



Interdepartmental Programme of Postgraduate Studies in Economics

(Master in Economics)

Master Thesis

RECESSION AND FIELD OF STUDY CHOICE

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## **Abstract**

The main purpose of the present Thesis is to examine how the recent recession has affected the preferences of Greek students regarding their enrollment in departments of tertiary education. Therefore, we use panel data about the preferences of applicants, as well as about the admission thresholds for all the undergraduate programs of the Greek higher education Institutions. We have found that both the preferences and the thresholds have been affected by the financial crisis. Applicants discouraged by the rising unemployment rates, the severe impacts of crisis and the uncertainty concerning their future avoid departments with poor employment prospects like departments related to Education. Instead, they prefer departments whose degrees lead to professions in demand during crises such as Law, Psychology and Medicine. Merchant Marine Academies seem to be the most preferred departments, as the preferences towards them have skyrocketed. Things are not so clear concerning the field of Military and Police Academies. Finally, both the Institutions and the locations of their campuses (i.e. cities) play a significant role to the formation of admission thresholds and preferences.

Keywords: recession, higher education, admission thresholds, choice of degree

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# 1. Introduction

It is true that the recent financial crisis was the most severe since the era of the Great Depression. No one can deny that it has had a harsh impact on the whole economic activity. However, it is also true that a crisis of this level is impossible not to affect other sectors of the society as well. In other words, it is obvious that the recession has affected GDP, interest rates, unemployment, investments, consumption and so on, but we are not sure about what happened regarding other sectors such as education. The majority of literature focuses mainly on issues such as the consequences of graduating in a recession on earnings (Kahn, 2010, Wee, 2013, Oreopoulos et.al., 2012), or how economic imbalances affect human capital investment including college enrollment (Hershbein, 2012). Other researchers like Bicakova et.al. (2018) explore the labor market outcomes of cohorts who selected into university at different points in the business cycle. However, only few have investigated the changes in preferences about specific degrees during recession. In fact, as regards the recent crisis in Greece only Goulas and Megalokonomou (2018) examined this issue. Therefore, as there is a lack in the relevant literature, through this Thesis, we try to answer the same question. Especially, in order to do this we exploit the nature of the Greek Higher Education System, as well as the unique characteristics of the enrollment system in tertiary education. To be more specific, we are going to examine how recession has affected the preferences of applicants towards specific departments of Higher Education Institutions. For this reason, we use two data sets concerning the admission thresholds of the departments, as well as the preferences concerning them. All data are sourced from the Greek Ministry of Education, Research and Religious Affairs. Furthermore, our analysis includes two different approaches, a non-econometric comparative analysis and a second regression analysis. All things considered, the significance of this Thesis lies on three main issues. Firstly, it investigates an aspect of the crisis which is not so popular and has not attracted much attention on the side of the researchers so far. Secondly, it provides us with useful information about the individuals' behavior during a recession, as well as the adjustments of their expectations. Finally, although our research is based on preferences, in some cases it gives us significant information about the future composition of the labor force. For some categories, it is possible that preferences eventually turn to university degrees.



So, this thesis can enhance the forecasting of potential shortages and surpluses in the labor market.

## 2. Literature Review

This chapter presents the part of literature review, which is relevant to the topic of the Thesis. It is true that there is high research interest concerning the relationship between economic crises and education. However, the research focuses mainly on issues such as the consequences of graduating in a recession on earnings (Kahn, 2010, Wee, 2013, Oreopoulos et al., 2012), or how economic imbalances affect human capital investment including college enrollment (Hershbein, 2012). On the other hand, the literature which concerns the preferences of students for a specific degree during recession or how recession changes these preferences is really poor. Thus, below are presented some papers that are relevant only to this aspect of the issue.

Table 1: Literature Review

	Title	Author	Methodology	Data	Conclusion
1	Ability sorting and the returns to college major.	Peter Arcidiacono [2004]	3 Period Model, Regression Analysis	National Longitudinal Study of the Class of 1972 (NLS72).	Selection into majors depends upon the monetary returns to various abilities, preferences in the workplace, and preferences for studying

					<p>particular majors in college. Large monetary premiums exist for choosing natural science and business majors even after controlling for selection. However, these large premiums and the differential monetary returns to ability and college quality cannot explain the ability sorting present across majors. Instead, virtually all sorting is occurring because of differing preferences across abilities for majors either in school or for the jobs associated with those majors in the workplace.</p>
2	Investment over the	Erica Blom	Panel Regression	Data on college major	Birth cohorts exposed to

