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DETERMINANTS OF YOUTH UNEMPLOYMENT IN GREECE WITH AN EMPHASIS ON TERTIARY EDUCATION GRADUATES*

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SUMMARY

The problem of unemployment, especially youth unemployment, is a central issue of public discourse in Greece. Youth unemployment rates in Greece are among the highest across the EU and, in contrast with other countries, a significant proportion of young unemployed persons are tertiary education graduates. This study aims to provide a detailed analysis of the determinants of unemployment in Greece, with an emphasis on the variables related to the educational qualifications of the labour force, using microdata from the Labour Force Surveys conducted by the National Statistical Service of Greece (NSSG) between 2004 and 2007.

The results of this study imply that the discussion about youth unemployment is slightly misplaced. The problem is not quite one of youth unemployment as such, but a problem of transition from education to the labour market, irrespective of age. It also involves graduates of all education levels, not only tertiary education. The difference between tertiary education graduates and graduates of lower education levels is that the unemployment rates of the first tend to decline at an acceptable level a few years after graduation, while for the latter the pace of this decline is substantially slower and unemployment rates usually converge to higher levels. Furthermore, across the entire spectrum of tertiary education (Technological Educational Institutes – TEI, Universities – AEI, postgraduate studies), the higher the level of education the lower the long-term unemployment rate, although significant variations can be observed in each education level. In fact, certain groups of tertiary education graduates (Law school or IT graduates), at least men, face no real unemployment problems after their graduation. Some other groups, however, run a high risk of unemployment but only for a few years after graduation (graduates from Schools of Physical Sciences, Mathematics & Statistics) and yet others face serious unemployment problems for several years after graduation (Physical Education & Sports, Social Sciences and several TEI graduates). Finally, *ceteris paribus*, women in general, and female tertiary education graduates in particular, face a significantly higher probability of unemployment compared to men with similar educational qualifications. In some groups of female tertiary education graduates, the estimated unemployment rates are exceptionally high, even several years after graduation (university graduates from Horticulture & Forestry, TEI graduates from the schools of Agriculture & Food Technology and Economics & Management).

The results of this study reflect the conditions in the labour market between 2004 and 2007; thus it would not be advisable to extrapolate them to the future. This is due to the fact that in the past fifteen years tertiary education in Greece, like in most OECD countries, has expanded very rapidly and the share of tertiary education graduates in recent cohorts is substantially higher than in previous ones. More-

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over, the recent financial crisis has brought about significant changes to employment and unemployment, as well as to the real economy both at the national and the international level. Whether the increase in graduate labour supply in Greece will lead to a more lasting rise in graduate employment rates, even after some difficulties in the first years of labour market participation, depends on several factors, such as whether enterprises will increase their demand for high-skilled human capital or whether they will be willing to recruit graduate labour to fill positions where higher education qualifications are not required. Nevertheless, the results of the paper suggest that the high demand of young individuals for tertiary education is rational, as tertiary education seems to be quite effective in shielding against unemployment, even if only in the long run. It should also be noted that schools associated with lower unemployment rates are among the most popular ones.

I INTRODUCTION

In the last two decades, the problem of unemployment, especially youth unemployment, is a central issue for public discourse in Greece. The rate of unemployment, which stood at 7.4% in 1986, peaked to 11.9% in 1999, fell to 8.8% in 2006 and further to 7.6% in 2008. Female unemployment rates are twice as high as male unemployment rates in every year for which data are available, while a constantly rising proportion of the unemployed are long-term unemployed, i.e. unemployed for more than 12 months. This percentage started off from 42.5% in 1986 and stabilised to over 50% after 1993. In 2006, it reached 56.1%, but dropped to 49.6% in 2008. Finally, both for males and females, there is a negative relationship between age and unemployment rate, with unemployment percentages for the age groups 15-19 and 20-24 being disproportionally higher than those for older groups. In most of the years in the period under review the unemployment rate of the (numerically small) group of women aged 15-19 who participate in the labour market was above 50%, whereas that of women aged 20-24 was constantly higher than 30%. High unemployment rates are also recorded among females aged 25-34 (14%-22%). Rates for the corresponding male groups are also high, but not as high as for the female ones, which range from 14% to 28% for the 15-19 age group, and from 15% to 22% for the 20-24 age group.

It should be clarified that the problem of youth unemployment is shared by all European countries. However, as shown by recent Eurostat data for the first quarter of 2009, based on the harmonised definition of unemployment, the unemployment rate of persons aged up to 24 in Greece was 24.2%, against 18.3% of the EU-27 average. This stems from the very high unemployment rate of young women (31.8% against 19.1% of the EU average); by contrast, the unemployment rate of young men was not much higher than the EU average (18.3% against 17.4%).[1]

Therefore, it is of particular interest —in terms of both scientific analysis and policymaking— to explore the determinants of unemployment for the entire labour force and more specifically of youth unemployment. This can be achieved in two ways: either at the macroeconomic level, with a view to identifying the factors that influence the aggregate unemployment rate (and possibly its composition) or at the microeconomic level, with the purpose of assessing the determinants of the probability of unemployment, given the total unemployment rate. This study adopts the second approach and aims at investigating the determinants of unemployment, focusing on tertiary education graduates and using the micro data from Labour Force Surveys (LFS) conducted between 2004 and 2007.

In the following section, we present a brief overview of the findings of available empirical studies on youth unemployment in Greece. The third section presents the LFSs used in the analysis, the fourth section sets out the most

1 In the first quarter of 2009, compared with Greece, the only countries which recorded higher unemployment rates for young people aged up to 24, were Spain (33.6%) and Italy (24.9%).

important empirical results of this study and the last one summarises its findings.

2 LITERATURE REVIEW[2]

Certain features of the Greek labour market often account —more or less— for the high unemployment rates, observed mainly in young people and women. For instance, the Greek labour market features dualism, i.e. there is an official labour market (subject to regulations/controls and offering job security) and an unofficial labour market (without job security, often with black labour, bad employment conditions and low compensation).[3]

In the past 25 years, the unemployment of tertiary education graduates has risen (4.3% in 1981, 6.6% in 1990, 7.6% in 1997), but this does not seem to affect all graduates in the same way. Thus, according to Karamessini (2003), unemployment among graduates from physical education & sports, philosophy, theology, horticulture & forestry is higher than average. Graduates from economics, social and political sciences, pedagogics, physical sciences and mathematics follow next.

In particular as regards high-skilled individuals, there is some imbalance between supply and demand (Liagouras et al., 2003, Katsanevas and Livanos, 2005), either because of the education system failure to adjust to the needs of the labour market, or because of the Greeks' insistence to acquire tertiary education (Papailias, 2006). Conversely, ISTAME (2006) considers that the main factor behind the high unemployment rates is the inadequate development of the economy's private sector and the subsequent low demand for highly skilled human capital (e.g. tertiary education graduates). According to this study, most new jobs require low specialisation and offer low compensation in return. The strong demand for tertiary education is often attributable to the comparatively low unemployment rates of tertiary education graduates (Kassimis, 2002, Karamessini, 2003). Keeping its focus on graduates, IOBE (2007) attributes high unemployment on the one hand to the inability of the education system to adjust to rapid technological progress[4] and on the other hand to the slow adjustment process of a significant portion of the economy's productive (private) sector. Even graduates themselves consider the lack of adequate information and —at the personal level— the lack of appropriate recommendations as the main reasons behind unemployment (IOBE, 2007).

There are relatively few available empirical studies on the issue of youth unemployment in Greece; these can be grouped in three categories according to the data they use. The first consists of the studies based on the single specialised survey on the transition from education to the labour market that was carried out by the National Statistical Service of Greece (NSSG), under the auspices of Eurostat, in the second half of 2000. The second contains research based on field studies on the graduates of specific university schools or faculties. The main advantage of such studies is that they are targeted and thus, the interviewees supply all necessary information for the investigation of the issue at hand. On the other side, though, such studies typically involve small subgroups of youth population (or young graduates), thus providing an incomplete picture. Finally, the third category is based on Labour Force Surveys compiled by the NSSG, which offer the advantage of country-wide coverage and a multitude of useful information for the analysis of the unemployment issues. Most of the available empirical studies are primarily descriptive and their conclusions are not always consistent.

The results of studies in the first category show that men's transition from education to their

2 For a detailed review of the literature on the employability of tertiary education graduates in Greece, see Cholezas and Tsakloglou (2008). This section provides a brief overview of the main findings of empirical studies regarding the issue of youth employment and especially youth unemployment of tertiary education graduates in Greece.

3 See ISTAME (2006).

4 According to a study conducted by the Hellenic Federation of Enterprises – SEV (2004), half of the enterprises reported lack of tertiary education graduates with specific qualifications.

first important job —defined as a job of at least 20 hours per week, held for at least six months— lasts longer compared with women (36 months on average against 29), although this can be attributed to military service (Karamessini and Kornelakis, 2005). Moreover, according to the same authors, graduates specialised in the provision of services need less time than other graduates to find an important job. When the sample is limited to those who graduated (any education level) between 1996 and 1999, then about one third of AEI graduates and one fourth of TEI graduates had not managed to find an important job until the second quarter of 2000. Among AEI graduates, this percentage is comparatively higher for the graduates of physics, mathematics, IT, social sciences, mass communication, humanities and pedagogics (over 40%). All in all, tertiary education graduates need on average more than 16 months to find an important job but, still, they are in a better position than those without a degree. Based on this criterion, graduates of physics, mathematics, IT, physical education & sports and polytechnic schools hold the worst position between all tertiary education graduates (over 18 months). In relation to gender, male tertiary education graduates seem to find an important job with more delay than female ones (around 20 months compared to 14).

Using the same data, Nicolitsas (2007) attempts to investigate the determinants of the duration of the transition period, applying hazard models. The results of her study show that the transition period is longer for married men, foreigners, residents in rural areas and older graduates, while the period is shorter for persons whose father is engaged in some business activity. The duration of the transition period is negatively correlated with local unemployment rate, graduation year and education level. Finally, female graduates of technical schools, TEI, IEK, polytechnic and medical schools find a job faster.

In the second type of research which is based on field studies, Bitros (2002) analyses the conditions for Economics graduates. According to his conclusions, slightly more than half of the graduates find a job within less than a year after graduation. The main justification for this low percentage, according to the graduates themselves, is the mismatch between education and labour market demands, as well as the lack of additional skills. The transition of engineering schools' graduates, especially graduates from the National Technical University of Athens (NTUA), to the labour market is the object of a number of studies; the results of these studies show, on the one hand, low unemployment rates (2.2% according to NTUA, 2002) and, on the other hand, short periods of transition to the first job (only 5 months after graduation, according to NTUA, 2002, and 5.7 months according to the Technical Chamber of Greece – TEE, 2006).

Another field study forms the basis for Karamessini's (2006b) analysis, which focuses on graduates from the University of Thessaly. Roughly 5 years after graduation, the unemployment rate of that University's graduates is 7%. *Ceteris paribus*, women, kindergarten teachers, horticulturalists and land planning & regional development engineers face the biggest problems in entering the labour market. However, according to the author, the temporary nature of many graduates' employment remains a big problem, as 5-8 years after graduation 45% of the graduates still have no permanent job.

The field study conducted by IOBE (2007) addresses both firms (about 200) and employees (about 500), which makes it particularly interesting. Results show that over 90% of the graduates found a job within 20 months after graduation – most of them in fields related to their studies. Conditions seem to be more difficult for graduates of social sciences, biology, horticulture and genetics, as well as for those who come from families with poor education background, are younger graduates or postgraduates. Turning to their field of work, it takes graduates from schools of fine arts and mathematics & statistics longer to find a job relevant to their degrees.

The most detailed field study is the one used by Karamessini (2007), which covers a large number of Greek AEI. According to its findings, 5-7 years after graduation 84% of AEI graduates found a job, with minor differences between men and women. Lower employment rates are observed among graduates from schools of biology, theology, history, archaeology and political science. Regarding unemployment, rates are higher for women (7% against 5% for men and 6.4% on average) and for graduates of history, archaeology and theology. Although 5-7 years after graduation from AEI almost all graduates (97%) have some working experience, 18% have no important working experience and just 71% have non-temporary employment (69% of women and 74% of men). As regards the timing of the first important job, large variations are observed. Thus, 15% found a job before graduation, 19% within one month from graduation, 33% needed one year and the remaining 33% more than one year. These results paint a different picture than IOBE (2007), where the percentage of graduates who found a job within a year was much higher (91% against 67%); this is possibly due to both the stricter definitions used in Karamessini (2007) and the fact that IOBE (2007) excluded unemployed graduates from its sample. However, a really alarming finding of Karamessini (2007) is that 41% of the graduates reported that they remained unemployed for more than 12 months after graduation. The picture only gets gloomier for women.

Finally, the studies of Karamessini (2006a) and Karamessini and Prokou (2006) fall under the third category, i.e. those using LFS data. In both studies, emphasis is placed on AEI and TEI graduates. According to their results, TEI graduates have higher rates of participation in the labour market in the first years after graduation —probably because proportionally more AEI graduates undertake further (postgraduate) studies— which are equalised thereafter (about 6 years after graduation). With respect to gender, men have higher rates of participation if they are TEI graduates, but differences are negligible among AEI graduates. Conversely, unemployment rates are clearly higher for TEI graduates and women, while the gap widens as we move further away from graduation. These higher unemployment rates are attributed by the authors to the higher participation rate of TEI graduates in the labour market and to discrimination against women. The results show that new graduates face high rates of unemployment after graduation (34.4% for AEI and 36.5% for TEI graduates), which decline with time, especially for AEI graduates. Also, they have difficulties in solidifying themselves to employment, as 32% (29%) of AEI (TEI) graduates still have no permanent job 6 years after graduation.

3 LABOUR FORCE SURVEY: SHORT DESCRIPTION AND FIRST DESCRIPTIVE RESULTS

For the purposes of this study, we used the micro-data of quarterly LFSs that the NSSG conducted during 2004(Q1)-2007(Q3). We chose this period because the methodology of collecting data for the LFS was radically revised in 2004 and, moreover, for this period micro-data are available by the NSSG in the form of rotating panels, as each member of the sample participates in the LFS for six consecutive quarters ("waves").

