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### Predictors of higher technological education graduates' labour market entrance success

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## Predictors of higher technological education graduates' labour market entrance success

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Nowadays, the successful transition of graduates from university into the world of work is one of the most important priorities of all involved stakeholders: governments, institutions of higher education, and individuals, as well as researchers. The present study analyzes the employability characteristics of higher technological education graduates, focusing on the determination of the factors which significantly affect the quality of their transition in the labour market. Original empirical data was collected through a national survey from 5183 graduates of 11 technological educational institutes (TEIs) of Greek higher education, corresponding to nine broader specialties and 51 professions. The findings of our study indicate that gender (that is, male) and postgraduate studies positively affect graduates' employment. The interval between graduation and first employment is inversely affected by the duration of bachelor studies, as well as by having children, and appears to depend significantly on the graduate's specialty. Male graduates, parents, postgraduate degree holders, and IT graduates appear to enjoy, on average, higher wages. The match between studies and work is higher for graduates who have children, who have a high or very high bachelor degree mark, for graduates of specialties related to health, as well as for postgraduate degree holders. Relevant suggestions for further research, and the practical implications of this study, are also discussed.

**Keywords:** higher technological education; graduate; labour market; multivariate analysis; Greece

### 1. Introduction

From a global perspective, economic and social developments are increasingly driven by the advancement and application of knowledge. The potential of working organizations to perform optimally in global markets depends on employees' capability to develop, cultivate, and maintain fundamental qualifications. However, being an expert and maintaining one's expertise is by no means an easy task. Nowadays, job qualifications are continuously changing at an ever-increasing rate.

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A characteristic of the above-mentioned changes is that not only do they produce new expertise requirements, but at the same time they create new opportunities for learning. The qualifications that are required for a job are becoming increasingly complex while, simultaneously, the 'half life' of these qualifications is becoming shorter. Employees who are able to survive and satisfy the current needs are the ones with not only the most up-to-date knowledge and skills, but also the capability to continuously build up the new expertise requirements. As it is hard to predict changing labour market requirements, achieving flexibility in functioning seems to be the key criterion that enables an employee to stay 'in the race' (Van der Heijde and Van der Heijden 2006).

This implies that the quality criteria as regards education in general and higher technological education in particular, because of the high speed of technological changes, is fundamental for the success of the knowledge economy and society in all nations (World Bank 1999). Yet, the potential of higher education systems to fulfil this responsibility in countries with (relatively) weak economies, such as Greece, is frequently thwarted by long-standing problems of finance, efficiency, equity, quality and unemployment. There is a serious lack of research on the relationship between higher (technological) education and transition success to the labour market (Paul, Teichler, and Van Der Velden 2000), even though this is a basic issue on the public debates' agenda more frequently.

Therefore, the aim of the current study is to determine possible predictors for higher technological education graduates' labour market entrance success.

## 2. Theoretical framework

Studies on graduate employment often give a limited description of graduates' professional success or so-called employability (career potential) (Forrier and Sels 2003; Fugate and Kinicki 2008; Rothwell and Arnold 2007; Van der Heijde and Van der Heijden 2006). The analysis of their income distribution (or distributions of related measures, such as salary or wages), in the context of applications of the human capital theory (Becker 1993), prevails (Psacharopoulos and Patrinos 2004). Following human capital theory, education is viewed as an investment and the later income is used to calculate the private or social rates of return from this investment. Sometimes even, only the employment status (employed/not employed) at a certain time after graduation is considered as an indicator of professional success.

Obviously, such a limited operationalization of professional success ignores the fact that graduates have complex work orientations and career plans in which other factors, such as the autonomy at the work place and the content of work, might play a more prominent role than income. Also, income and employment status are not satisfying indicators of professional success, especially of recent graduates, since, in many sectors, their income is not very differentiated (special entrance conditions – low salaries), and the question of being employed or not is not really relevant in case the employment conditions are not taken into account as well (Schomburg 2007). Most graduates work during their course of study in order to contribute to the costs of studying or to obtain work experience, and, therefore, in many cases, the time of graduation does not imply the official start of employment.

In line with this, Coates and Edwards (2011) referred to the development of a strong and vibrant knowledge-based economy and stressed the need for broader

outcome measures including measures of graduates' satisfaction with their jobs. Moreover, they advocated positioning the study internationally and in terms of research on graduate careers, quality assurance and planning (see also Finnie 2004). Wilton (2008) referred to the need to carefully assess the alignment between the level of knowledge that is required and the specific requirements the intended job calls for in order to facilitate successful labour market entrance. As such, a careful assessment of higher education institutions is key in the light of enabling a sound preparation of graduates for the ever-increasing demands in the labour market. In addition, jobs with higher requirements in terms of knowledge and skills, increase graduates' job satisfaction (García-Aracil and Van der Velden 2008), herewith supporting the ground for profound education.