	Business Cycle: Insights from College Major Choice.	Brian C. Cadena Benjamin J. Keys [2015]	Analysis	choice from the American Community Survey for cohorts graduating between 1962 and 2013.	higher unemployment rates during typical schooling years select majors that earn higher wages, that have better employment prospects, and that more often lead to work in a related field.
3	Modeling College Major Choices using Elicited Measures of Expectations and Counterfactuals.	Peter Arcidiacono V. Joseph Hotz Songman Kang [2012]	Multinomial Logit Model	Data come from a survey of male undergraduate students at Duke University.	Both expected earnings and students' abilities in the different majors are important determinants of student's choice of a college major.
4	The Effect of the Business Cycle on Freshman Major Choice.	Elizabeth S. Bradley [2012]	Multinomial Logit Technique	Cooperative Institutional Research Program (CIRP) Freshman Survey data.	Freshmen are less likely to have an undeclared intended major during a recession trough. Those who do report an intended major during a

					recession are generally more likely to choose majors that pay higher wages and have more job security like Technology, Business, Engineering and Health majors. Also, lower ability students are more likely to enroll in college during a recession.
5	The Financial Crisis and the Choice of College Major.	Sofoklis Goulas Rigissa Megalokonomou [2015]	Regression Analysis	Data set includes information on the number of college applicants for each university department in Greece from 2003 to 2011.	Job insecurity turns college applicants away from academically demanding college majors, while options with better job prospects become more popular.

6	Which degrees do students prefer during recessions?	Sofoklis Goulas Rigissa Megalokonomou [2018]	Panel Data Analysis OLS regression	Data set that contains administrative information from the Ministry of Education on the number of university applications for every undergraduate degree program offered in Greece from 2005 to 2011.	Degree- and major-specific job insecurity turns applicants away from degrees and majors that are associated with poor employment prospects. Results indicate that the steep increase in the unemployment rate that started in 2009 is associated with an increase in the number of university applicants. The effect is heterogeneous across fields, with an increase in the demand for degrees in Psychology as well as for entrance to Naval, Police and Military Academies, and a decrease in the demand for degrees in Business and
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					Management. Also, the business cycle changes degrees' admission thresholds by affecting their popularity.
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## 2.1. Education Systems

Before we start our investigation into the Greek educational system and the procedure which is followed in order to enroll in a higher education institution we ought to make a short analysis about what occurs in other EU member countries. Therefore, we exploit the Eurydice: a network whose task is to explain how educational systems are organized in Europe and how they function. National organizations are responsible for the drafting of their education system descriptions and the content of all chapters. The following information comes from national unit pages. We point out that in some cases the educational system is in the process of being reformed. Therefore, some of these systems may have been modified. As a consequence, for our research, we selected 10 European Union member countries in order to examine their admission requirements for enrollment in higher education institutions and compare them with the Greek system. The selection was based on 3 criteria:

- 1) International distinction for having a well organized education system (e.g. Scandinavian Countries i.e. Finland, Sweden and Denmark).
- 2) Being a traditionally popular destination for studies (the United Kingdom (England), Germany, France, Italy).
- 3) Other large countries of the European Union with considerable economic and political power, as well as recording a rising number of international higher education students (Spain, Austria, the Netherlands).



Table 2: Education Systems

Country	Examinations	Admission	Restrictions
Austria	Matriculation examination	Organized by educational institutions.	In some study programmes, (e.g. architecture, biology, economy, informatics, medicine, dentistry, psychology) the university may limit admissions either by introducing an entrance examination before admission or by carrying out a selection procedure until two semesters after admission.
Denmark	National examinations	<p>Admission to most study programmes depends on the fulfilment of both general requirements and specific requirements.</p> <p>The general admission requirement for all programmes at first cycle level is the completion of one of the qualifying examinations at upper secondary level</p>	The educational institutions are responsible for regulating the size of the student population themselves, including the specific number enrolled at each program. The Ministry of Science, Innovation and Higher Education can however determine the maximum number of students in a given programme.