The LFS has been conducted on a quarterly basis by the NSSG since 1998 (earlier it was conducted only in the second quarter of every year) with the aim of collecting detailed data on the employment and unemployment status of household members aged 15 or over.

More specifically, the LFS aims at:

(a) recording the employment status of household members aged 15 or over, together with gender, age and education background, at national and regional level;

(b) studying the breakdown of employment by sector of economic activity, profession, working hours etc.;

(c) monitoring the duration of unemployment, in relation to gender, age, education back-

ground, region and some features of the latest job, such as the sector of economic activity and the profession;

(d) studying the employment condition of household members a year before, whether employed persons have a second job, etc.

In the LFS, the unemployed are defined according to the original definition of the International Labor Organization (ILO); we used the same definition in our study too. In particular, a person is considered unemployed if:

(i) s/he hasn't worked for even one hour in the reference week;

(ii) s/he's looking for a job;

(iii) s/he reports the actions s/he did to this end in the last four weeks before the study;

(iv) s/he is ready to start working the following week, if s/he finds a job.

The LFS quarterly sample includes approximately 30,000 households (a sampling fraction of 0.85% of the total population of the country), with one sixth of the sample rotating (being replaced) every quarter.

The main features of the LFS used in this study are depicted in Tables 1 and 2. Table 1 shows participation rates of persons aged 15-64, by gender, level of education and breakdown by age group, for the period 2004-2007. The total participation rate follows a slightly upward path in the period under review. Male participation is significantly higher than female participation (79.0% against 54.5%, on average) and, furthermore, there are significant differences in terns of education level and age. Female participation is higher at tertiary educational levels, whereas male participation shows a small decline between primary and secondary education and a sharp increase in tertiary education graduates. Differences between male and female labour force participation rates of tertiary education graduates are relatively small (below 10%), especially in the age group 15-34. By contrast, for the two other education levels, large differences are noticeable in male and female participation rates: over 35% for primary or lower education graduates and over 25% for secondary education graduates.

Table 2 shows unemployment rates by gender, education level and age group between 2004 and 2007. During this period, total unemployment declined (from 11.3% to 9.1%). For both men and women, the decline was substantial but it was more pronounced in the case of women, even though the female unemployment rate was constantly more than double that of men. Both for men and women, unemployment rates decline with age (with a small exception for the male group aged 55-64). In the age group 15-24, unemployment rates are particularly high. In women, unemployment rates are markedly higher among secondary education graduates, whereas in men, differences in unemployment rates do not vary substantially with the education level.

As it was already mentioned above, one of the most attractive features of the LFS for the purposes of this study, besides its large sample, is the form of rotating panel which (theoretically) allows for the isolation of the impact of non-observable individual characteristics, with the use of appropriate econometric techniques, and the calculation of a "net" impact that particular components of the educational system have on a person's probability of unemployment. This isolation was not possible, however, as the intertemporal variation of the dependent variable and (to an even greater extent) of many independent variables per individual was extremely limited. In other words, most of the participants were either always employed or always unemployed over the quarters they participated in the LFS, while all other features remained usually unchanged throughout their participation in the survey. Therefore, for the purpose of analysis, we used the first observation of each individual in the LFS of the period under examination.

Table 1 Rate of participation of persons aged 15-64 in the labour force: LFS (2004 Q1 – 2007 Q3)

	2004			2005			2006			2007*		
	Men	Women	All	Men	Women	All	Men	Women	All	Men	Women	All
Primary or lower education												
15-24	67.6	37.8	55.9	65.6	26.4	49.3	67.4	29.0	51.8	57.7	35.9	48.0
25-34	92.9	50.3	74.3	92.5	52.1	75.0	92.3	54.3	75.7	93.0	45.5	73.8
35-44	93.3	57.5	74.6	93.1	59.2	75.7	92.5	57.1	74.6	91.1	56.1	73.5
45-54	90.2	47.1	65.6	89.1	49.1	66.6	89.7	46.3	65.5	89.6	48.4	65.5
55-64	56.8	24.9	38.4	57.7	25.0	38.6	58.1	24.2	38.2	59.8	24.9	39.6
Total	*77.4*	*39.4*	*56.8*	*77.3*	*39.8*	*57.0*	*77.7*	*38.3*	*56.3*	*77.4*	*39.0*	*56.5*
Secondary education												
15-24	33.9	24.2	29.0	34.0	21.0	27.9	32.2	20.9	26.7	33.1	21.1	27.3
25-34	95.4	67.3	82.8	95.4	64.8	81.7	94.6	67.0	82.4	94.9	63.5	80.9
35-44	97.1	65.7	81.6	97.4	65.6	82.1	97.9	65.7	81.9	98.2	66.8	83.3
45-54	91.0	50.4	70.6	92.6	51.0	73.1	91.9	53.1	72.3	91.2	57.2	74.0
55-64	53.7	17.8	35.9	53.4	22.0	38.6	58.7	22.2	40.5	56.5	26.1	42.2
Total	*73.3*	*46.6*	*60.4*	*73.5*	*46.0*	*60.6*	*73.3*	*46.2*	*60.2*	*74.6*	*47.8*	*61.9*
Tertiary education												
15-24	86.2	87.1	86.8	79.1	88.3	85.0	75.4	86.4	82.4	84.6	87.8	86.4
25-34	94.2	87.8	90.6	94.3	89.7	91.8	95.0	89.5	92.1	95.0	87.4	90.7
35-44	98.1	86.9	92.5	99.0	87.5	93.0	97.1	87.7	92.4	98.7	88.1	93.3
45-54	94.5	76.9	87.0	94.4	80.1	87.8	94.2	81.0	88.3	92.7	79.2	86.7
55-64	65.0	37.8	55.4	67.7	42.3	58.7	65.9	40.7	56.3	67.1	38.9	56.9
Total	*91.1*	*82.2*	*86.6*	*91.2*	*84.0*	*87.5*	*90.6*	*83.4*	*87.0*	*90.8*	*82.2*	*86.5*
All												
15-24	41.4	34.2	37.8	40.1	31.2	35.8	38.3	30.8	34.6	40.0	31.1	35.7
25-34	94.7	74.5	84.8	94.7	74.8	84.9	94.5	76.3	85.8	94.7	73.3	84.2
35-44	96.7	70.7	83.7	97.2	72.0	84.5	96.7	71.8	84.3	97.2	72.1	84.9
45-54	91.8	54.6	72.9	92.0	57.0	74.5	91.9	56.9	74.1	91.2	58.9	74.6
55-64	57.7	24.6	40.3	58.6	26.1	41.7	60.0	25.6	41.9	60.5	27.1	43.5
Total	*78.9*	*53.6*	*66.1*	*78.9*	*54.5*	*66.7*	*78.9*	*54.3*	*66.6*	*79.6*	*55.0*	*67.3*

* Q1, Q2 and Q3.

Table 2 Rate of unemployment of persons aged 15-64: LFS (2004 Q1 – 2007 Q3)

	2004			2005			2006			2007*		
	Men	Women	All	Men	Women	All	Men	Women	All	Men	Women	All
Primary or lower education												
15-24	18.5	38.9	23.9	14.5	25.4	16.9	25.9	46.1	30.5	13.5	27.0	18.0
25-34	9.2	27.4	14.5	5.6	16.8	9.0	7.1	21.1	11.5	9.4	17.5	11.4
35-44	7.2	19.4	12.2	4.9	17.0	9.8	6.4	15.6	9.9	7.2	16.3	10.7
45-54	4.7	13.1	8.1	5.2	11.8	7.9	4.4	11.8	7.3	4.8	11.9	7.8
55-64	5.7	4.9	5.4	3.9	5.0	4.3	4.5	3.7	4.2	5.6	4.5	5.2
Total	*7.0*	*14.8*	*9.9*	*5.4*	*12.0*	*7.9*	*6.4*	*12.3*	*8.6*	*6.6*	*11.9*	*8.6*
Secondary education												
15-24	20.6	38.5	28.0	21.6	37.0	27.0	20.3	37.0	26.6	12.6	31.6	19.7
25-34	8.6	21.8	13.4	8.0	19.0	11.9	8.2	20.3	12.5	7.1	16.7	10.4
35-44	4.3	16.5	9.1	5.6	14.7	9.1	4.0	12.9	7.5	4.4	12.4	7.5
45-54	4.6	9.5	6.4	3.2	12.2	6.2	3.4	9.4	5.6	2.7	8.8	5.1
55-64	4.1	7.9	5.0	2.6	5.4	3.3	3.3	8.0	4.6	2.9	5.6	3.7
Total	*8.1*	*20.4*	*12.7*	*7.8*	*18.2*	*11.5*	*7.3*	*17.5*	*11.0*	*5.8*	*14.8*	*9.1*
Tertiary education												
15-24	22.4	36.3	31.4	22.9	37.7	32.7	24.6	31.0	28.9	20.8	38.1	30.9
25-34	10.3	17.4	14.2	12.7	16.6	14.8	9.7	16.3	13.1	13.7	15.3	14.6
35-44	3.0	9.2	5.9	4.5	9.1	6.8	3.3	7.6	5.3	2.9	7.1	4.9
45-54	2.9	6.3	4.1	1.5	4.6	2.8	1.3	2.9	1.9	0.5	4.2	2.0
55-64	3.0	2.2	2.8	2.4	1.9	2.3	1.5	4.5	2.3	1.6	0.6	1.4
Total	*6.3*	*14.9*	*10.4*	*7.2*	*13.9*	*10.5*	*5.8*	*12.4*	*9.0*	*6.6*	*12.4*	*9.3*
All												
15-24	20.6	37.7	28.4	20.8	36.7	27.5	21.7	35.0	27.6	14.4	33.8	22.7
25-34	9.2	19.9	13.8	9.3	17.6	12.9	8.7	18.2	12.7	9.7	15.9	12.3
35-44	4.4	14.1	8.5	5.1	12.7	8.4	4.1	11.0	7.1	4.4	10.7	7.0
45-54	4.1	9.8	6.3	3.3	9.6	5.7	3.1	8.0	5.0	2.6	8.3	4.9
55-64	4.7	5.0	4.8	3.2	4.6	3.6	3.4	4.9	3.9	3.8	4.1	3.9
Total	*7.3*	*17.1*	*11.3*	*7.1*	*15.2*	*10.4*	*6.6*	*14.5*	*9.8*	*6.2*	*13.3*	*9.1*

* Q1, Q2 and Q3.

The next problem we encountered relates to the definition of education groups. The LFS divides the population into a large number of education groups – sometimes quite arbitrarily. As this study focuses on tertiary education graduates, we chose to group AEI and TEI graduates with as much detail as possible. However, in many cases this was not feasible, as the number of observations was too small. In the end, the criterion for keeping or merging tertiary education groups, apart from the homogeneity of the disciplines, was the existence of a minimum number of observations (around 100 men or women, whichever lower) covering a large number of years since graduation. For lower education levels, fewer groups were formed. Moreover, it was decided to exclude from the sample a small number of groups that presented specific problems (e.g. graduates of special needs schools; open university and inter-disciplinary selection programmes, graduates of military and law enforcement schools and the School of Pedagogical and Technological Education–SELETE/ASPETE, graduates from pedagogic academies with a two-year duration of studies).

Even after these exclusions, the sample of the analysis remains very large, as it covers a total of 108,847 employed or unemployed individuals (58% men and 42% women). Labour force participation rates and unemployment rates of the sample are shown in Table 3. The variations in both percentages on account of the education level are obvious. The rate of participation in the labour force is positively related to the education level and variations within a level do exist but are not large – with one exception: the participation of general lyceum graduates in the labour force is about 27 percentage points smaller than that of higher technical education graduates (technical lyceum, post-gymnasium technical school).

Table 3 also shows that the unemployment rate is lower in the small group of individuals with postgraduate studies (7.5%) and higher in the group of post-lyceum and non-tertiary education graduates (14.3%). Significant variations are also observed between the two larger groups of tertiary education graduates (AEI: 7.9% and TEI: 12.3%). Even within the narrow definition of education levels, there are variations. For instance, the unemployment rate of technical lyceum graduates is 18.4%, whereas that of general lyceum graduates, albeit higher than the national average, is significantly lower (10.9%). Accordingly, within AEI, the unemployment rate of Law school graduates is just 2.8%, while the corresponding rate for graduates of Social Sciences is 12.9%. Within TEI, the unemployment rate of polytechnic schools graduates (Structural Engineering, Mechanical Engineering and IT) is less than 8% and the rate of the graduates from the school of Agriculture & Food Technology is more than 17%. Therefore, it is of particular interest to analyse the probability of unemployment for specific graduate groups. Moreover, these variations may be the result of factors which are not associated with the education system. For example, according to many studies, the probability of unemployment is negatively correlated with the time that has lapsed since graduation. Given the very rapid growth of tertiary education in Greece in recent decades, it is quite probable that tertiary education graduates will be much younger on average than the graduates of lower education levels. It is, thus, particularly interesting to isolate the effect of the two factors (education and years after graduation).

Especially in relation to this last point, we have to underline that public discourse typically makes mention of "youth unemployment". But is it really a youth unemployment problem or a problem of transition from education to the labour market? Undoubtedly, 5 or even 10 years after graduation, a compulsory education (gymnasium) graduate is still very young; this, however, is not necessarily true for a tertiary education graduate or, even less, for a postgraduate degree holder. An initial approximation to this problem is made in Charts 1 and 2 where the members of the sample are divided into two large groups according to the number of years that have lapsed since their graduation: those with 5 or less years and those with 6 or more years since graduation.