That is to say, previous research provides evidence for the hypothesis of a growing complexity in the relationship between higher (technological) education and work (Teichler 1999). More concretely, new demands regarding individuals' flexibility on the labour market influence their orientations and career choices, and might stimulate them to proactively prepare themselves for the future transition from education to work. Therefore it seems necessary to use an extended conceptualization of professional success with a broad range of measures, such as: (a) the smoothness of the transition process; (b) status, income and other dimensions of professional success; (c) success with regard to the nature of work, e.g. use of knowledge and the extent to which work is characterized by autonomy and challenging tasks; and (d) overall appreciation of employment (see also García-Aracil 2003; Van der Heijden 2000; for a more elaborate conceptualization of professional success).

In Greece, though accurate data on unemployment is hard to come by, there is no doubt about the fact that today the country is faced with a high unemployment rate (Hellenic Statistical Authority 2011). Karamesini (2008) was the first one to publish a national survey on the incorporation of university graduates in the labour market, and found that their unemployment rate five to seven years after graduation is relatively low (5.3% of men and 7.2% of women); there is however a significant percentage of inactive university graduates (9.7% of men and 9.1% of women).

Nickell, Nunziata, and Ochel (2003) showed that most of the unemployment histories can be explained by institutional changes (see also Lee and Wolpin 2010 for an exemplary and more recent analysis). Their study is based on annual data for 20 OECD countries over the period 1961 to 1995. Besides estimating the direct effects of labour market institutions, they introduced interaction terms between institutions and economic shocks, defined in a similar way to Blanchard and Wolfers (2000). Nickell et al. (2003) also concluded that interactions between economic shocks and institutions do not add very much to the explanation of unemployment rates, over and above the separate effects of the predictor variables.

As a result, in recent times, one major interest, that has attracted public debate in many countries, with Greece being no exception, as well as in many working organizations, has centred on the relationship between higher (technological) education and the world of work. Another reason for the grown interest lies in the increased enrolment in higher education institutes. The 'mismatch' between education and employment contributes to the continuous increase of unemployment, while the process of transition from higher education to employment has become increasingly complex and protracted (Béduwé and Giret 2010).

Moreover, rapid changes at the labour market also imply that graduates can no longer expect to remain in a single profession, or with a few employers; they have to be more flexible and better prepared for lifelong learning. Specifically, gone are the days when careers consisted of upward moves within a framework of long-term employment relations (Arthur and Rousseau 1996; Briscoe et al. 2006; DeFillippi and Arthur 1996; Feldman and Ng 2007; Hall and Mirvis 1995; Sullivan 1999).

The problem of successful job assignment, in general, is referred to as the 'matching problem' (Burgess and Profit 2001; Padoa Schioppa 1991). For an assignment to come about, employer and employee must make a positive decision: the employer agrees to hire, the employee accepts the offered job conditions. Since both must make their decision under imperfect information conditions, they are at risk of a mismatch. This while employers and employees are concerned to reach an optimal match, and the parties will re-adjust the assignment until this has been found. From this perspective, the purpose of all labour mobility is to adjust the matching process (McGuinness and Sloane 2010).

Approaching the labour market entry process in this way brings two of its aspects into focus: (1) the speed of finding a (first) job; and (2) the stability of jobs. Entry speed has implications for the amount and duration of unemployment before labour market entry, whereas stability sheds light on the duration of jobs and the risk of job loss. Job stability is a function of the quality of the match, legal opportunities to 'correct' assignments, and the options available to job seekers in the labour market. High job instability does not necessarily imply high unemployment risks after labour market entry; but it may well result from job-to-job mobility (see also Van der Heijden 2002), depending on the options available to job seekers in the labour market. In the next paragraphs, we will go into some factors affecting the transition of higher education graduates in the labour market, the entry process with respect to the speed of entry, and the stability of job assignments.

In order to make their decisions, employers and employees evaluate the resources of the other party in the light of their own needs and requirements. This implies that, on the one hand, decisions depend on the specific requirements, individual preferences and resources of the actors involved, while, on the other hand, however, opportunities and resources are restricted and pre-defined by the institutional context. Thus, individuals take account of the structural and institutional context in which they act. This gives rise to different recruitment or job search behaviours in different institutional settings and, therefore, in different countries (Coates and Edwards 2011). Two institutions are of central importance in shaping resources and constraints in the matching process: (1) the education and training system (ETS); and (2) the labour market, particularly the vocational specificity of the educational system, and employment protection legislation.

The vocational training system in Greece has been characterized as intricate, partly because of its modular structure. However, recent reforms have sought to give clearer organization to the system and greater standardization to certificates. In Greece, the promotion of higher technological education graduates in the labour market is based primarily on the role of career offices, while, recently, the Greek government promoted the design and development of a new academic structure called 'Innovation and Entrepreneurship Unit' (IEU), aiming to strengthen the graduates networking in the labour market, and therefore reducing unemployment.