		The specific admission requirement for each bachelor program is stipulated by The Ministry of Science, Innovation and Higher Education. However, in general, students are granted admission on the basis of the average mark obtained at the final examination at upper secondary level.	Some schools, e.g. the film school, the school of journalism etc. have their own aptitude tests.
<b>Finland</b>	Matriculation examination	Universities and UAS (University of Applied Sciences) select their students independently and they use different kinds of student selection criteria. Most commonly these include success in matriculation examination and entrance tests.	There is restricted entry to all fields of study. The numbers of degrees are determined in performance negotiations between the Ministry of Education and Culture and the higher education institutions.
<b>France</b>	French baccalauréat	To enroll at university, it is necessary to have the French baccalauréat.	Although the obtainment of the baccalauréat is a necessary condition for access to any higher course of studies, it is not necessarily enough for admission to certain types of courses. Distinctions may therefore be made between: <ul style="list-style-type: none"> <li>• courses for which there is no selective</li> </ul>

			<p>admission; i.e. university courses. Enrolment takes place at the beginning of the Bachelor's degree;</p> <ul style="list-style-type: none"> <li>• courses for which students are selected on the basis of their application forms: classes préparatoires aux grandes écoles (CPGE - classes preparing for admission to the "Grandes écoles"), which are selective higher education institutions which recruit their pupils through a competitive examination, sections de techniciens supérieurs (STS - Advanced vocational courses), courses dispensed in instituts universitaires de technologie (IUT - University institutes of technology), in instituts universitaires professionnalisés (IUP - University institutes of professional education), in</li> </ul>
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			<p>Écoles Supérieures du Professorat et de l'Éducation (ESPE - Higher Schools for Teaching and Education) and in Specialised schools;</p> <ul style="list-style-type: none"> <li>• courses for which admission is granted through a competitive examination, carried out in the "Grandes Écoles".</li> </ul>
Germany	Abitur examination	As a rule the applicant's average mark in the Abitur, school-leaving examination constituting higher education entrance qualification.	In some courses, in which the total number of applicants exceeds the number of places available at all higher education institutions, there are quotas. In the 2016/2017 winter semester there are nationwide quotas for medicine, veterinary medicine, dentistry and pharmacy.
Greece	Pan-hellenic Examinations	Graduates participate in the Pan-hellenic Examinations (Panelladikes Eksetaseis), a system which is centrally co-ordinated by the Ministry of	The number of entrants in each department is based on the principle of "numerous clausus" and is determined every year by the Ministry of

		<p>Education and Religious Affairs. The grade on the “Certificate” is the result of what the pupil has accomplished at the national level examination.</p> <p>Their success depends on their grade as well as the priority order of applying and the availability in each department.</p>	Education, Research and Religious Affairs.
Italy	State examination	Central regulations establish the general requirements to access university courses.	Admission is restricted for single-cycle courses in medicine and surgery, pharmacy, veterinary science and dentistry studies, primary teacher education and architecture; admission is also restricted for courses in health professions or for bachelor courses for which study plans foresee practical training and the use of laboratories.
The Netherlands	The leaving examination is in two parts: a	<p>Higher professional education (HBO) institutions and universities have a central admissions system.</p> <p>The selection procedure for places at universities and</p>	For courses subject to a quota (‘numerus fixus’), there is also a weighted draw for places followed by selection by the institutions themselves.

	<p>school examination and a national examination.</p>	<p>HBO institutions is as follows:</p> <ul style="list-style-type: none"> <li>• Prospective students with an average grade of 8 or higher in their school-leaving examination are automatically awarded a place on the course of their choice.</li>   <li>• Those not entitled to direct admission are allocated places by means of a weighted draw.</li>   <li>• Decentralised selection: places may be awarded by the educational institutions themselves. They may apply their own selection criteria, provided these are not linked to school-leaving examination results. Decentralised selection is optional, and if</li> </ul>	<p>Some courses have next to the degree requirements additional admission requirements.</p> <p>Where no restrictions on numbers apply, students are free to enroll on whichever course and at whichever university they wish.</p>
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		institutions decide not to opt for it, the draw system automatically applies instead. It is up to the individual educational institution to decide how often a candidate may apply through the decentralised system.	
Spain	Bachillerato certificate	The Bachillerato certificate qualifies for access to higher education studies. Universities may exclusively use the final grade obtained in Bachillerato or establish admission procedures.	There is a limit for the number of places available in each of the programmes. This numerus clausus is valid for all universities, either public or private. The maximum number of places in each public university is published annually.
Sweden	The upper secondary school (gymnasieskolan) does not have a final examination	To be admitted to a course or a study programme, the applicant must fulfill the basic conditions for eligibility as well as any specific qualifications prescribed by the higher education institution.	Each institute of higher education determines the number of study places to be provided in different subjects. Indirectly, the government determines the number of study places by setting a ceiling on the total allocation of state funds based on the number of students. If the ceiling is exceeded, the institution will not receive funds