Table 3 Rate of unemployment and participation in the labour force of persons aged 15-64 the first time they are included in the LFS sample (2004 Q1 – 2007 Q3)

Education level	Rate of unemployment	Rate of participation in labour force	N (labour force)
Pre-lyceum education	*9.8*	*56.8*	*40,955*
Primary	9.1	59.6	27,891
Lower secondary	11.1	52.3	13,064
Lyceum	*11.7*	*65.1*	*35,773*
General lyceum	10.9	60.5	27,514
Technical lyceum	18.4	86.3	4,529
Post-gymnasium technical school	9.4	88.2	3,730
Post-lyceum non-tertiary education	*14.3*	*85.5*	*9,844*
IEK	14.6	86.0	8,573
Other post-lyceum education	12.4	82.4	1,271
TEI	*12.3*	*90.2*	*5,490*
Structural Engineering	7.5	90.3	326
Mechanical & Computer Engineering	7.9	92.3	1,319
Agricultural & Food Technology	17.2	89.5	463
Economics & Management	15.9	90.1	1,720
Medical Sciences	11.3	90.0	1,418
Other TEI	12.8	82.7	244
AEI	*7.9*	*88.0*	*15,093*
Structural Engineering	5.0	91.9	1,252
Mechanical Engineering	6.5	92.3	888
IT	5.1	88.5	203
Physical Sciences	7.3	87.2	860
Mathematics & Statistics	5.7	90.0	680
Medical School etc.	5.5	89.8	1,804
Horticulture & Forestry	8.9	88.7	513
Law School	2.8	87.4	1,120
Economics & Management	7.8	85.5	2,824
Social Sciences	12.9	81.8	405
Humanities	11.8	86.2	2,131
Languages	9.5	86.2	600
Physical Education & Sports	11.8	92.1	665
Pedagogics	11.0	91.2	918
Other AEI	11.4	79.9	230
Postgraduate studies	*7.5*	*94.3*	*1,292*
Postgraduate degree	8.6	93.2	875
Doctorate	4.9	97.1	417
TOTAL	**10.7**	**67.5**	**108,447**

Chart 1a illustrates the rates of unemployment by education level for recent (up to 5 years) and older (6 or more years) graduates. Panels 1b and 1c repeat the same, splitting the sample for men and women. For reasons of comparability, in all three panels we applied the same scale to the x-axis. In the first panel, it is clear that for all education levels, the rate of unemployment is substantially higher for recent than for older graduates (27.0% against 8.6% for the total). In general, the unemployment rates of tertiary education graduates are lower than those of primary or secondary education graduates, both for recent and for older graduates. However, what is impressive with tertiary education graduates is the discrepancy in the unemployment rates of recent and older graduates (ratios of 3.7:1 for TEI graduates, 5.1:1 for AEI graduates and 4.0:1 for postgraduates). Especially in the case of older AEI graduates and postgraduates, at first sight unemployment rates do not appear to be particularly alarming (4.7% and 3.8% respectively).

Charts 1b and 1c paint a similar picture for both men and women: unemployment rates are significantly higher for recent graduates compared with older ones. However, some differ-

Chart 1 Rates of unemployment by education level

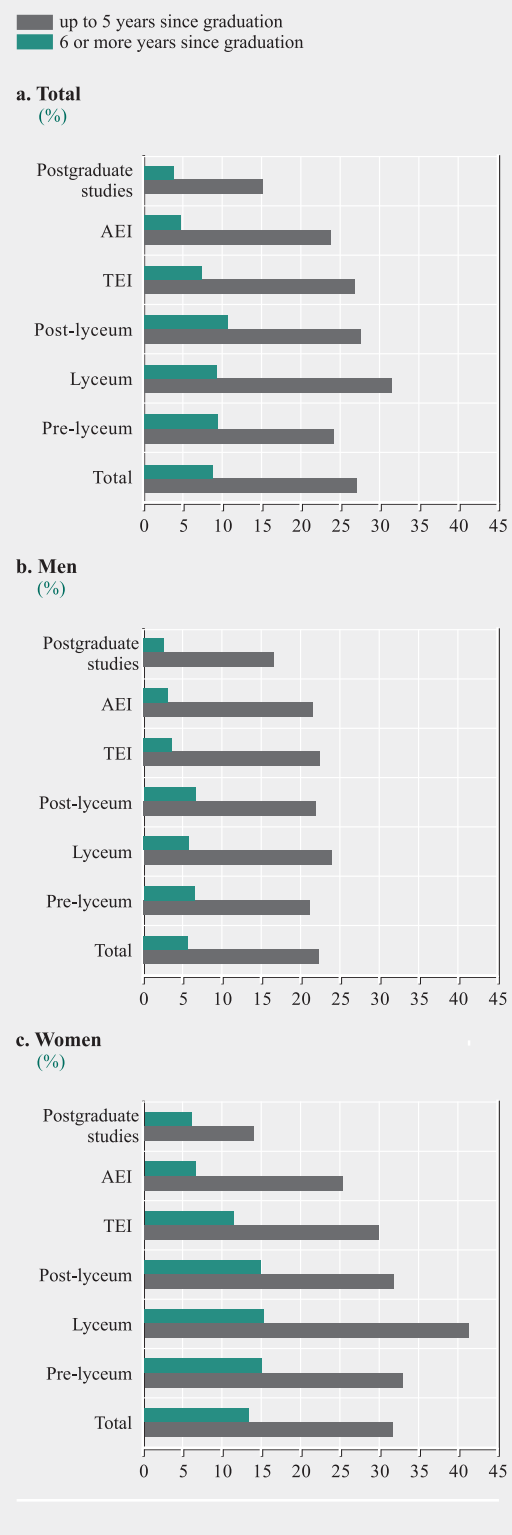
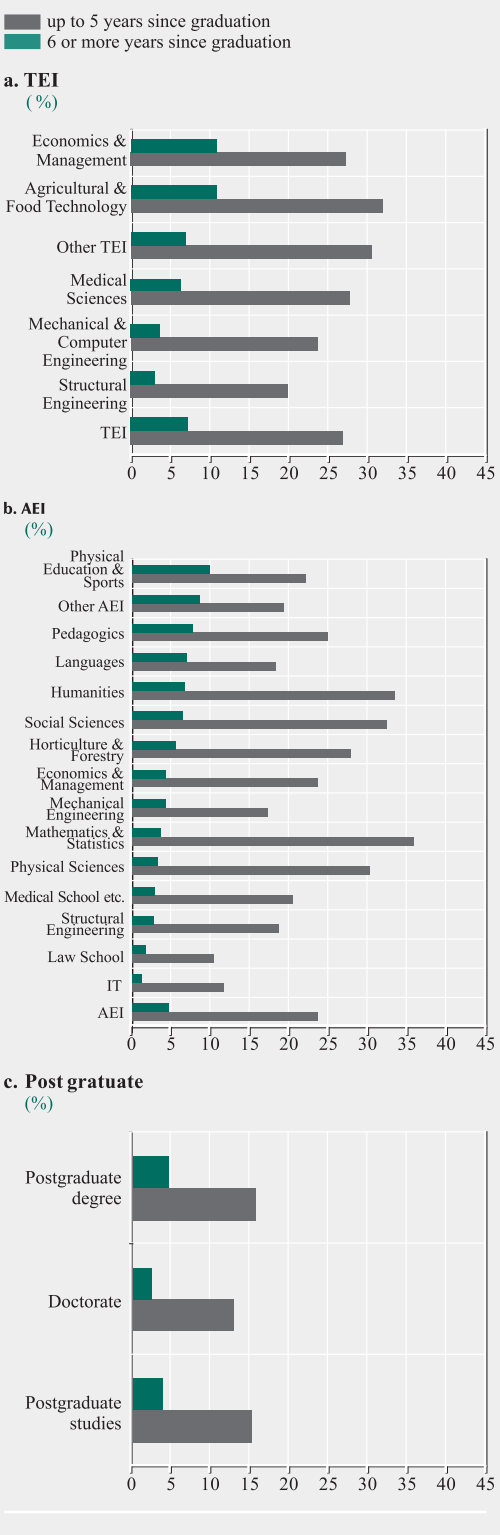


Chart 2 Rates of unemployment for tertiary education gratuates



ences between the two genders are also impressive. In all individual groups, without exception, female unemployment rates are higher than male ones. Especially for women who have recently graduated from lyceum, the unemployment rate is excessively high (41.2%). Male unemployment rates for older tertiary education (AEI, TEI, postgraduate studies) graduates are in the area of 2.6% to 3.7%, whereas in the corresponding female group these rates are considerably higher (6.0% to 11.3%). Moreover, although male unemployment rates of recent tertiary education graduates are not very different from those of lower education graduates, there are significant differences in women.

Charts 2a, 2b and 2c focus on tertiary education graduates and provide a more detailed picture for TEI and AEI graduates, as well as for the small but rapidly growing group of postgraduates (Kikilias, 2008). The conclusion that is clearly drawn from these charts is that, even though some generalisation is possible, there are major intra-group differences. Chart 2a shows that, among TEI graduates with high unemployment rates, there are similarities between the groups of recent and older graduates (with the exception of graduates from the school of Economics & Management). However, unemployment rates of recent graduates and, to a greater extent, of older graduates show considerable differences between groups of schools. For example, the unemployment rate for older graduates from Polytechnic Schools (Structural Engineering, Mechanical Engineering and IT) is below 4%, whereas for older graduates from the school of Economics & Management and Agricultural & Food Technology it is above 10%.

There are even larger differences within the group of AEI graduates, which is evident in Chart 2b, possibly as a result of the larger number of sub-groups in the sample. In all these groups, without exception, unemployment rates of recent graduates are much higher than those of older ones. However, in some groups, unemployment rates are alarmingly high for older graduates (e.g. graduates from the schools of Physical Education & Sports: 9.8%), whilst in other groups the corresponding rates are lower than those typically classified as frictional unemployment (e.g. graduates from IT: 1.3% or Law: 1.7%). Furthermore, in the classification of schools by unemployment rates of older and recent graduates, the groups are not really correlated. For example, while the unemployment rates of older graduates from the schools of Physical Sciences and Mathematics & Statistics are very low, those of the recent graduates from the same schools are among the highest for recent graduates. Finally, Chart 2c shows that acquiring a postgraduate or a doctorate degree is associated with very low unemployment rates 6 or more years after graduation; however, such degrees should not be considered as effective shields against unemployment in the first five years after graduation (unemployment rates of recent graduates are 15.8% and 12.9% respectively).

4 ECONOMETRIC RESULTS

Naturally, an individual's probability of unemployment is influenced by various factors and not solely by educational qualifications. Some of these factors are directly observable while others are not. Furthermore, random factors may influence this probability. The LFS includes a number of variables which may influence the probability of unemployment. Therefore, in order to better understand the phenomenon, it is necessary to apply a multivariate econometric probability analysis, which is the primary objective of this part of the study.

The descriptive results of the previous section provide some indications. First, the labour force participation rate seems to be associated with both the individual's age —and, most likely, with the number of years that have lapsed since graduation— and the education level, as well as with gender (and, possibly, other factors such as family status). Hence, without controlling for the probability of

labour force participation, it is very likely that the estimated results for the probability of unemployment are biased (from a statistical point of view). In other words, it is highly likely that a two-stage estimation method is required: (i) a first estimation of the probability of labour force participation, and (ii) a subsequent estimation of the probability of unemployment following the inclusion of the relevant correction term in the explanatory variables (Inverse Mills Ratio).

The descriptive results show that, in all likelihood, the variable related to the probability of unemployment is the time interval from graduation and not the individual's age *per se*. The same results imply that the time interval from graduation has a non-linear effect on the probability of unemployment, something that should be taken into account in the econometric estimation.

Moreover, the descriptive results indicate that both the unemployment rate and its change after graduation vary significantly between men and women. Therefore, it is essential to estimate different equations for men and women rather than introducing a dummy variable for women in the unemployment probability equation for the entire sample.

Lastly, since the evolution of the unemployment rate in relation to the years that have lapsed since graduation shows substantial differences between groups of graduates of the same education level, graduates of different schools should not only be distinguished by applying dummy variables, but flexible, non-linear formulas should also be used, which allow for different unemployment probabilities as a function of the time after graduation for different types of education groups.

All of the above were taken into account in the specification and estimation of the econometric model. The methodology used is a variation of Heckman's (1979) two-stage method, with which we attempted to correct the sample's selection bias. At a first stage, the probability of labour force participation was estimated using the sample of all individuals aged 15-64 who participated in the labour market. The variation lies in the fact that at the second stage of the estimation of the unemployment probability, a binominal variable (instead of a continuous one, as in Heckman's classical method) was used as a dependent variable. This has brought about changes in the estimated maximum likelihood function (Pindyck and Pubinfeld, 1998, Greene, 2003). The detailed results of these estimations and the definitions of the variables used are presented in the Annex.

The presentation of the results begins with the estimation of the labour force participation probability, in which the sample comprises all individuals aged 15-64 (79,288 men and 83,736 women). The male labour force participation rate in our sample is 79.9% and the female rate is 53.8%. In both equations (men and women) the control group consists of members of childless couples, who are Greek nationals, general lyceum graduates, residents of Athens and took part in the LFS in 2007(Q3), whereas, on account of heteroskedasticity, the estimated standard errors of coefficients were corrected using White's (1980) method.

Both for men and —markedly— women, the probability of labour force participation is closely linked with their family status. In comparison with the control group, the probability of female labour force participation is significantly lower when women are married with children (the opposite is usually observed for female heads of single-parent households), while, in connection to men, the result varies depending on the number and age of the children. In terms of education level, for both men and women, *ceteris paribus*, the labour force participation probability for graduates of all education groups (except gymnasium graduates) is higher compared with general lyceum graduates. For both genders, the labour force participation probability of postgraduates is particularly high (a finding which is in line with the predictions of human capital theory). Fur-

thermore, for both men and women, the probability of labour force participation appears to have a close but non-linear association with the number of years since graduation.

Regional differences in terms of labour force participation are not particularly large in men, whereas, in women, differences are more important and probabilities of participation are higher in most regions (compared with Attica). As regards the degree of urbanisation, *ceteris paribus*, higher participation rates are observed in semi-urban and, particularly, rural areas. Finally, there are no significant differences with respect to the year of the LFS or seasonality (the survey's quarter). In both equations, the coefficient showing whether there is bias ("arthrho") is statistically significant and implies the existence of systematic bias, which is corrected using the Inverse Mills Ratio in the equations for the probability of unemployment (in other words, the results of the estimation for the probability of unemployment presented below would not be reliable without this correction).