To conclude, the stability of occupational assignments should result from a close protection of jobs on the one hand, and from high matching quality and direct assignment to skilled positions on the other hand. More empirical research is needed in order to safely conclude which determinants are at stake in this regard. In this article, we will present the results of a large scale survey related to the factors which significantly affect the transition of higher technological education graduates into the Greek labour market. The next section of this contribution deals with the research methodology. More specifically, we will describe some of the participating graduates' demographic characteristics, the research design, the measures that have been used. Subsequently, we will go into the findings of our study. The article concludes with a reflection upon the main results, an outline on limitations of the study, and recommendations for future research. Some practical implications of our study are given as well.

In this article, the analysis focuses on the investigation of the existing relationships through the testing of seven research hypotheses concerning the significant effects of each one of the selected predictors (considered as independent variables) to the dependent employment variables.

### 3. Methodology

#### 3.1. Sample and procedure

The original empirical data used in this study was collected by the participating institutions of higher education through telephone interviews. For this purpose, we designed a structured questionnaire, the survey's research tool. The questionnaire was addressed during the period September 2006 to May 2008 to randomly, yet stratified (according to gender and study specialty, and regarding student population's size per institution), samples of all Greek TEI graduates who have completed their bachelor studies during the time interval 1997–2001. The overall response rate, though different across the participating institutions, was very high (above 80% for each institution) indicating both the appropriate organization of the survey, and the high interest of the graduates. All non-respondents of the initial sample were replaced by substitute graduates taken randomly from reserve lists, which had been created beforehand to tackle such cases.

Graduates from 11 TEIs which followed the above requirements were included in the study corresponding to 5183 valid questionnaires. The final sample consisted of graduates of all the existing nine broader specialties incorporating 51 different professions.

#### 3.2. Measurement

Six variables, sketching graduates' education and demography, were selected as independent variables:

*Degree grade* Bachelor degree final grades are classified using a three-point scale in the 5–10 grade intervals: (1) 'good' degree mark (5–6.4); (2) 'very good' degree mark (6.5–8.4); and (3) 'honours' degree mark (8.5–10). The corresponding codes used are 1, 2 and 3 respectively.

*Duration of bachelor studies* It is considered as the time interval between entrance and graduation, and is measured in years.

*Acquisition of a postgraduate degree* The variable postgraduate degree is coded 1 if the graduate has attended postgraduate studies in Greece; 2 if s/he attended them abroad; and 3 if the graduate has not proceeded to postgraduate education.

*Gender and family status* Two variables are examined. Regarding gender, male graduates are coded 1, and female graduates are coded 2. As far as the family status is concerned, the code used for single graduates is 1, and for married graduates is 2.

*Graduates' age* A five categories age interval is used for the age of the participating graduates at the time of the study: 30 years or younger (code 1); 31 to 33 years (code 2); 34 to 36 years (code 3); 37 to 39 years (code 4); and 40 years and older (code 5).

*Specialty of bachelor studies* Graduates' specialty of studies is classified in nine broad specialties (corresponding to different TEI faculties), and subsequently in 51 professions (corresponding to different TEI departments) (see Table 1).

As far as the dependents are concerned, the following main employment variables outlining the incorporation of the graduates into the labour market were selected: (1) employment or unemployment of graduates at the time of the study; (2) self-employment of graduates versus their employment as employees; (3) full- or part-time employment of graduates; (4) interval between graduation and first employment; (5) level of wages; (6) relevance between work and studies; and (7) satisfaction of employed graduates with their position.

### 3.3. Findings

SPSS was used for the statistical analyses. Descriptive analysis techniques were used to provide information on the prevalence of the main employment issues, being the dependents, and on the defined independent variables. Bivariate and multivariate statistical techniques were used to investigate the effects of the employment variables. The Chi-square ( $X^2$ ) test was used to examine the significance of the statistical dependence between two variables. Both logistic and linear regressions were applied to examine whether our research hypotheses concerning the effects of each one of the selected independent variables upon the dependent variables could be confirmed. A logistic model is applied in case the dependent variable is dichotomous, and a linear model in case the dependent variable is continuous.

## 4. Results

This section is divided into three subsections. The first and the second subsection provide descriptive information about the professional success of the participating graduates, and reports the outcomes as regards the defined independent variables, respectively. The third subsection focuses on the examination of the relationship between the predictors and the employment outcomes.

### 4.1. Employability characteristics of TEI graduates

Seven to 11 years after their graduation, nearly nine out of 10 (88.5%) of the TEI graduates possess a working position; 85% of them are employed within a working organization, and 15% are self-employed. About one out of 25 graduates (4.1%)



Table 1. Broader specialties, professions and corresponding distribution.

