece, *Economic Bulletin*, 21, 33-60.

Papapetrou, E. (2004), "Gender wage differentials in Greece", Bank of Greece, *Economic Bulletin*, 23, 47-64.

Papapetrou, E. (2007), "Education, labour market and wage differentials in Greece", Bank of Greece, *Economic Bulletin*, 28, 51-74.
Papapetrou, E. (2008), "Evidence on gender wage differentials in Greece", *Journal of Economic Change and Restructuring*, 41, 155-66.
Patrinos, H.A. (1992), "Higher Education Finance and Economic Inequality in Greece", *Comparative Education Review*, 36(3), 298-308.
Patrinos, H.A. (1995), "Socioeconomic Background, Schooling, Experience, Ability and Monetary Rewards in Greece", *Economics of Education Review*, 14(1), 85-91.
Patrinos, H.A. and H.S. Lambropoulos (1993), "Gender Discrimination in the Greek Labour Market", *Education Economics*, 1(2), 153-64.
Psacharopoulos, G. (1973), *Returns to education: An international comparison*, Elsevier, San Francisco.
Psacharopoulos, G. (1981), "Returns to education: An updated international comparison", *Comparative Education*, 17, 321-41.
Psacharopoulos, G. (1982), "Earnings and Education in Greece, 1960-1977", *European Economic Review*, 17(3), 333-47.
Psacharopoulos, G. (1985), "Returns to education: A further international update and implications", *Journal of Human Resources*, 20, 583-604.
Psacharopoulos, G. (1994), "Returns to investment in education: A global update", *World Development Report*, No. 22, 1325-43.
Psacharopoulos, G. and H.A. Patrinos (2004), "Returns to investment in education: A further update", *Education Economics*, 12, 111-35.
Schultz, T.W. (1961), "Investment in Human Capital", *American Economic Review*, 51(1), 1-17.
White, H. (1980), "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity", *Econometrica*, 48(4), 817-38.