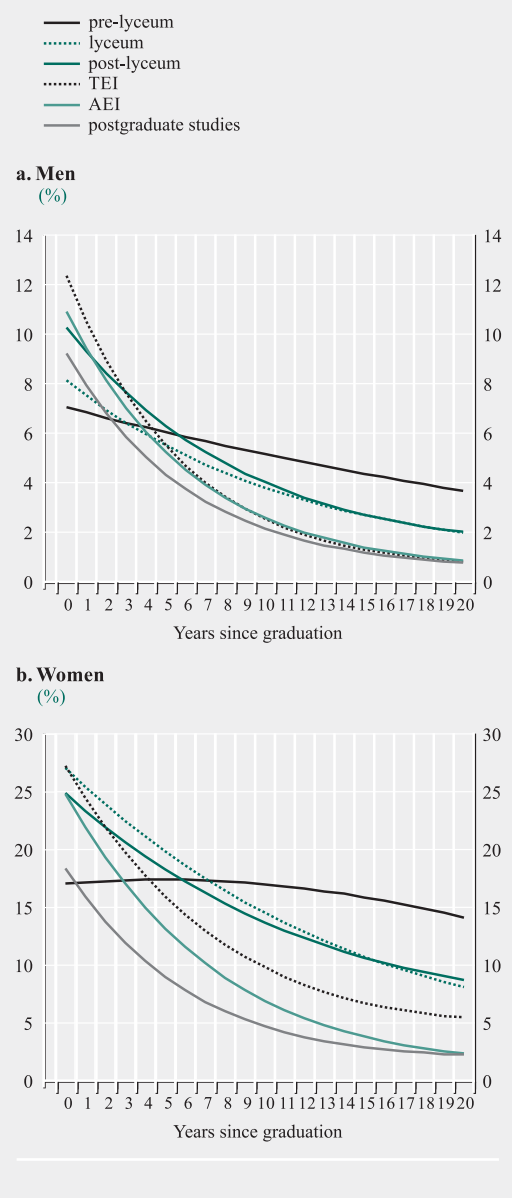
After the presentation of the results on the probability of labour force participation, we move on to the presentation of the results from the estimation of the probability of unemployment. This time, the samples consist of 63,378 men and 45,060 women. Similarly to previous equations, on account of heteroskedasticity, the estimated standard errors of coefficients were corrected using White's (1980) method. Most of the results are presented in charts. Once more, the control group comprises members of childless couples, who are Greek nationals, general lyceum graduates, residents of Athens and took part in the LFS in 2007(Q4). The dependent variable is the probability of unemployment and independent variables include the individual's education background, the number of years after graduation (and its square), dummy variables related to household composition, the individual's nationality, the region and the degree of urbanisation of the place of residence, the local unemployment rate, as well as the dummy variables for the year and the quarter of the LFS in which they participated. Education groups are much more detailed, compared with the previous equations (like the groups of Table 3), while demographic groups (household composition) are much less detailed. In order to capture the different unemployment probabilities for each education group in relation to the time interval from the year of graduation, we introduced multiplicative terms between the dummy variable of each education group and (a) the time from the individual's graduation and (b) its square.

The dummy variables of the quarters aim to capture the potential seasonality of unemployment, while the dummy variables of the years seek to capture possible effects of the economic cycle on employment.[5] The two groups of variables are not statistically significant, both in the female and the male function. The variable that relates to the local unemployment rate refers to the unemployment rate of the region of the individual's place of residence in the period of their participation in the LFS. As expected, this variable has a positive effect on the unemployment probability and is statistically significant. As regards the demographic features of the individual's household, the results indicate that both for men and women, single parenthood as well as the presence of household members other than spouse and children increase the probability of unemployment compared with the control groups (members of childless couples).

Before moving on to the presentation of results in detailed charts, it would be interesting to examine the corresponding results for six broad groups according to the education level (pre-lyceum, lyceum, post-secondary non-tertiary, TEI, AEI, postgraduate studies). These results stem from estimations that use the variables mentioned above, but this time for broader groups of graduates, and are presented in Charts 3a and 3b for men and

5 However, it should be noted that the LFS used in this paper cover a period of 4 years, during which the Greek economy was growing at a quite high rate.

Chart 3 Estimated rates of unemployment of broad education groups



women, respectively. These charts show the estimated rate of unemployment (vertical axis)[6] as a function of the first 20 years since graduation from the highest education level completed (horizontal axis), after controlling for the effect of all other variables (family status, region, urbanisation, nationality, local rate of unemployment, etc.).[7] Similar charts are used in the remainder of this study.

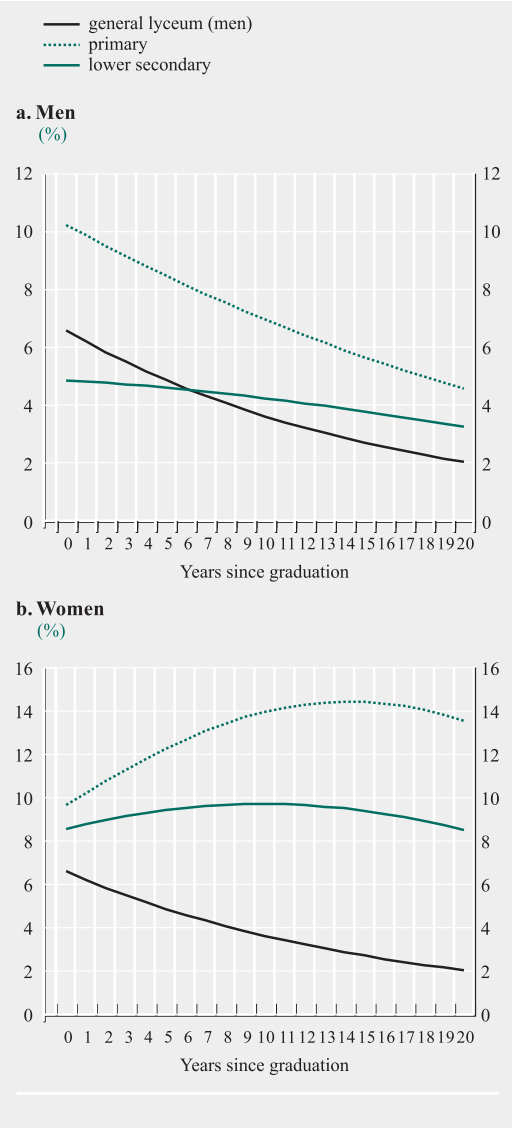
Many interesting conclusions can be drawn from Charts 3a and 3b. Both men and women with low education level (pre-lyceum) begin with lower rates of unemployment compared to the other members of the sample right after their graduation, but their estimated rate of unemployment changes very slowly throughout their working life. Differences between lyceum and post-secondary non-tertiary graduates are negligible for women, while for men estimated rates of unemployment of post-secondary non-tertiary graduates are considerably higher than those of lyceum graduates in the first 5-6 years after graduation; differences get small thereafter. As regards tertiary education graduates, estimated rates of both male and female unemployment for a given number of years since graduation are lower for holders of postgraduate degrees, followed by AEI graduates and, finally, TEI graduates. However, while estimated rates of female unemployment of AEI graduates and holders of postgraduate degrees converge about 20 years after graduation, they never converge with the estimated rate of unemployment of TEI graduates. On the contrary, the difference in the estimated rates of male unemployment of AEI and TEI graduates is very small about 6 years after graduation and converges with the estimated rate of unemployment of postgraduate degree holders 12-13 years after graduation, at levels much lower than in other education levels.

The next seven charts, 4.1a to 4.7b, present the estimated rates of unemployment (one for men and one for women) as a function of the years since graduation, for homogeneous groups within education levels. Because the scale of the vertical axis (estimated rates of unemployment) does not always have the same length, all charts referring to education groups also include, for reasons of comparability, the estimated rate of unemployment of male lyceum graduates.

6 It should be noted that the scale which measures the rate of unemployment is much "lengthier" in the case of women, since their estimated rates of unemployment were much higher than those of men.

7 In all likelihood, 20 years after graduation is the maximum period that young people consider when deciding on the level and specialty of their studies.

Chart 4.1 Estimated rates of unemployment of graduates of compulsory education levels



Charts 4.1a and 4.1b refer to groups with low educational qualifications: primary education and lower secondary education. It should be noted that most members of these groups are of relatively old age. The "primary education" category comprises both persons who have not finished primary school and primary school graduates who have additionally attended a few years of gymnasium. Male members of lower secondary education groups start off with a low rate of unemployment and their estimated rate of unemployment changes little with time, while the rate of unemployment of primary education graduates remains at relatively high levels even many years after graduation. For female graduates of these two categories, the results are rather surprising, as the estimated rate of unemployment seems to increase in the first few years since graduation (especially for "primary education" graduates), before starting to decline.

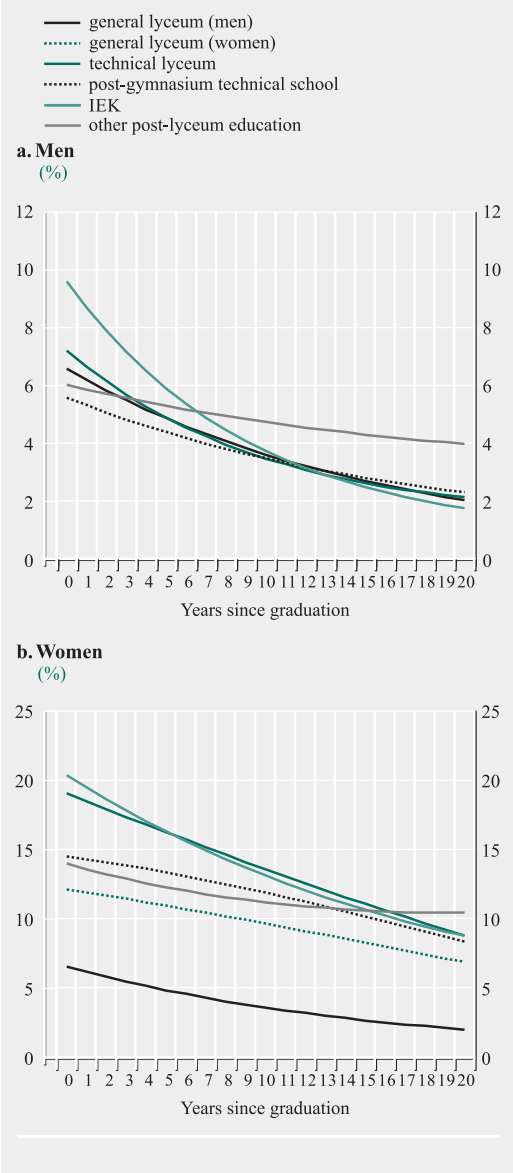
Charts 4.2a and 4.2b show the estimated rates of unemployment of higher secondary and post-secondary non-tertiary education graduates. Graduates of higher secondary education are grouped into three categories: general lyceum, technical lyceum and post-gymnasium technical schools. The first category also comprises persons who have not completed tertiary education studies; the second category consists of graduates from Technical Vocational Lyceums (TEL), Unified Multidisciplinary Lyceums (EPL) and Technical Vocational Institutes (TEE); and the third category comprises graduates from Technical Vocational Schools (TES), post-gymnasium foreman schools and post-gymnasium mercantile marine schools. Post-secondary non-tertiary education graduates are grouped into two categories: graduates from (public or private) Institutes of Vocational Training (IEK) and graduates from other post-secondary education. The latter category comprises graduates of colleges, dance schools, tourism, (non-university) foreign languages, mercantile marine officers, etc.

Differences between men and women in Charts 4.2a and 4.2b are noteworthy. For men, differences between general and technical lyceum graduates are negligible. Graduates of post-gymnasium technical schools are at a slightly better position in the first few years after graduation, but differences from the other levels of higher secondary education are eliminated about 6 years after graduation. Conversely, graduation from IEK or other post-secondary non-tertiary education establishment is associated with higher rates of unemployment than graduation from a higher

secondary education establishment. In the case of IEK, the estimated rates of unemployment converge with those of higher secondary education about 10 years after graduation, while in the case of graduates of other post-secondary establishments, the estimated rate of unemployment constantly diverges from that of higher secondary education graduates. As in almost all charts, the estimated rates of female unemployment in Chart 4.2b are higher than those of male unemployment for each education group of Chart 4.1a. In women, however, the lowest estimated rates of unemployment are recorded among general lyceum graduates. In the first 15 years after graduation, the rates of unemployment of female technical lyceum graduates are higher than those of post-gymnasium technical schools graduates and, as mentioned above, both are much higher than those of general lyceum graduates. Estimated rates of unemployment of IEK graduates and, to a lesser extent, other post-secondary establishments are very high and, in the case of other post- secondary establishments, diverge from the rates of unemployment of general lyceum graduates. The above results do not corroborate the view often expressed in public discourse on the need to boost technical education in order to combat youth unemployment in Greece.

Charts 4.3a and 4.3b show the estimated rates of unemployment of TEI graduates (or, previously, KATEE, i.e. Centers of Higher Technical and Vocational Training). These graduates have been grouped into six categories. The first two categories have a technical orientation (Structural Engineering and Mechanical & Computer Engineering), the third one resulted from the merging of the graduates of Agricultural and Food Technology schools, the next two relate to graduates of Economics & Management and Medical (or Paramedical) Sciences, while the last one (other TEI) comprises Librarians, Social Workers and Applied Arts graduates. Due to the heterogeneity of the latter and the small number of observations, results concerning the category "other TEI" must be interpreted with caution.