Broader specialties (faculties)	Number of professions	Professions/Departments (sample size)	N	Sample %
Agriculture	6	<ul style="list-style-type: none"> <li>● Animal Production (n = 59)</li> <li>● Farm Management (n = 51)</li> <li>● Fisheries and Aquaculture Technology (n = 121)</li> <li>● Floristry and Greenhouse Technology (n = 56)</li> <li>● Forestry (n = 118)</li> <li>● Plant Production (n = 129)</li> </ul>	534	10.3
Care and Welfare	3	<ul style="list-style-type: none"> <li>● Occupational Therapy (n = 9)</li> <li>● Public Health (n = 14)</li> <li>● Social Work (n = 72)</li> </ul>	95	1.9
Engineering	14	<ul style="list-style-type: none"> <li>● Civil Construction Engineering (n = 151)</li> <li>● Civil Infrastructure Engineering (n = 73)</li> <li>● Electrical Engineering (n = 222)</li> <li>● Energy Technology (n = 18)</li> <li>● Geotechnology and Environmental Eng. (n = 35)</li> <li>● Industrial Design (n = 30)</li> <li>● Marine Engineering (n = 28)</li> <li>● Medical Instruments Technology (n = 25)</li> <li>● Mechanical Engineering (n = 283)</li> <li>● Mine Engineering (n = 30)</li> <li>● Oil and Natural Gas Technologies (n = 60)</li> <li>● Surveying Engineering (n = 31)</li> <li>● Transportation Engineering (n = 36)</li> <li>● Vehicle Engineering (n = 57)</li> </ul>	1079	20.8
Food and Nutrition	3	<ul style="list-style-type: none"> <li>● Food Technology (n = 83)</li> <li>● Nutrition and Dietetics (n = 55)</li> <li>● Oenology and Spirits Technology (n = 19)</li> </ul>	157	3.0

Table 1 (Continued)

Broader specialties (faculties)	Number of professions	Professions/Departments (sample size)	N	Sample %
Graphics and Arts	5	<ul style="list-style-type: none"> <li>● Conservation of Antiquities &amp; Works of Art (n = 26)</li> <li>● Graphic Design (n = 27)</li> <li>● Graphical Arts Technologies (n = 20)</li> <li>● Interior Architecture and Decoration (n = 71)</li> <li>● Photography (n = 23)</li> </ul>	167	3.2
Health	6	<ul style="list-style-type: none"> <li>● Aesthetics and Cosmetology (n = 76)</li> <li>● Early Childhood Care and Education (n = 118)</li> <li>● Health Visitors (n = 18)</li> <li>● Midwifery (n = 96)</li> <li>● Nursery (n = 418)</li> <li>● Physiotherapy (n = 147)</li> </ul>	873	16.8
Health Technology	4	<ul style="list-style-type: none"> <li>● Dental Technologies (n = 26)</li> <li>● Medical Laboratories Technology (n = 83)</li> <li>● Optics and Optometry (n = 8)</li> <li>● Radiology Technology (n = 32)</li> </ul>	149	2.9
Information Technologies	3	<ul style="list-style-type: none"> <li>● Automation (n = 52)</li> <li>● Electronics (n = 227)</li> <li>● Informatics (n = 141)</li> </ul>	420	8.1
Management and Economics	7	<ul style="list-style-type: none"> <li>● Accounting (n = 713)</li> <li>● Administration of Cooperative Organizations (n = 66)</li> <li>● Business Administration (n = 392)</li> <li>● Health &amp; Welfare Units Administration (n = 37)</li> <li>● Librarianship (n = 79)</li> <li>● Marketing (n = 205)</li> <li>● Tourism Management (n = 217)</li> </ul>	1709	33.0
Total	51		5183	100

remain inactive, not being presently interested in employment, and a significant proportion of the TEI graduates (7.4%) are unemployed.

Nevertheless, this unemployment rate is lower compared to the national mean unemployment rate of higher education graduates of the same age groups; that is, 9.15% (Hellenic Statistical Authority 2009). Additionally, the effect of the national unemployment rate at the time (calendar year) in which the graduate begins the job search was examined, assuming no-regional mobility. More specifically, the detailed unemployment rate of the participating TEI graduates over the years 1997 to 2001, and (following in brackets), respectively, the national average unemployment rate, and the national average unemployment rate of graduates of higher education within the age range 22–29 years are the following; 1997: 7.3% (10.8%, 11.6%); 1998: 7.1% (11.7%, 14.3%); 1999: 7.5% (10.2%, 14.2%); 2000: 6.3% (9.8%, 11.7%); and 2001: 9% (9.8% and 11.9%), with the 1997–2001 average: 7.4% (10.7%, 12.7%) (Hellenic Statistical Authority 2011). These results reveal both the significantly lower unemployment rate of the examined TEI graduates and the non-existence of a correlation between the yearly TEI graduates' and national unemployment rates.

Gender plays an important role in graduates' transition to the labour market. Women are in a significantly inferior position than men, presenting more than double the unemployment rate, and triple the rate of inactivity compared to the corresponding rate of men (10% versus 4%, and 6% versus 2%, respectively). Additionally, compared to men, women work more on part-time basis (5% versus 3%). Male graduates turn much more than women to entrepreneurship; 20% of them are self-employed (43% of them with employees, and 57% without employees, that is, as freelancers), the corresponding percentage of self-employed women being only 9%, and just 33% of them with employees).