			for all their students. The government also determines the goals for the number of degrees in a limited number of programmes.
The United Kingdom (England)	The minimum entry requirement is usually two or three General Certificate of Education Advanced level (GCE A level) passes, as well as a minimum number of General Certificate of Secondary Education	Institutions determine their own admissions policies and the minimum entry requirements for each programme.	<p>You can choose up to five courses. There is no preference order and universities/colleges will not see where else applicants have applied.</p> <p>Applicants can only apply to a maximum of four courses in any one of the following subjects : Medicine, dentistry, veterinary medicine or veterinary science.</p> <p>You can only apply to one course at either the University of Oxford or the University of Cambridge.</p>



	(GCSE) passes at grade C or above.		
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Source: Eurydice

## **2.2. Key features of the Greek education system**

Article 16 of the Greek Constitution states that education is the main mission of the State and all Greeks are entitled to free education at all levels at State Educational Institutions. One of the main characteristics of the Greek education system is that it is fairly centralised. The Ministry of Education, Research and Religious Affairs exercises supervisory control over all types of primary and secondary education schools by defining the content of the curricula, recruiting and appointing staff and controlling funding. Tertiary institutions are nominally autonomous; however, the Ministry is responsible for their funding and the distribution of students to undergraduate courses. The administration of primary and secondary education is conducted at central, regional and local level respectively by: the Ministry of Education, Research and Religious Affairs; the Regional Education Directorates; the Directorates of Education (Prefectures) and the School Units. Educational officials of the country, whatever level of education they are appointed at, primary or secondary education, are graduates of Higher Education of a University or the Technological sector, holding at least a first cycle degree.

Higher education constitutes the last level of the formal education system and comprises of the Panepistimio (University) and Technological sectors. The University sector includes Universities, Polytechnics and the School of Fine Arts. The Technological sector includes the Technogika Ekpaideftika Idrymata (Technological Education Institutions – TEIs) and the Higher School of Pedagogical and Technological Education (ASPETE). Undergraduate courses typically last for 4 years, while postgraduate courses last from 1 to 2 years and doctorates from 3 to 6 years.

### **Higher Education sectors**

In Greece, Higher Education is divided into two sectors: the University Sector and the Technological Sector. Higher Education University Sector, which includes the Universities, the National Technical Universities and the Higher School of Fine Arts, aims at establishing, producing and developing science and technology, achieving our country's future scientists' high level, comprehensive, theoretical and applied training while promoting and developing scientific research. Higher Education Technological

Sector aims at developing the scientific and technological research and at providing programmes of more applied character.

The mission of University and Technological Sectors Institutions comprises the following:

a) The University (Panepistimio) gives emphasis to high quality education according to the demands of science, technology and arts taking into account the international scientific practice and the corresponding professional fields.

b) The Technological Educational Institute (TEI) (Technologiko Ekpaideftiko Idryma) and the School of Pedagogical and Technological Education/ASPETE (Technological Sector Institutions) give emphasis to high quality education as well as to the applied character of science, technology and arts. In this framework they promote the development of the appropriate theoretical background together with the development of high standard practice.

Compared to University studies, TEI studies have a more applied character. Nevertheless, care is taken to ensure that the TEI curricula contain a sufficient number of background theoretical courses, so that graduates are able to adjust easily and efficiently to the ever changing and increasing professional and social life demands.

Pursuant to the system established by Law 2525/1997, as amended, supplemented and currently in force, the Faculties and Departments of Universities and Technological Educational Institutes (TEIs) - as well as the Academy of Police Officers, the Military School and other schools falling under the system - are grouped into five (5) disciplinary fields:

- FIELD 1: Humanities, Law and Social Sciences, including theoretical faculties such as Philology, Law, Sociology, Foreign Languages, etc. (duration of studies: 4 or 5 years).
- FIELD 2: Science, including Mathematics, Physics, Chemistry, etc. (duration of studies: 4 years).

- FIELD 3: Health Sciences, including the Faculty of Medicine, School of Dentistry, School of Pharmacy, etc. (duration of studies: 4, 5 or 6 years).
- FIELD 4: Technological Sciences, including the Schools of Architecture, Civil Engineering, etc. schools (duration of studies: 4 or 5 years).
- FIELD 5: Sciences of Economy and Administration, including the Departments of Economics, Business Administration, Accounting and Finance, etc. (duration of studies: 4 years).