Chart 4.2 Estimated rates of unemployment of graduates of higher secondary and post-lyceum non-tertiary education



For both male and female TEI graduates, the lowest estimated rates of unemployment are observed among technical school graduates. A relatively better position between the two groups is held by Structural Engineering graduates compared with Mechanical & Computer Engineering graduates (for women, this is true only for the first 7 years after graduation). Among men, Medical Sciences graduates begin with extremely high

Chart 4.3 Estimated rates of unemployment of TEI graduates

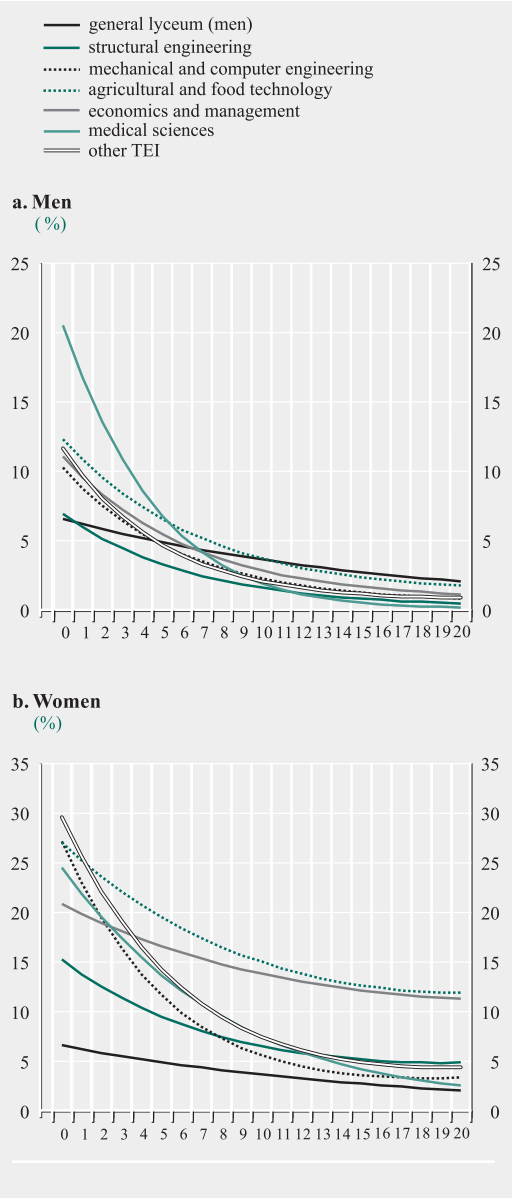


Chart 4.4 Estimated rates of unemployment of AEI graduates

rates of unemployment in the first few years after graduation, while rates of female unemployment among graduates of Agricultural & Food Technology and, to a lesser extent, Economics & Management begin with and remain at very high levels, even many years after graduation.

Because of the classification of AEI graduates (except for postgraduates) into a large number of categories, the relevant results have been grouped and are presented in three sets of charts. Charts 4.4a and 4.4b show the estimated rates of unemployment of science graduates. More specifically, estimates are presented for two groups of technical schools graduates, i.e. (a) Structural Engineering and (b) Mechanical Engineering, as well as for (c) graduates of IT, (d) graduates of Physical Sciences and (e)

graduates of Mathematics & Statistics. The group of IT graduates is numerically small and includes relatively few individuals several years after their graduation; consequently, the corresponding results should be interpreted with caution. The main reason we decided to group IT graduates in a separate category is the frequency with which this particular group is mentioned in public discourse as an example of excessive demand in the labour market. Under Structural Engineering we have included graduates from schools such as Civil Engineering, Architecture, Topography, etc. Mechanical Engineering also includes graduates from Naval Architecture, Electrical Engineering, Chemical Engineering, Mineralogy, etc. Under Physical Sciences graduates from Physics, Chemistry, Biology (apart from Medical Biology) and Geology are included.

Among both men and women, the best performers are IT graduates (which confirms the references in public discourse), followed by —at least for the first years after graduation— Polytechnic School graduates (from Structural Engineering and Mechanical Engineering). On the other hand, male —and, to a much larger degree, female— graduates of Physical Sciences or Mathematics and Statistics start with extremely high estimated rates of unemployment. In the case of men, these rates drop dramatically after 5-10 years, while in the case of women, the rates remain very high even 10 years after graduation.

Charts 4.5a and 4.5b illustrate the estimated rates of unemployment for five groups of AEI graduates: (a) Medicine, (b) Horticulture & Forestry, (c) Law, (d) Economics & Management and (e) Social Sciences. Apart from Medical School graduates, the Medicine group also includes dentistry, pharmaceutical and veterinary graduates, while Social Sciences include Sociology, Psychology, Anthropology, etc.

Both male and female graduates of Law Schools have low rates of unemployment (in the case of men the rates are extremely low), even during the first years after graduation.

Chart 4.5 Estimated rates of unemployment of AEI graduates II

For Medical School graduates, the rates tend to get close to zero only many years after graduation. To illustrate this better, the estimated rates of unemployment of men in this group 8 years after graduation are higher than the respective rates of men who have graduated from a general lyceum. Female graduates of Horticulture & Forestry or Social Sciences also have high estimated rates of unemployment for many years after graduation.

Chart 4.6 Estimated rates of unemployment of AEI graduates III

Finally, the estimated rates of unemployment of Economics & Management graduates lie in the middle of the range.

The third category of AEI graduates is that of "Instructors". Charts 4.6a and 4.6b show the estimated rates of unemployment for five groups of schools, namely Humanities, Languages, Physical Education & Sports, Pedagogics and other AEI. The latter includes Fine Arts, Medical Biology, Nursing, Dietetics, Journalism, Librarianship, Home Economics, etc. As in the case of TEI, the high degree of heterogeneity among the members of the group may render the interpretation of the corresponding results almost meaningless. The same applies to men who have graduated from Language Schools, since very few of them are included in the LFS sample. The Humanitarian Studies group includes graduates of Greek Literature, Philosophy, History, Archaeology, Theology, Music, Theatre, etc.

Among men, those with the best prospects appear to be the graduates of Pedagogics and among women the graduates of Languages. By contrast, male graduates of Physical Education seem to face high unemployment for many years after graduation. Among women, high rates of unemployment are observed for graduates of Humanitarian Studies and Pedagogics, especially during the first years after graduation. The shape of the curve for female graduates from Physical Education & Sports is rather surprising, as it implies a rise in the estimated unemployment rate in the first 7 years after graduation and a gradual decline thereafter.

Finally, Charts 4.7a and 4.7b show the results for individuals with postgraduate studies, separately for Master's degree holders (MA, MSc, MBA) and doctorate (PhD) holders. In the case of men, the estimated rates of unemployment of postgraduate degree holders start from unexpectedly high levels (7%-9% for the first year after graduation), but then drop rapidly. In the case of doctorate holders, their rates of unemployment come close to zero in less than 10 years after graduation, while in the case of Master's degree holders they drop below 5% about 5 years after graduation. As for women, differences between the two groups are very difficult to ascertain. Although compared to most groups of female tertiary education graduates their estimated rates of unemployment are lower, they seem to be quite high during the first years after graduation (for the first year, their estimated rate of unemploy-

ment is more than 17%), while even 20 years after graduation, their estimated rate of unemployment remains higher than that of male lyceum graduates, in the corresponding phase of their career.

Table 4 tackles the question "what is the estimated rate of unemployment 1, 3, 5 and 10 years after graduation, after isolating the impact of all other factors?" Many interesting conclusions can be drawn from the results reported there and we have already mentioned some of them. Let us start from the groupings according to education level. Both men and women with basic or lower education have the lowest estimated rates of unemployment one year after the completion of their studies. This is not surprising, as most drop-outs leave school because they have already found a job. Coming to 3, 5 and 10 years after graduation, the lowest rates of unemployment are registered for the group with very high educational qualifications (postgraduate degree holders). As years go by, the relative position of tertiary education graduates improves and AEI graduates are (in general) in a better position than TEI graduates.

At this point we should make two more remarks. First, even if the impact of all other factors is eliminated, the relative position of women in general —and of female higher education graduates in particular— is much worse than that of men. For instance, even 10 years after graduation, when the estimated rate of male unemployment drops to 2.6% for both AEI and TEI graduates, the rates for women are 7.0% for AEI graduates and 9.9% for TEI graduates. Similar differences are also evident among graduates of other education levels. Second, there exist very large differences across groups within specific education levels. Referring to tertiary education alone, one can see the differences in the estimated rates of unemployment in all three time periods (immediately after graduation, after 3 years and after 5 years) for both male and female graduates of Physical Sciences and Mathematics & Statistics on the one hand and Law and IT on the other. However, even if a higher education degree shields against unemployment in the long run, Table 4 shows that this does not apply to all graduates. For instance, even 10 years after graduation, the estimated rates of unemployment for women who have graduated from Horticulture & Forestry or Physical Sciences (AEI) as well as from Agricultural & Food Technology or Economics & Management (TEI) are considerably higher than 10%.

Chart 4.7 Estimated rates of unemployment of individuals with postgraduate studies

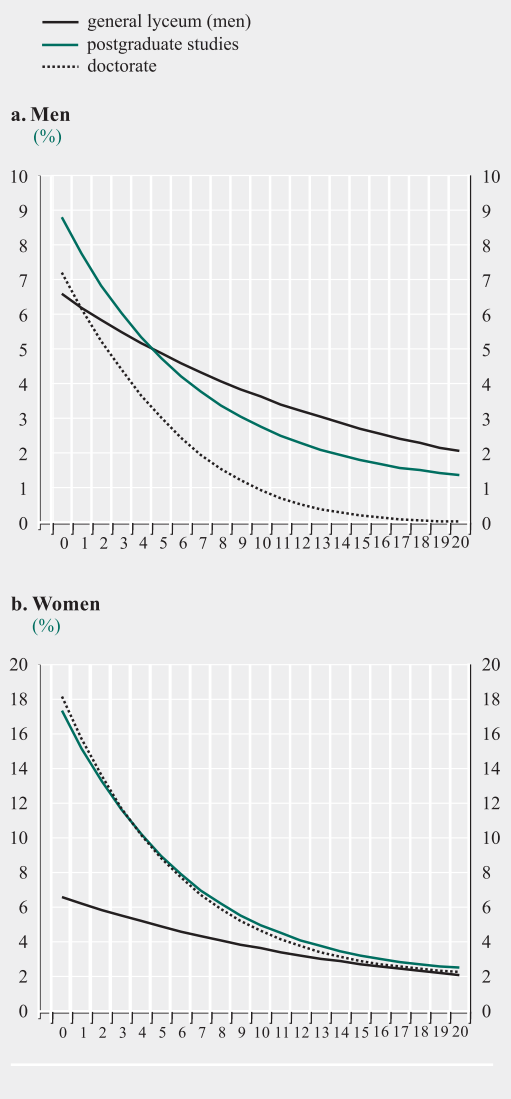


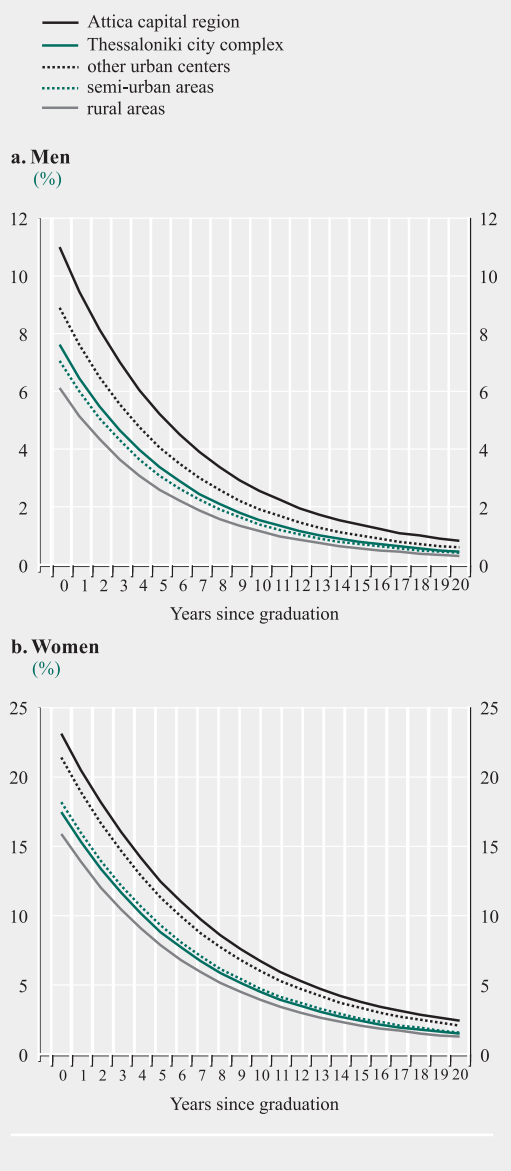
Table 4 Estimated rate of unemployment as a function of years since graduation