Regarding the association between employment and the type of bachelor studies, there is a high percentage of hetero-employment (getting a working position not vocationally related to their subject of study). One out of four of the participating graduates (25%) declared a minimal or small association between current employment and type of studies, 11% declared a modest relevance, and 64% declared a high or very high association. According to a European level survey, compared to their European counterparts, 40% of the Greek University graduates are employed in sectors that are significantly different than their educational background, herewith holding the second position after Italy (47%) among the EU countries (Kostoglou and Paloukis 2007).

## 4.2. Predictor variables importance

### 4.2.1. Degree grade

Of the participating graduates, 43% (52% of the men and 36% of the women) graduated with a 'good' degree mark (5–6.4), 54% of the graduates (46% of the men and 59% of the women) with a 'very good' degree mark (6.5–8.4), and only 3% of the graduates (2% of the men and 5% of the women) with an 'honours' degree mark (8.5–10). Women graduates appeared to achieve significantly better degree marks than men ( $X^2 = 145.64 > 5.99$ ). The relevant differences between graduates of different institutions ( $X^2 = 434.08 > 28.87$ ) or specialties ( $X^2 = 517.40 > 26.30$ ) appeared to be significant as well.

#### 4.2.2. Duration of bachelor studies

The mean duration of studies was 5.5 years presenting, however, a high fluctuation with significant differences among graduates of different institutions and their specialties. The distribution of bachelor studies' duration was the following (duration in years – percentage): 3 years – 3.3%; 4 years – 34.2%; 5 years – 28%; 6 years – 13.5%; 7 years – 5.3%; 8 or more years – 12.3%.

#### 4.2.3. Acquisition of a postgraduate degree

One out of nine of the TEI graduates (11.4%) has attended postgraduate studies and acquired a Master's degree. More than half of them have attended postgraduate programmes in Greece (6.1% versus 5.3% who have studied abroad). Men appeared to turn significantly more often to postgraduate education compared to women (16% of their population versus 9% for women).

#### 4.2.4. Gender and marital status

According to the distribution that was found within the examined sample, women were the majority of TEI graduates of the years 1997–2001 (58% versus 42% who were men). At the time of the study, more than half of the graduates were married (52%; 60% of them were women and 40% were men, presenting a significant difference:  $X^2 = 194.80 > 3.84$ ). Forty-nine percent of the graduates had one or more children.

#### 4.2.5. Graduates' age

At the time of the study, and seven to 11 years after their graduation, graduates' age appeared to vary significantly. The distribution of graduates' age using a five categories' age interval scale was the following (age – percentage): 30 years or younger – 3%; 31 to 33 years – 37.1%; 34 to 36 years – 41.5%; 37 to 39 years – 13.7%; 40 years or older – 4.7%.

#### 4.2.6. Specialty of bachelor studies

The participating graduates belonged to nine broader specialties (faculties) and 51 distinguished professions (departments). The graduates' distribution across categories including detailed sample sizes is presented in Table 1.

Table 2 contains the main descriptive statistics for all the examined independent and dependent variables, including the distribution across categories, means and standard deviations, where applicable, and a distinction between males and females.

### 4.3. Relationships between the predictor variables and graduates' employability

Regression analyses' results are presented for every research hypothesis separately. In case of a dichotomous variable, the Hosmer–Lemeshow goodness-of-fit test was used. Values of more than 0.05 indicated reliability of the model that was tested (Hosmer and Lemeshow 2001).

Table 2. Descriptive statistics for independent and dependent variables.

Independent variable	Categories	Males (%)	Females (%)	Total (%)
Degree grade	Good	52	36	43
	Very good	46	59	54
	Honours	2	5	3
Duration of studies	3 years	3.5	5.3	4.4
	4 years	28.2	40.7	33.8
	5 years	26.3	31.4	27.8
	6 years	16.6	12.4	13.3
	7 years	14.4	5.5	8.6
	8 years or more	11.0	4.7	12.1
	Mean	5.9	4.7	5.2
Postgraduate studies	Yes, in Greece	7.8	5.0	6.2
	Yes, abroad	7.6	3.9	5.4
	No	84.6	91.1	88.4
Marital status	Single	60	39	48
	Married	40	61	52
Age	30 or less	7.6	13.6	11.1
	31–33	40.0	49.2	45.4
	34–36	36.3	29.5	32.3
	37–39	11.7	5.2	7.9
	40 or more	4.4	2.5	3.3
	Mean	34.0	33.0	33.4
	SD	3.0	2.6	2.8

Table 2 (Continued)

Dependent variable	Categories	Males (%)	Females (%)	Total (%)
Professional status	Employed	74	76	75
	Self-employed	20	9	14
	Unemployed	4	10	7
	Inactive	2	6	4
Type of employment	Full-time	76	84	81
	Part-time	3	5	4
	Entrepreneur	9	3	6
	Free-lancer	12	7	9
Time interval until first employment		16 months*	10 months	12 months
Level of wages (€/month)	< 800	12	23	19
	801–1500	76	73	74
	1501–2000	10	3	6
	> 2500	2	1	1
Relevance between work and studies	Minimal	24	19	21
	Small	5	4	5
	Modest	11	10	11
	High	22	22	22
	Very high	37	45	42
Satisfaction from employment	Minimal	14	13	13
	Small	3	4	4
	Modest	20	20	20
	High	35	37	37
	Very high	28	26	26

\*Greek male civilians must serve a nine to 12 months obligatory military service; most of them fulfill it after graduation.