Each Department's Curriculum corresponds to a field of knowledge related to a science and/or a profession, and leads to a Bachelor's degree. However, the Department's General Assembly, has recommended that Directions or Specialisations may be incorporated in the degree awarded by the Department.

### **Admission requirements**

Graduates of General Upper Secondary Schools may apply for studying at both Universities (Panepistimia) and Technological Education Institutes (TEIs) (Technologika Ekpaideftika Idrymata). Graduates of Vocational Upper Secondary Schools are divided into the following groups: group A who can only apply for Technological Education Institutes and group B who can apply for both Universities and Technological Education Institutes.

Graduates of General Upper Secondary Schools and Vocational Upper Secondary Schools, group B acquire apart from the "Apolytirion", a "Certificate" for access to Higher Education. They participate in the Pan-hellenic Examinations (Panelladikes Eksetaseis), a system which is centrally co-ordinated by the Ministry of Education and Religious Affairs. The grade on the "Certificate" is the result of what the pupil has accomplished at the national level examination.

When the results come out, holders of the "Certificate" may apply for entry at the Departments/Faculties of their choice, in a priority order and in no more than 2 scientific fields. Their success depends on their grade as well as the priority order of applying and the availability in each department.

For entry in departments where specialized knowledge or skills are a prerequisite candidates must also:

- Be examined in the specific fields of their interest in the cases of studying architecture, music, translation & interpretation, foreign languages.
- Undergo physical, psychiatric and sports tests in the cases of studying at the Military and Police Academies.
- Undergo sports tests in the case of studying Physical Education and Athletics

The number of entrants in each department is based on the principle of “numerous clausus” and is determined every year by the Ministry of Education, Research and Religious Affairs.

The main subject of this research is how applicants declare their interest in tertiary education institutions. To be more specific a brief description of the examinations (i.e. the Pan-hellenic Examination System), as well as the choice and enrollment system is given below:

The examinations take place at the end of an academic year (i.e. every June) and provide the same conditions for all candidates. In other words, it is a simultaneous procedure, in which the candidates sit the exams at the same time throughout the country and do the same tasks. Some days after the end of the examinations the Ministry of Education, Research and Religious Affairs announces the grades of the candidates. The grades vary from 0 to 20.000. Once the results are announced students are required to submit the “Mixanografiko Deltio”. This is a ranked list of their preferences regarding the departments they would like to be admitted to. A system ranks students by their grades and assigns them to the specific departments according to their list of preferences. This way, each department of every university and TEI fills in its empty enrollment places. At the end of this procedure, the grades of the student with the lowest score who has enrolled in every department are considered the “admission –threshold score” or “cutoff score” of the department.