	Men				Women			
	Years since graduation				Years since graduation			
Education level	<1	3	5	10	<1	3	5	10
Pre-lyceum education	**7.1**	**6.4**	**6.0**	**5.2**	**17.0**	**17.4**	**17.4**	**17.0**
Primary	9.6	8.7	8.1	6.8	9.9	11.6	12.6	14.3
Lower secondary	4.9	4.8	4.6	4.3	8.6	9.2	9.5	9.8
Lyceum	**8.1**	**6.4**	**5.5**	**3.8**	**27.0**	**22.5**	**19.8**	**14.5**
General lyceum	6.6	5.5	4.9	3.6	12.2	11.5	11.0	9.7
Technical lyceum	7.3	5.7	4.9	3.5	19.2	17.5	16.3	13.6
Post-gymnasium technical school	5.6	4.9	4.4	3.5	14.6	13.9	13.4	12.0
Post-lyceum non-tertiary education	**10.3**	**7.6**	**6.3**	**4.0**	**24.9**	**20.6**	**18.3**	**13.7**
IEK	9.7	7.2	5.9	3.8	20.5	17.9	16.4	13.2
Other post-lyceum education	6.1	5.6	5.3	4.8	14.0	13.0	12.4	11.3
TEI	**12.4**	**7.6**	**5.5**	**2.6**	**27.2**	**19.7**	**16.0**	**9.9**
Structural Engineering	6.9	4.4	3.3	1.6	15.3	11.4	9.5	6.5
Mechanical & Computer Engineering	10.3	6.4	4.7	2.3	27.3	16.4	11.7	5.6
Agricultural & Food Technology	12.4	8.4	6.6	3.7	27.1	22.2	19.6	15.1
Economics & Management	11.1	7.2	5.5	2.8	20.9	18.2	16.7	13.9
Medical Sciences	20.7	10.9	6.8	1.9	24.6	17.4	13.7	7.5
Other TEI	11.7	6.7	4.7	2.1	29.7	19.1	14.3	7.5
AEI	**10.9**	**7.0**	**5.2**	**2.6**	**24.8**	**17.1**	**13.2**	**7.0**
Structural Engineering	6.4	4.2	3.2	1.7	19.6	12.0	8.6	4.1
Mechanical Engineering	5.8	4.6	3.9	2.8	11.5	7.0	5.1	2.7
IT	0.7	2.1	2.5	0.6	10.1	9.1	5.5	0.1
Physical Sciences	16.3	10.5	7.7	3.3	40.1	27.4	20.6	9.2
Mathematics & Statistics	24.5	11.3	6.5	1.6	44.1	25.9	17.2	5.9
Medical School etc.	8.6	7.5	6.3	3.0	18.7	12.2	9.1	4.4
Horticulture & Forestry	6.5	5.1	4.3	2.7	24.5	23.4	21.9	16.4
Law School	1.0	0.7	0.5	0.3	10.4	7.6	6.1	3.4
Economics & Management	10.9	6.6	4.8	2.3	18.3	13.6	11.2	7.0
Social Sciences	10.9	7.5	6.0	3.7	32.0	20.7	15.4	7.6
Humanities	12.9	9.0	7.0	3.6	27.3	20.3	16.5	9.3
Languages	18.7	12.3	8.0	1.3	13.2	10.4	9.0	6.4
Physical Education & Sports	12.9	10.8	9.5	6.6	9.0	11.8	12.9	11.9
Pedagogics	6.7	5.2	4.3	2.4	21.7	16.1	13.1	7.5
Other AEI	8.0	7.2	6.8	5.7	15.2	11.4	9.6	6.8
Postgraduate studies	**9.2**	**5.9**	**4.3**	**2.2**	**18.4**	**11.9**	**9.0**	**4.8**
Postgraduate degree	8.8	6.1	4.8	2.8	17.4	11.7	9.0	5.0
Doctorate	7.2	4.4	3.0	0.9	18.2	11.8	8.9	4.7

Table 5 attempts to answer the question "after how many years would the estimated rate of unemployment drop to 2%, 4% and 6%?". Undoubtedly, 2% can be considered to fall within frictional unemployment, many economists would consider 4% to fall within the natural rate of unemployment and, given the current conditions prevailing in the Greek economy, 6% can be considered a relatively satisfactory rate of unemployment. In Table 5 it is assumed that 40 years after graduation is the maximum time period that an individual remains in the labour market. The sample of the LFS used in our analysis includes a few persons who were less than 65 years old and reported that they had reached their highest education achievement 40 years earlier. In any case, the vast majority exits the labour market in less than 40 years after the completion of studies.

Women reach the 6% threshold after 18, 12 and 9 years from the completion of their TEI, AEI and postgraduate studies respectively. The estimated rates of 4% are reached only by female graduates of AEI and postgraduate studies, while 2% is reached only by AEI graduates (23 years after graduation) and not by female postgraduates. Men reach the estimated rates of unemployment much sooner than women and, in general, the higher the education level, the fewer the years required for the attainment of these levels. Again, the differences across education groups within the same level are very large. At the tertiary education level, men are close to 2% already from the first year after graduation from IT and Law Schools, but never after obtaining a degree in Social Sciences. Additionally, while the rate of unemployment is less than 6% already from the first year since graduation from IT, Law, Structural Engineering (both AEI and TEI) and Mechanical Engineering, or again already from the second year since graduation from Horticulture & Forestry and Languages, it usually takes graduates of Physical Education & Sports 12 whole years to reach the same levels. As regards women, the rate of unemployment drops to 2% in 10 years after graduation from IT Schools. According to our estimates, female graduates of Economics & Management, Social Sciences and Languages (AEI), graduates of any TEI (excluding Medical Sciences) and holders of Master's degrees and doctorates do not fall below these unemployment rates within the period of 40 years after graduation.

Chart 5.1 Estimated rates of unemployment of AEI graduates by degree of urbanisation



The last part of our empirical results is presented through charts and deals with the

Table 5 Years until the estimated rate of unemployment drops to 2%, 4% and 6%

	Men			Women		
	Years until the estimated rate of unemployment drops to			Years until the estimated rate of unemployment drops to		
Education groups	2%	4%	6%	2%	4%	6%
Before lyceum	**38**	**18**	**6**	**40+**	**40+**	**38**
Primary school	39	24	14	40+	39	35
Gymnasium	32	13	1	40+	36	29
Lyceum	**21**	**10**	**4**	**40+**	**40**	**27**
General lyceum	21	9	2	40+	32	24
Technical lyceum	23	8	3	40+	35	28
Post-gymnasium technical school	25	8	1	40+	33	27
Post-lyceum non-tertiary education	**21**	**11**	**6**	**40+**	**40+**	**40+**
IEK (post-lyceum vocational training institute)	19	10	5	40+	40+	33
Other post-lyceum education	40+	21	1	40+	40+	40+
TEI (Technological Educational Institutes)	**12**	**8**	**5**	**40+**	**40+**	**18**
Structural Engineering	9	4	1	40+	40+	12
Mechanical & Computer Engineering	11	7	4	40+	14	10
Agricultural & Food Technology	18	10	6	40+	40+	40+
Economics & Management	14	8	5	40+	40+	40+
Medical Sciences	10	8	6	23	16	12
Other TEI	11	6	4	40+	40+	13
AEI (Universities)	**13**	**7**	**5**	**23**	**15**	**12**
Structural Engineering	9	4	1	18	11	8
Mechanical Engineering	18	5	1	15	7	4
IT	1	1	1	8	6	5
Physical Sciences	13	9	7	19	15	13
Mathematics & Statistics	10	7	6	16	12	10
Medical School etc.	12	9	6	17	11	8
Horticulture & Forestry	14	6	2	23	21	19
Law School	1	1	1	15	9	6
Economics & Management	11	7	4	40+	17	12
Social Sciences	40+	10	5	40+	17	13
Humanities	15	10	7	22	17	14
Languages	10	8	7	40+	20	12
Physical Education & Sports	23	16	12	21	18	16
Pedagogics	12	6	2	21	16	12
Other AEI	40+	21	9	40+	40+	13
Postgraduate studies	**11**	**6**	**3**	**40+**	**12**	**9**
Postgraduate degree	14	7	4	40+	13	9
Doctorate	7	4	2	40+	12	8

impact of three factors on the probability of unemployment. These factors are: nationality, region and urbanisation level of the place of residence. The results are set forth in Charts 5.1a through to 5.3b, separately for men and women, and involve all AEI graduates. As the terms of the equation are introduced as dummy variables, the respective curves do not intersect.

Charts 5.1a and 5.1b depict the estimated unemployment rates for male and female graduates of AEI, in relation to the degree of urbanisation of their place of residence, holding constant the impact of other factors. Both men and women residing in Athens or another urban center (apart from Thessaloniki) face considerably higher rates of unemployment, especially during the first years after graduation. On the other hand, residence in rural areas is associated with lower rates of unemployment. It is quite possible —but cannot be ascertained by our results— that the negative (positive) impact of living in a rural area (large urban centre) on the rate of unemployment can be attributed to the excess demand (supply) of labour in those areas. This finding may also be related to the high level of underemployment in rural areas.

Charts 5.2a and 5.2b repeat the same procedure for the 13 regions of the country. The results are quite similar for men and women. Residents in Thessaly, Western Greece and Central Macedonia (men) or the Peloponnese (women) face higher rates of unemployment. By contrast, residing in Crete, the islands of the North Aegean, the remaining Central Greece and Euboea (men) or Attica (women) is associated with lower rates of unemployment. It should be noted that differences in the estimated regional rates of unemployment are considerably high, especially in the first years after graduation.

Finally, Charts 5.3a and 5.3b show the estimated rates of unemployment for AEI graduates according to the years after graduation, separately for men and women, on the basis of their nationality. The LFS sample is divided into three categories: Greek nationals, other EU countries' nationals and non-EU nationals. The estimated rate of unemployment of Greek men is considerably higher than the rates of the other two groups. By contrast, Greek women

Chart 5.2 Estimated rates of unemployment of AEI graduates by region

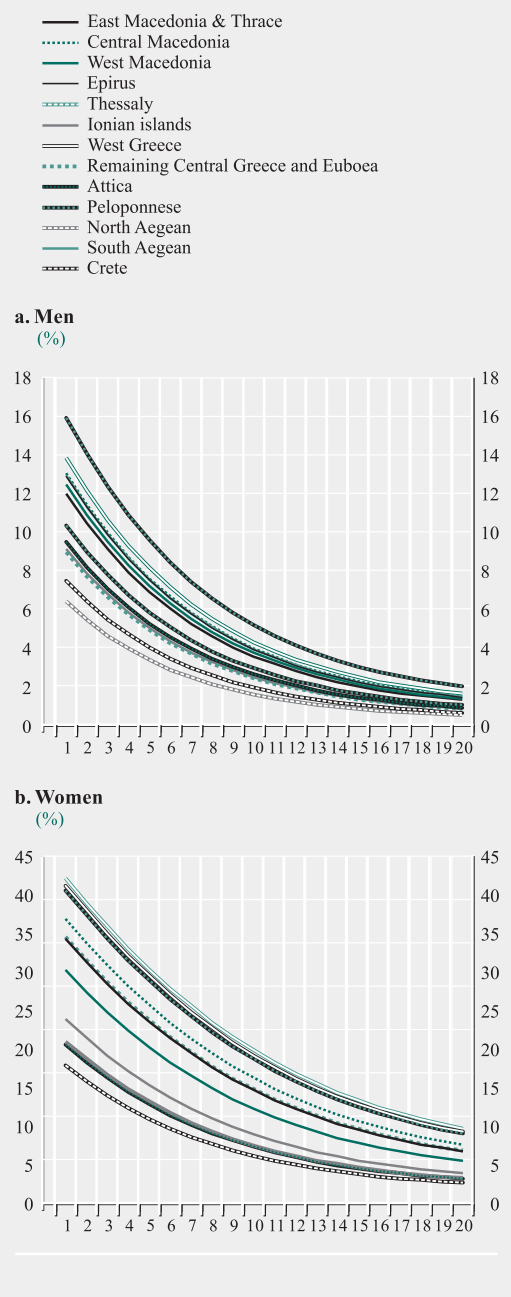
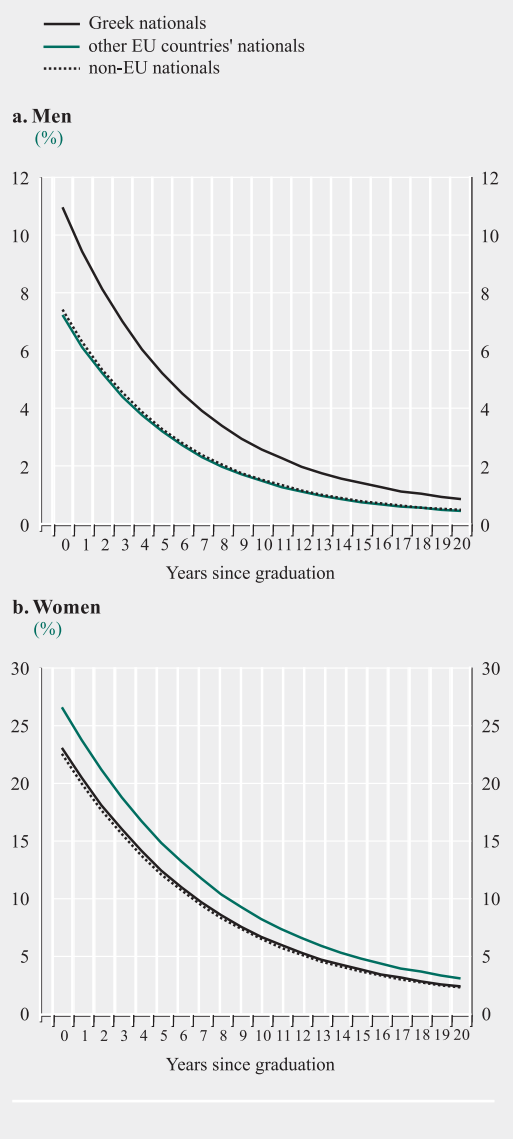


Chart 5.3 Estimated rates of unemployment of AEI graduates by nationality



and non-EU women face the same unemployment rates, while the estimated unemployment rate of women from EU countries other than Greece is slightly higher.

5 CONCLUSIONS

According to Georganta, Kandilorou and Livada (2008), 58% of second-year students of the Athens University of Economics and Business and the University of Macedonia reported that they decided to pursue tertiary education in order to find a better-paid job more easily (the "better-paid" part will be the subject of another study). Can our findings justify the "more easily" part? In other words, can tertiary education shield against unemployment? The results of our analysis show that these students took a very rational decision, as better educational qualifications seem to be quite effective in shielding against unemployment, even if it is only in the long run. It should also be noted that Schools whose graduates experience the lowest unemployment rates are the most popular ones among tertiary education applicants.

This study has yielded other findings as well. Some of these findings are consistent with the results of previous studies. However, as it becomes clear from the review of the second section, empirical studies on youth unemployment in Greece show divergent results. The first finding of the present paper is that the discourse on youth unemployment is rather misplaced. The problem is not quite a problem of youth unemployment, but a problem of transition from education to the labour market, irrespective of age. It also involves graduates of all education levels, not only tertiary education. The difference between tertiary education graduates and graduates of lower education levels is that the unemployment rates of the first drop to acceptable levels a few years after graduation, while for the latter the pace of this decline is substantially slower and unemployment rates converge to higher levels. This is the second significant finding of our paper. In general, the higher the education level (TEI, AEI, postgraduate studies) the lower the rate of unemployment in the long run.