Table 3. Results of logistic regression analysis with employment status being the dependent.

Variables	Odds	95% CI*	<i>p</i> -value
Postgraduate studies (Yes)	1.460	1.052–2.027	0.018
Gender (Man)	2.792	2.268–3.439	<0.001
Model evaluation criterion	Value		
Hosmer–Lemeshow	0.052 > 0.05		

Note: Comparison categories: Gender is female, postgraduate studies is no.

\*CI = Confidence interval.

#### 4.3.1. Predicting employment and unemployment rates of the participating graduates

As this variable can take only two values (employment or unemployment), logistic regression was used. Regressions for all the predictor variables that were included in our study have been carried out. It was found from the analysis that only the acquisition of a postgraduate degree and gender explained a significant amount of variance in graduates' employment status (see Table 3).

According to the results of Table 3, this model is considered as marginally satisfactory and the variables 'gender' and 'postgraduate studies' appear to significantly, yet weakly, predict the dependent variable 'employment status.' More specifically, the odds (probability) of graduates who have attended postgraduate studies in order to get a position in the labour market appeared to be 1.46 times higher than that of those who have not attended such studies, whereas the odds of men is found to be 2.79 times more than that of women. More concretely, graduates who have acquired a postgraduate degree have more chances of getting a job than those who have not continued their studies after their bachelor degree, and graduate men have more chances of getting a position than graduate women.

#### 4.3.2. Predicting whether the graduate becomes self-employed or employed

As the dependent variable is dichotomous, logistic regression was used. The procedure of multiple regressions identified that the degree grade, gender, age and the specialty of studies can statistically explain the dependent variable 'type of employment' (see Table 4).

According to the value of the evaluation criterion, the model outcomes are considered to be satisfactory. The odds of graduates with a 'good' degree grade to become self-employed are 2.56 times more than those with an 'honours' degree. There are no statistically significant differences between graduates with a 'very good' or 'honours' degree grade. The odds of graduate men to become self-employed are 1.89 more than that of graduate women. With one year's increase in a graduate's age, the probability of becoming self-employed increased by 5.4%. Regarding the specialty of studies, the odds of Agriculture graduates who became self-employed were 2.63 times more compared to those of IT graduates. Similarly, the odds of Graphics and Arts, Management and Economics, Health Technology, Health, Food and Nutrition and Engineering are 4.48, 2.23, 2.66, 2.35, 4.49 and 3.77 times higher, respectively, compared to the odds of IT graduates.

In conclusion, men, older graduates, and graduates with lower bachelor degree grades have more chance of being self-employed. Also, graduates of the faculties

Table 4. Results of logistic regression analysis predicting type of occupation (employed versus self-employed).

Variables	Odds	95% C.I.	<i>p</i> -value
Degree grade (Good)	2.558	1.212–5.399	0.014
Gender (Man)	1.886	1.53–2.326	<0.001
Age	1.054	1.019–1.081	0.002
Specialty: Agriculture	2.632	1.581–4.382	<0.001
Specialty: Graphics and Arts	4.477	2.304–8.700	<0.001
Specialty: Management and Economics	2.232	1.452–3.432	<0.001
Specialty: Health Technology	2.655	1.397–5.045	<0.003
Specialty: Health	2.347	1.464–3.763	<0.001
Specialty: Food and Nutrition	4.486	2.546–7.905	<0.001
Specialty: Engineering	3.774	2.479–5.447	<0.001
Model evaluation criterion	Value		
Hosmer–Lemeshow	0.223	> 0.05	

Note: Comparison categories: Specialty is IT. Gender is female, Degree grade is Honours.

Food and Nutrition, Graphics and Arts and Engineering turn significantly more to self-employment compared to those who have studied IT.

#### 4.3.3. Predicting full- versus part-time employment of graduates

The dichotomous nature of this variable implied the use of logistic regression. The outcomes of multiple logistic regression analyses indicated that only gender and some of the bachelor studies specialties appeared to be significant predictors in the light of graduates' employment status (see Table 5).

The outcomes of the model testing are considered to be very satisfactory due to the high value of the evaluation criterion. The odds of men being employed on a part-time basis appeared to be 35% less than those of women. Furthermore, the odds of Agriculture, Graphic and Arts, Food and Nutrition, and Engineering graduates who were part-time employed were 3.51, 3.83, 3.53 and 2.57 times more than those of IT graduates respectively, the other specialties not presenting significant differences.

Table 5. Results of logistic regression analysis predicting type of employment (full- versus part-time).

Variables	Odds	95% C.I.	<i>p</i> -value
Gender (Man)	0.647	0.435–0.961	0.031
Specialty: Agriculture	3.511	1.343–9.182	0.01
Specialty: Graphics and Arts	3.834	1.177–12.487	0.026
Specialty: Food and Nutrition	3.532	1.183–10.548	0.024
Specialty: Engineering	2.569	1.048–6.299	0.039
Model evaluation criterion	Value		
Hosmer–Lemeshow	0.813	>0.05	

Note: Comparison categories: Specialty is IT. Gender is female.



With these outcomes, we may conclude that male and IT graduates are less likely to work on part-time basis.

#### 4.3.4. Time interval between graduation and first employment

The dependent continuous variable ‘time interval between graduation and first employment’ was transformed in a two-value categorical variable (rapid employment equals time interval shorter than one year, and delayed employment equals time interval longer than one year), and subsequently the logistic regression was used. The outcomes indicated that the duration of studies, having children, and three specialties of bachelor studies were important predictors for the time interval between graduation and first employment (see Table 6).

According to the value of the evaluation criterion, the outcomes of the tested model appear to be satisfactory. More specifically, for every extra year of studies’ duration, the odds of graduates to face delayed employment decrease by 7%. The corresponding odds of graduates having children are 25% less than those who do not have children. Regarding the specialty of studies, the odds of graduates who face a delayed employment, and who were specialized in Agriculture, Health Technology and Food and Nutrition were, respectively, 41%, 61% and 47% less than those of IT graduates.

To conclude, the increase of bachelor studies duration, and having children appear to positively affect one’s employability. Moreover, we have found that IT graduates enjoy their first employment later than the Health Technology, Food and Nutrition, and Agriculture graduates.

#### 4.3.5. Level of wages

As the dependent variable is continuous with four ascending categories (1 equals up to €800 per month; 2 equals €801–€1500; 3 equals €1501–€2500; and 4 equals more than €2500), ordinal regression analysis is used. Table 7 shows the outcomes as regards the predictive validity of the specific independent variables for the level of wages. The application of multiple regressions determined as statistically significant variables the postgraduate degree, having children, gender, and some of the bachelor studies specialties.

Table 6. Results of logistic regression analysis predicting time interval between graduation and first employment.

Variables	Odds	95% C.I.	p-value
Duration of Studies	0.931	0.897–0.967	<0.001
Acquisition of Children (Yes)	0.755	0.649–0.879	<0.001
Specialty: Agriculture	0.587	0.411–0.838	0.003
Specialty: Health Technology	0.391	0.250–0.612	<0.001
Specialty of studies: Food and Nutrition	0.534	0.351–0.813	0.003
Model evaluation criterion	Value		
Hosmer–Lemeshow	0.50	> 0.05	

Note: Comparison categories: Specialty is IT. No children.

The significance of the model that was tested appeared to be very satisfactory due to the high value of the evaluation criterion. The odds (probability of having higher wages) of postgraduate degree holders appear to be more than triple than those who have not attended postgraduate studies. The corresponding odds of graduates who have children are 1.47 times more than those who do not have children, whereas the odds of male graduates are 2.77 times more than those of women graduates. Furthermore, the odds of Agriculture, Food and Nutrition, Management and Economics, and Engineering graduates to earn high wages were, respectively, 77%, 57%, 51% and 34% less than those of IT graduates.

Interpreting these results, it can be concluded that men, postgraduate degree holders and graduates with children are in a favourable position concerning their level of wages in comparison with women, graduates without postgraduate studies, and graduates without children, respectively. It also appeared that IT graduates enjoy higher wages.

#### 4.3.6. Relevance between studies and work

Ordinal regression was used as the dependent variable which is continuous consisting of five categories (1 – minimal; 2 – small; 3 – modest; 4 – high; and 5 – very high). The outcomes of the analysis indicate that the degree grade, the postgraduate studies, having children, as well as the graduate's specialty significantly affect the perceived match between studies and work (see Table 8).

The model that was tested appeared to have very satisfactory outcomes (value of criterion = 1.00). The odds of graduates holding a bachelor degree marked as 'good' perceiving a good match between studies and work are 41% less than those of graduates having an 'honours' degree. In contrast, there are no significant differences between graduates holding a 'very good' degree or an 'honours' degree. The corresponding odds of postgraduate degree holders are 1.47 times higher than those for graduates who have not continued their studies after graduation. Graduates with children also have more chance (by 17%) of getting a good match between studies and work. Regarding the specialty of bachelor studies, our outcomes indicated that the graduates with a degree related to health (Health or Health Technology or Care and Welfare) presented very small hetero-employment having a 2.6 to 3 times higher

Table 7. Results of ordinal regression analysis predicting level of wages.

Variables	Odds	95% C.I.	<i>p</i> -value
Postgraduate degree (Yes)	3.098	2.316–4.149	<0.001
Acquisition of Children (Yes)	1.437	1.202–1.721	<0.001
Gender (Man)	2.775	2.241–3.441	<0.001
Specialty: Agriculture	0.231	0.152–0.351	<0.001
Specialty: Management and Economics	0.489	0.349–0.684	<0.001
Specialty: Food and Nutrition	0.427	0.248–0.677	0.002
Specialty of studies: Engineering	0.659	0.462–0.547	0.021
Model evaluation criterion	Value		
Goodness-of-fit	1.00	>0.05	

Note: Comparison categories: Specialty is IT. Gender is female. Postgraduate degree is yes. No children.