The third finding relates to the very significant differences within education levels. Some groups of graduates face no real problems after graduating (from IT and Law Schools – at least the male graduates), others run a serious risk of unemployment for a relatively small number

of years after graduation (Physical Sciences, Mathematics & Statistics), while others face a serious problem of unemployment for several years after graduation (Physical Education and & Sports, Social Sciences and several TEI Schools). The last finding of the study is that, *ceteris paribus*, women in general, and female tertiary education graduates in particular, face a significantly higher risk of unemployment compared to male graduates with similar educational qualifications. For certain categories of female tertiary education graduates, the estimated unemployment rates are exceptionally high, even several years after graduation (AEI: Horticulture & Forestry, Physical Education & Sports; TEI: Agricultural & Food Technology, Economics & Management).

Would it be possible to generalise the above results and extrapolate them to the future? Possibly yes, but that would be too risky because of ever-changing circumstances. Tertiary education in Greece —like in most OECD countries— has expanded rapidly in the past 15 years. A recent OECD report concludes that demand for tertiary education will increase in the years to come. The recent economic crisis and the recession could possibly push more young people to remain in education as, in most countries, the pay gap between tertiary education graduates and people with lower education keeps widening (OECD, 2009).

In Greece, the number of places available in AEI and TEI for students accounts for more than 80% of the corresponding (annual) demographic cohort. Of course, many places remain vacant and some students never graduate. But even if these two factors are taken into consideration, the share of tertiary education graduates in recent cohorts is substantially higher than in previous ones. Would this imply that the increased supply of graduates —which is expected to continue in the next years— will lead to a more permanent increase in the graduate unemployment rate, or that graduate unemployment is not just a temporary phenomenon, as described in this study? The answer to this depends on a number of factors, as for example whether enterprises in Greece will increase their demand in high-skilled human capital or whether they will be willing to recruit graduate labour to fill positions where higher education qualifications are not required (Kikilias, 2008). If these prospects do not materialise, and if there is no significant brain drain, then we may witness higher rates of graduate unemployment and the phenomenon of graduate unemployment may turn out to be more permanent (Karamessini, 2003).

Finally, there are a number of policy implications stemming from our results. It is obvious that all curricula, especially in tertiary education, have to be upgraded and linked to the knowledge society and the labour market. They should provide young people with the necessary skills to creatively address the great challenges of modern world. Their content must focus on the development of cutting-edge and high-demand skills that respond to the needs of the Greek labour market, thus contributing in effectively shielding from unemployment. Mechanisms linking education to the labour market could also contribute to the achievement of this goal since, as confirmed by our analysis, the main problem is not youth unemployment but the transition from education to the labour market, irrespective of age. The effective operation and upgrading of such mechanisms, e.g. the National System for Linking Vocational Education and Training to Employment, the Career Offices of AEI and TEI and the services of the Greek Manpower Employment Organisation (OAED), could help curb the problem of youth and graduate unemployment. Private human resources management firms may also play an important role. However, contrary to what happens in other countries, the small number of such enterprises in Greece focuses on recruiting high-skilled executives primarily on behalf of multinational corporations. This is probably due to the structure of the Greek economy, with its large number of small and medium-sized enterprises, which do not turn to specialised (especially private) entities to cover their needs in human resources.

ANNEX

Table A1 MALE – Estimated probability of unemployment

Dependent variable: unemployed=1

Independent variables	Coefficient	
Single parent with children – male	0.2322	
Single parent with children and other members – male	0.6288	***
Couple with children – male	0.0029	
Couple with children and other members – male	0.3106	***
Single male	0.1746	***
Couple without children – male	Reference group	
Other type of household, single parent (without children) – male	0.5408	***
Other type of household, couple (without children) – male	0.4359	***
Primary or lower education	0.2393	**
Lower secondary education	-0.1521	*
General Lyceum	Reference group	
Technical Lyceum	0.0475	
Post-gymnasium technical school	-0.0827	
IEK	0.2024	**
Other post-lyceum education	-0.0453	
Structural Engineering (TEI)	0.0228	
Mechanical & Computer Engineering (TEI)	0.2402	
Agricultural & Food Technology (TEI)	0.3476	
Economics & Management (TEI)	0.2827	*
Other TEI	0.3133	
Medical Sciences (TEI)	0.6851	**
Structural Engineering	-0.0210	
Mechanical Engineering	-0.0659	
Other AEI	0.1017	
IT	-0.9305	
Horticulture & Forestry	-0.0078	
Medical School etc.	0.1395	
Physical Sciences	0.5213	*
Mathematics & Statistics	0.8121	**
Law School	-0.8395	*
Economics & Management	0.2698	**
Social Sciences	0.2705	
Humanities	0.3698	
Languages	0.6157	
Physical Education & Sports	0.3725	
Pedagogics	0.0076	
Postgraduate degree	0.1547	
Doctorate	0.0456	

*** Statistically important coefficient at importance level 1%
** Statistically important coefficient at importance level 5%
* Statistically important coefficient at importance level 10%

Table A1 MALE – Estimated probability of unemployment (continued)

Dependent variable: unemployed=1

Independent variables	Coefficient	
Years since graduation x Primary or lower education	0.0100	
Years since graduation x Lower secondary education	0.0275	***
Years since graduation x General Lyceum	Reference group	
Years since graduation x Technical Lyceum	-0.0115	
Years since graduation x Post-gymnasium technical school	0.0065	
Years since graduation x IEK	-0.0243	*
Years since graduation x Other post-lyceum education	0.0174	
Years since graduation x Structural Engineering (TEI)	-0.0454	
Years since graduation x Mechanical & Computer Engineering (TEI)	-0.0589	**
Years since graduation x Agricultural & Food Technology (TEI)	-0.0468	
Years since graduation x Economics & Management (TEI)	-0.0524	*
Years since graduation x Other TEI	-0.0783	
Years since graduation x Medical Sciences (TEI)	-0.1116	*
Years since graduation x Structural Engineering	-0.0418	
Years since graduation x Mechanical Engineering	-0.0104	
Years since graduation x Other AEI	0.0122	
Years since graduation x IT	0.2280	
Years since graduation x Horticulture & Forestry	-0.0111	
Years since graduation x Medical School etc.	0.0153	
Years since graduation x Physical Sciences	-0.0603	
Years since graduation x Mathematics & Statistics	-0.1527	**
Years since graduation x Law School	-0.0152	
Years since graduation x Economics & Management	-0.0655	***
Years since graduation x Social Sciences	-0.0431	
Years since graduation x Humanities	-0.0385	
Years since graduation x Languages	-0.0410	
Years since graduation x Physical Education & Sports	-0.0033	
Years since graduation x Pedagogics	-0.0093	
Years since graduation x Postgraduate degree	-0.0396	
Years since graduation x Doctorate	-0.0469	

*** Statistically important coefficient at importance level 1%
** Statistically important coefficient at importance level 5%
* Statistically important coefficient at importance level 10%

Table A1 MALE – Estimated probability of unemployment (continued)

Dependent variable: unemployed=1

Independent variables	Coefficient	
Years since graduation sqrd./100 x Primary or lower education	-0.0209	
Years since graduation sqrd./100 x Lower secondary education	-0.0498	**
Years since graduation sqrd./100 x General Lyceum	Reference group	
Years since graduation sqrd./100 x Technical Lyceum	0.0504	
Years since graduation sqrd./100 x Post-gymnasium technical school	0.0008	
Years since graduation sqrd./100 x IEK	0.0561	
Years since graduation sqrd./100 x Other post-lyceum education	-0.0026	
Years since graduation sqrd./100 x Structural Engineering (TEI)	0.0763	
Years since graduation sqrd./100 x Mechanical & Computer Engineering (TEI)	0.1438	**
Years since graduation sqrd./100 x Agricultural & Food Technology (TEI)	0.1290	
Years since graduation sqrd./100 x Economics & Management (TEI)	0.1311	
Years since graduation sqrd./100 x Other TEI	0.2277	
Years since graduation sqrd./100 x Medical Sciences (TEI)	0.1535	
Years since graduation sqrd./100 x Structural Engineering	0.1053	
Years since graduation sqrd./100 x Mechanical Engineering	0.0577	
Years since graduation sqrd./100 x Other AEI	-0.0102	
Years since graduation sqrd./100 x IT	-2.0429	
Years since graduation sqrd./100 x Horticulture & Forestry	-0.0133	
Years since graduation sqrd./100 x Medical School etc.	-0.3710	
Years since graduation sqrd./100 x Physical Sciences	0.0319	
Years since graduation sqrd./100 x Mathematics & Statistics	0.3621	**
Years since graduation sqrd./100 x Law School	0.0713	
Years since graduation sqrd./100 x Economics & Management	0.1761	***
Years since graduation sqrd./100 x Social Sciences	0.1690	
Years since graduation sqrd./100 x Humanities	0.0074	
Years since graduation sqrd./100 x Languages	-0.6442	
Years since graduation sqrd./100 x Physical Education & Sports	-0.0494	
Years since graduation sqrd./100 x Pedagogics	-0.0969	
Years since graduation sqrd./100 x Postgraduate degree	0.1188	
Years since graduation sqrd./100 x Doctorate	-0.1342	
Years since graduation	-0.0311	***
Years since graduation sqrd./100	0.0213	

*** Statistically important coefficient at importance level 1%
** Statistically important coefficient at importance level 5%
* Statistically important coefficient at importance level 10%

Table A1 MALE – Estimated probability of unemployment (continued)

Dependent variable: unemployed=1

Independent variables	Coefficient	
Greek national	Reference group	
Other EU national	-0.2253	
Third country national	-0.2265	***
East Macedonia–Thrace	0.1591	***
Central Macedonia	0.1442	***
West Macedonia	0.1558	**
Epirus	0.1578	***
Thessaly	0.1090	**
Ionian Islands	0.2150	***
West Greece	0.0682	
Central Greece and Euboea	0.0949	**
Attica	Reference group	
Peloponnese	0.1173	***
North Aegean	0.0375	
South Aegean	0.2027	***
Crete	0.1552	***
Capital region – Attica	Reference group	
City complex – Thessaloniki	-0.1974	***
Other urban areas	-0.1154	***
Semi-urban areas	-0.2366	***
Rural areas	-0.3146	***
First year of survey (2004)	-0.0644	**
Second year of survey (2005)	-0.0190	
Third year of survey (2006)	-0.0154	
Fourth year of survey (2007)	Reference group	
1st quarter	0.0260	
2nd quarter	-0.0206	
3rd quarter	Reference group	
4th quarter	0.0343	
Regional rate of unemployment	5.2382	***
Constant term	-1.8455	***

*** Statistically important coefficient at importance level 1%
** Statistically important coefficient at importance level 5%
* Statistically important coefficient at importance level 10%

Table B1 MALE – Estimated probability of participation in labour force

Dependent variable: labour force participant=1

Independent variables	Coefficient	
Single parent with children (0 aged up to 5, 1+ aged 6-17) – male	-0.8720	***
Single parent with children (1+ aged up to 5, 0+ aged 6-17) – male	-0.4188	
Single parent with children (0 aged up to 5, 1 aged 6-17) and other members – male	-0.1822	**
Single parent with children (0 aged up to 5, 2 aged 6-17) and other members and Single parent with children (0+ aged up to 5, other aged 6-17) and other members – male	0.2099	
Couple with children (0 aged up to 5, 1 aged 6-17) – male	-0.2698	***
Couple with children (0 aged up to 5, 2 aged 6-17) – male	-0.3715	***
Couple with children (0 aged up to 5, 3+ aged 6-17) – male	-0.5677	***
Couple with children (1 aged up to 5, 0 aged 6-17) – male	0.9621	***
Couple with children (1 aged up to 5, 1 aged 6-17) – male	0.4873	***
Couple with children (1 aged up to 5, 2 aged 6-17) – male	-0.1258	
Couple with children (1 aged up to 5, 3+ aged 6-17) – male	-0.4203	***
Couple with children (2 aged up to 5, 0 aged 6-17) – male	0.6096	***
Couple with children (2 aged up to 5, 1 aged 6-17) and Couple with children (2 aged up to 5, 2 aged 6-17) and Couple with children (2 aged up to 5, 3+ aged 6-17) – male	0.4779	***
Couple with children (3+ aged up to 5, 0+ aged 6-17) – male	0.3124	
Couple with children (0 aged up to 5, 1 aged 6-17) and other members – male	-0.1442	***
Couple with children (0 aged up to 5, 2 aged 6-17) and other members – male	-0.2168	***
Couple with children (0 aged up to 5, 3+ aged 6-17) and other members – male	-0.4081	***
Couple with children (1 aged up to 5, 0 aged 6-17) and other members – male	0.3859	***
Couple with children (1 aged up to 5, 1 aged 6-17) and other members – male	-0.0453	
Couple with children (1 aged up to 5, 2 aged 6-17) and other members – male	-0.3340	
Couple with children (1 aged up to 5, 3+ aged 6-17) and other members and Couple with children (2+ aged up to 5, 0+ aged 6-17) and other members – male	0.1775	
Single male	-0.2780	***
Couple without children – male	Reference group	
Other type of household, single parent (without children) – male	0.0752	**
Other type of household, couple (without children) – male	0.0989	***
Primary or lower education	0.9370	***
Lower secondary education	-0.1058	***
General Lyceum	Reference group	
Technical Lyceum	0.5414	***
TEI	0.9062	***
AEI	0.5051	***
Postgraduate degree	1.2741	***
Years since graduation	0.2280	***
Years since graduation sqrd./100	-0.4791	***

Note: Wald test (rho = 0): $x^2(1) = 21.80$ Prob > $x^2 = 0.0000$.
*** Statistically important coefficient at importance level 1%
** Statistically important coefficient at importance level 5%
* Statistically important coefficient at importance level 10%

Table B1 MALE – Estimated probability of participation in labour force (continued)

Dependent variable: labour force participant=1

Independent variables	Coefficient	
Eastern Macedonia–Thrace	-0.0539	
Central Macedonia	-0.0167	
Western Macedonia	-0.2810	***
Epirus	-0.1581	***
Thessaly	0.0655	*
Ionian Islands	-0.1276	**
Western Greece	-0.1348	***
Central Greece and Euboea	-0.0373	
Attica	Reference group	
Peloponnese	0.0196	
North Aegean	-0.1632	***
South Aegean	0.0359	
Crete	-0.0572	*
Attica capital region	Reference group	
Thessaloniki city complex	-0.0090	
Other urban areas	0.0581	**
Semi-urban areas	0.2506	***
Rural areas	0.3917	***
First year of survey (2004)	-0.0118	
Second year of survey (2005)	-0.0037	
Third year of survey (2006)	-0.0063	
Fourth year of survey (2007)	Reference group	
1st quarter	-0.0257	
2nd quarter	-0.0220	
3rd quarter	Reference group	
4th quarter	0.0133	
Constant term	-0.7881	***
/athrho	*0.5143*	***
rho	*0.4733*	

Note: Wald test (rho = 0): $x^2(1) = 21.80$ Prob > $x^2 = 0.0000$.
*** Statistically important coefficient at importance level 1%
** Statistically important coefficient at importance level 5%
* Statistically important coefficient at importance level 10%

Table A2 FEMALE – Estimated probability of unemployment

Dependent variable: unemployed=1

Independent variables	Coefficient	
Single parent with children – female	0.2290	***
Single parent with children and other members – female	0.3122	***
Couple with children – female	0.0425	
Couple with children and other members – female	0.1301	***
Single female	-0.0417	
Couple without children – female	Reference group	
Other type of household, single parent (without children) – female	0.2758	***
Other type of household, couple (without children) – female	0.2364	***
Primary or lower education	-0.1336	
Lower secondary education	-0.1995	**
General Lyceum	Reference group	
Technical Lyceum	0.2934	***
Post-gymnasium technical school	0.1110	
IEK	0.3416	***
Other post-lyceum education	0.0879	
Structural Engineering (TEI)	0.1420	
Mechanical & Computer Engineering (TEI)	0.5612	***
Agricultural & Food Technology (TEI)	0.5574	***
Economics & Management (TEI)	0.3562	***
Other TEI	0.6333	**
Medical Sciences (TEI)	0.4790	***
Structural Engineering	0.3091	
Mechanical Engineering	-0.0333	
Other AEI	0.1390	
IT	-0.1075	
Horticulture & Forestry	0.4771	
Medical School etc.	0.2780	
Physical Sciences	0.9142	***
Mathematics & Statistics	1.0191	***
Law School	-0.0904	
Economics & Management	0.2610	**
Social Sciences	0.6999	***
Humanities	0.5627	***
Languages	0.0490	
Physical Education & Sports	-0.1760	
Pedagogics	0.3841	**
Postgraduate degree	0.2291	
Doctorate	0.2596	

*** Statistically important coefficient at importance level 1%
** Statistically important coefficient at importance level 5%
* Statistically important coefficient at importance level 10%

Table A2 FEMALE – Estimated probability of unemployment (continued)

Dependent variable: unemployed=1

Independent variables	Coefficient	
Years since graduation x Primary or lower education	0.0446	***
Years since graduation x Lower secondary education	0.0246	***
Years since graduation x General Lyceum	Reference group	
Years since graduation x Technical Lyceum	-0.0104	
Years since graduation x Post-gymnasium technical school	0.0023	
Years since graduation x IEK	-0.0219	**
Years since graduation x Other post-lyceum education	-0.0075	
Years since graduation x Structural Engineering (TEI)	-0.0549	
Years since graduation x Mechanical & Computer Engineering (TEI)	-0.1250	***
Years since graduation x Agricultural & Food Technology (TEI)	-0.0459	
Years since graduation x Economics & Management (TEI)	-0.0247	
Years since graduation x Other TEI	-0.1123	**
Years since graduation x Medical Sciences (TEI)	-0.0763	***
Years since graduation x Structural Engineering	-0.1036	***
Years since graduation x Mechanical Engineering	-0.0910	*
Years since graduation x Other AEI	-0.0534	
Years since graduation x IT	0.0570	
Years since graduation x Horticulture & Forestry	0.0055	
Years since graduation x Medical School etc.	-0.0860	***
Years since graduation x Physical Sciences	-0.1088	**
Years since graduation x Mathematics & Statistics	-0.1669	***
Years since graduation x Law School	-0.0504	
Years since graduation x Economics & Management	-0.0560	***
Years since graduation x Social Sciences	-0.1145	***
Years since graduation x Humanities	-0.0661	***
Years since graduation x Languages	-0.0385	
Years since graduation x Physical Education & Sports	0.0785	
Years since graduation x Pedagogics	-0.0593	
Years since graduation x Postgraduate degree	-0.0801	**
Years since graduation x Doctorate	-0.0890	*

*** Statistically important coefficient at importance level 1%
** Statistically important coefficient at importance level 5%
* Statistically important coefficient at importance level 10%

Table A2 FEMALE – Estimated probability of unemployment (continued)

Dependent variable: unemployed=1

Independent variables	Coefficient	
Years since graduation sqrd./100 x Primary or lower education	-0.0943	***
Years since graduation sqrd./100 x Lower secondary education	-0.0453	**
Years since graduation sqrd./100 x General Lyceum	Reference group	
Years since graduation sqrd./100 x Technical Lyceum	0.0116	
Years since graduation sqrd./100 x Post-gymnasium technical school	-0.0136	
Years since graduation sqrd./100 x IEK	0.0564	**
Years since graduation sqrd./100 x Other post-lyceum education	0.0721	
Years since graduation sqrd./100 x Structural Engineering (TEI)	0.1944	
Years since graduation sqrd./100 x Mechanical & Computer Engineering (TEI)	0.3986	***
Years since graduation sqrd./100 x Agricultural & Food Technology (TEI)	0.1653	
Years since graduation sqrd./100 x Economics & Management (TEI)	0.1020	*
Years since graduation sqrd./100 x Other TEI	0.3469	**
Years since graduation sqrd./100 x Medical Sciences (TEI)	0.1429	*
Years since graduation sqrd./100 x Structural Engineering	0.2845	**
Years since graduation sqrd./100 x Mechanical Engineering	0.3187	**
Years since graduation sqrd./100 x Other AEI	0.2010	
Years since graduation sqrd./100 x IT	-2.1860	
Years since graduation sqrd./100 x Horticulture & Forestry	-0.2124	
Years since graduation sqrd./100 x Medical School etc.	0.1787	**
Years since graduation sqrd./100 x Physical Sciences	0.1397	
Years since graduation sqrd./100 x Mathematics & Statistics	0.3821	**
Years since graduation sqrd./100 x Law School	0.0733	
Years since graduation sqrd./100 x Economics & Management	0.1242	**
Years since graduation sqrd./100 x Social Sciences	0.3136	***
Years since graduation sqrd./100 x Humanities	0.0725	
Years since graduation sqrd./100 x Languages	0.1115	
Years since graduation sqrd./100 x Physical Education & Sports	-0.4890	*
Years since graduation sqrd./100 x Pedagogics	0.0650	
Years since graduation sqrd./100 x Postgraduate degree	0.2242	*
Years since graduation sqrd./100 x Doctorate	0.2503	*
Years since graduation	-0.0106	**
Years since graduation sqrd./100	-0.0257	**

*** Statistically important coefficient at importance level 1%
** Statistically important coefficient at importance level 5%
* Statistically important coefficient at importance level 10%

Table A2 FEMALE – Estimated probability of unemployment (continued)

Dependent variable: unemployed=1

Independent variables	Coefficient	
Greek national	Reference group	
Other EU national	0.0886	
Third country national	-0.0209	
East Macedonia–Thrace	0.2138	***
Central Macedonia	0.2224	***
West Macedonia	0.1497	**
Epirus	0.2442	***
Thessaly	0.2709	***
Ionian Islands	0.1629	***
West Greece	0.1769	***
Central Greece and Euboea	0.2305	***
Attica	Reference group	
Peloponnese	0.2947	***
North Aegean	0.2930	***
South Aegean	0.1607	***
Crete	0.2483	***
Capital region – Attica	Reference group	
City complex – Thessaloniki	-0.2156	***
Other urban areas	-0.0822	***
Semi-urban areas	-0.1664	***
Rural areas	-0.2119	***
First year of survey (2004)	-0.0201	
Second year of survey (2005)	-0.0133	
Third year of survey (2006)	0.0129	
Fourth year of survey (2007)	Reference group	
1st quarter	0.0068	
2nd quarter	-0.0161	
3rd quarter	Reference group	
4th quarter	-0.0021	
Regional rate of unemployment	5.6842	***
Constant term	-1.7809	***

*** Statistically important coefficient at importance level 1%
** Statistically important coefficient at importance level 5%
* Statistically important coefficient at importance level 10%

Table B2 FEMALE – Estimated probability of participation in labour force

Dependent variable: labour force participant=1

Independent variables	Coefficient	
Single parent with children (0 aged up to 5, 1 aged 6-17) – female	0.2829	***
Single parent with children (0 aged up to 5, 2 aged 6-17) – female	0.1740	**
Single parent with children (0 aged up to 5, 3+ aged 6-17) – female	-0.0355	
Single parent with children (1 aged up to 5, 0 aged 6-17) – female	0.6509	***
Single parent with children (1 aged up to 5, 1 aged 6-17) – female	-0.1298	
Single parent with children (1 aged up to 5, 2+ aged 6-17) – female	-0.0771	
Single parent with children (2+ aged up to 5, 0+ aged 6-17) – female	-0.3168	
Single parent with children (0 aged up to 5, 1 aged 6-17) and other members – female	0.2237	***
Single parent with children (0 aged up to 5, 2+ aged 6-17) and other members – female	0.1241	
Single parent with children (1+ aged up to 5, 0+ aged 6-17) and other members – female	0.1153	
Couple with children (0 aged up to 5, 1 aged 6-17) – female	-0.2394	***
Couple with children (0 aged up to 5, 2 aged 6-17) – female	-0.2951	***
Couple with children (0 aged up to 5, 3+ aged 6-17) – female	-0.3850	***
Couple with children (1 aged up to 5, 0 aged 6-17) – female	-0.2161	***
Couple with children (1 aged up to 5, 1 aged 6-17) – female	-0.3661	***
Couple with children (1 aged up to 5, 2 aged 6-17) – female	-0.4686	***
Couple with children (1 aged up to 5, 3+ aged 6-17) – female	-0.4620	***
Couple with children (2 aged up to 5, 0 aged 6-17) – female	-0.3920	***
Couple with children (2 aged up to 5, 1 aged 6-17) – female	-0.6709	***
Couple with children (2 aged up to 5, 2 aged 6-17) – female	-0.9113	***
Couple with children (2 aged up to 5, 3+ aged 6-17) – female	-1.2648	***
Couple with children (3+ aged up to 5, 0+ aged 6-17) – female	-0.7267	***
Couple with children (0 aged up to 5, 1 aged 6-17) and other members – female	-0.2126	***
Couple with children (0 aged up to 5, 2 aged 6-17) and other members – female	-0.2168	***
Couple with children (0 aged up to 5, 3+ aged 6-17) and other members – female	-0.3372	***
Couple with children (1 aged up to 5, 0 aged 6-17) and other members – female	-0.0799	
Couple with children (1 aged up to 5, 1 aged 6-17) and other members – female	-0.0237	
Couple with children (1 aged up to 5, 2 aged 6-17) and other members – female	-0.5561	***
Couple with children (1 aged up to 5, 3+ aged 6-17) and other members and	-0.4717	***
Couple with children (2+ aged up to 5, 0+ aged 6-17) and other members – female	-0.3842	***
Single female	-0.0037	
Couple without children – female	Reference group	
Other type of household, single parent (without children) – female	0.2677	***
Other type of household, couple (without children) – female	0.0292	*

Note: Wald test (rho = 0): $x^2(1) = 53.40$ Prob > $x^2 = 0.0000$
*** Statistically important coefficient at importance level 1%
** Statistically important coefficient at importance level 5%
* Statistically important coefficient at importance level 10%

Table B2 FEMALE – Estimated probability of participation in labour force *(continued)*

Dependent variable: labour force participant=1

Independent variables	Coefficient	
Primary or lower education	0.0901	***
Lower secondary education	-0.3163	***
General Lyceum	Reference group	
Technical Lyceum	0.8168	***
TEI	1.0967	***
AEI	0.9779	***
Postgraduate degree	1.5844	***
Years since graduation	0.0906	***
Years since graduation sqrd./100	-0.2136	***
East Macedonia–Thrace	0.2354	***
Central Macedonia	0.1183	***
West Macedonia	0.0554	*
Epirus	0.0815	***
Thessaly	0.1502	***
Ionian Islands	0.0931	**
West Greece	-0.0107	
Central Greece and Euboea	0.0750	***
Attica	Reference group	
Peloponnese	0.2317	***
North Aegean	-0.1056	***
South Aegean	-0.0672	**
Crete	0.2336	***
Attica capital region	Reference group	
Thessaloniki city complex	-0.1756	***
Other urban areas	-0.0980	***
Semi-urban areas	0.0261	
Rural areas	0.2388	***
First year of survey (2004)	-0.0047	
Second year of survey (2005)	0.0048	
Third year of survey (2006)	0.0031	
Fourth year of survey (2007)	Reference group	
1st quarter	-0.0009	
2nd quarter	0.0175	
3rd quarter	Reference group	
4th quarter	-0.0319	*
Constant term	-0.5449	***
/athrho	*1.0758*	***
rho	*0.7916*	

Note: Wald test (rho = 0): $x^2(1) = 53.40$ Prob > $x^2 = 0.0000$
*** Statistically important coefficient at importance level 1%
** Statistically important coefficient at importance level 5%
* Statistically important coefficient at importance level 10%

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