Table 8. Results of ordinal regression analysis predicting the perceived match between studies and work.

Variables	Odds	95% C.I.	<i>p</i> -value
Degree grade (Good)	0.586	0.383–0.897	0.014
Postgraduate studies (Yes)	1.469	1.176–1.834	0.001
Acquisition of children (Yes)	1.169	1.014–1.347	0.031
Specialty: Agriculture	0.345	0.251–0.477	<0.001
Specialty: Management and Economics	0.663	0.519–0.848	0.001
Specialty: Care and Welfare	2.721	1.467–5.043	0.002
Specialty: Health Technology	2.603	1.631–4.162	<0.001
Specialty: Health	3.028	2.264–4.056	<0.001
Model evaluation criterion	Value		
Goodness-of-fit	1.00	> 0.05	

Note: Comparison categories: Specialty is IT. Degree grade is Honours, Postgraduate degree is no. No children.

probability of having a good match in comparison to IT graduates. The opposite situation was found for Agriculture and Management and Economics graduates who indicated a lesser match between studies and work (having, respectively, 66% and 34% less chances of having a relevant to studies job in comparison with IT graduates).

Conclusively, many independent variables, such as gender, having children, the postgraduate studies, the degree grade, as well as the specialty of bachelor studies, appear to significantly affect the relevance between studies and work.

#### 4.3.7. Satisfaction of employed graduates with their employment status

Ordinal regression analysis was used as our continuous dependent variable consisted of five categories (1 – minimal; 2 – small; 3 – modest; 4 – high; and 5 – very high). The outcomes of our analysis indicate that only attendance of postgraduate studies was significantly affecting graduates' satisfaction with employment status (see Table 9).

The outcomes of the model that was tested appeared to be very satisfactory due to the high value of the evaluation criterion. According to the results of the analysis, the employed graduates who are holders of a postgraduate degree appeared to have a higher probability (1.5 times) to be highly satisfied with their position in comparison with the graduates who have not proceeded to postgraduate education.

Table 9. Results of ordinal regression analysis predicting graduates' satisfaction with employment status.

Variables	Odds	95% C.I.	<i>p</i> -value
Postgraduate studies (Yes)	1.5	1.212–1.857	<0.001
Model evaluation criterion	Value		
Goodness-of-fit	1.00	> 0.05	

Note: Comparison category: Postgraduate Studies is no.

## 5. Discussion and conclusions

### 5.1. Reflection upon the outcomes

This article focused on the determination of factors affecting the quality of the transition of higher technological education graduates into the labour market. Nationwide original Greek data was collected, and the effects of six independent variables to selected main employment variables outlining the graduates' vocational socialization were investigated through bivariate and multivariate statistical analysis.

The outcomes of our study indicate that graduates' employment is significantly influenced by gender and postgraduate studies. Male graduates and postgraduate degree holders have significantly higher chances to find employment. Gender, degree mark, age, and specialty of bachelor studies appeared to significantly affect the decision to become self-employed. Significantly, men, graduates with low degree grades, and older graduates appeared to turn more to self-employment as well. We have also found that type of employment is significantly influenced by gender and specialty; with men being less likely than women to turn to this type of employment; There are four types of employment (of working graduates): full-time employee; part-time employee; entrepreneur; and free-lancer. These types of employment are also presented in Table 2.

Another finding of our study comprises the impact of time interval between graduation and employment. That is to say, the waiting time for one's first employment is inversely affected by the duration of bachelor studies, as well as by having children. The duration time also depends significantly on graduate's specialty. Male graduates, parents, postgraduate degree holders, and IT graduates appear to enjoy, on average, higher wages. The perceived match between graduates' studies and work is higher for graduates who have children, who have a high or very high bachelor degree mark, graduates of specialties related to health, as well as for postgraduate degree holders. The latter category of graduates appears to be more satisfied by their work.

### 5.2. Limitations of the study

The present study has some limitations. Firstly, all data have been collected using questionnaires opening up the possibility of response set consistencies. Secondly, all data have been collected at one point in time, that is, the study is cross-sectional. This implies that further research is needed in order to address the issue of causality. Research using multi-wave designs can provide more specific information about the stability and change of the variables, and about cross-lagged (i.e. over time) relationships than our cross-sectional approach (Taris and Kompier 2003). Thirdly, further research is needed to investigate the robustness of our findings, and to determine the extent to which our findings are generalized to other countries. Nevertheless, we think that our results are noteworthy and provide good challenges for future research and cross-validation.

### 5.3. Practical implications

The initial selection of a promising bachelor specialty, the acquisition of an honors degree, as well as the continuation of studies at a postgraduate level are three well-

suggested actions higher technological education students should take into account in order to increase their chances of a more favorable entrance and position in the highly competitive Greek labour market.

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