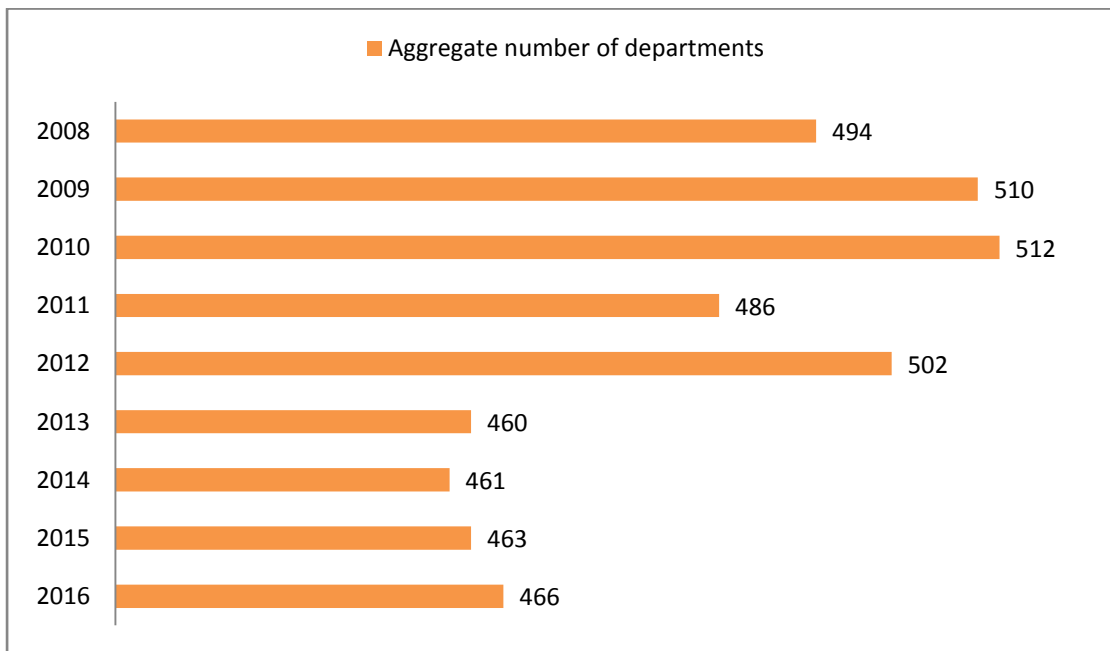
### 3. Review of the period 2008-2016

Before we start our empirical research it would be beneficial to perform a retrospect of the period which we are going to examine. As we will see in the data analysis section, we investigate the period 2008-2016. We have chosen these years because of the significant changes which took place during that time, not only regarding the economic situation of the country, but also due to the changes which were implemented in the educational system. First of all, the beginning of this period coincides with the outbreak of the financial crisis. Although the GDP of Greece had begun to decrease in 2008, some austerity measures were taken in 2009. Eventually, in May 2010 Greece resorted to the IMF seeking financial support. The first reform program was then signed. After that, the second program followed in 2012 and the third in 2015. Even after 10 years Greece still suffers from recession. This crisis led to the most severe drop in GDP of any developed country, with repercussions for every sector of Greek society. Consequently, education is one of them, with the first indications appearing in 2011. As we see in Tables 3 and 4, until 2010 the aggregate number of higher education departments, as well as the aggregate supply of university places progressively increased. In fact, in 2010 they reached their peak. In 2011, we have the Ministry's first endeavor to reform the higher education. Some departments were temporarily removed from the Mixanografiko Deltio in order to reconsider their function. In 2012 they became available again for the applicants and in 2013 eventually implemented the first large reform program of the higher education system called "ATHENA"<sup>1</sup>. This program aimed to limit the number of departments and universities through mergers in order to reduce the cost of their function. Thus, in 2013 some departments for which applicants exhibited a lesser interest in, mainly located in small cities, were merged with others and were transferred to a bigger University, in a different city.

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<sup>1</sup> Presidential Decree 69-80 (Government Gazette 119/issue A'/28-5-2013)  
Presidential Decree 82, 83 (Government Gazette 123/issue A'/3-6-2013)  
Presidential Decree 84-86 (Government Gazette 124/issue A'/3-6-2013)  
Presidential Decree 87, 88 (Government Gazette 129/issue A'/5-6-2013)  
Presidential Decree 89, 90 (Government Gazette 130/issue A'/5-6-2013)  
Presidential Decree 91-93 (Government Gazette 131/issue A'/5-6-2013)  
Presidential Decree 94 (Government Gazette 132/issue A'/5-6-2013)  
Presidential Decree 95, 96 (Government Gazette 133/issue A'/5-6-2013)  
Presidential Decree 97-99 (Government Gazette 134/issue A'/5-6-2013)  
Presidential Decree 100, 101 (Government Gazette 135/issue A'/5-6-2013)  
Presidential Decree 102, 103 (Government Gazette 136/issue A'/5-6-2013)  
Presidential Decree 104, 105 (Government Gazette 137/issue A'/5-6-2013)

Table 3: Aggregate number of departments



Source: Ministry of Education, Research and Religious Affairs

Table 4: Aggregate supply of places



Source: Ministry of Education, Research and Religious Affairs

This was the most substantial change of the whole period. However, we have to note that there are also some other educational system modifications in these years which were irrelevant to the economic crisis. Greece's educational system was characterized by

instability and frequent minor changes regarding the scientific fields, as well as the faculties and departments of universities and TEIs which belong to them. Nevertheless, for the majority of the departments the categorization remained stable throughout the whole period of our research. For example, an important change took place in 2006, when the Minister of Education decided to implement a common minimum threshold for all higher institutions' departments<sup>2</sup>. In other words, every student has the right to enroll in a department only if he manages to get a score above the 10000 out of 20000 in Pan-hellenic Examinations. This measure had led to a reduction in the number of undergraduate students who had enrolled in tertiary education, as well as to the degradation of departments headquartered in regional universities and cities, in which students with lower total grades usually enrolled. However, in 2010 this measure was repealed<sup>3</sup>. Furthermore, in 2016 another significant modification in the examination system was applied. The number of compulsory subjects which are examined were reduced and there was also a reallocation concerning the scientific fields to which some departments belong<sup>4</sup>. Finally, we ought to mention that the Ministry has made efforts to support applicants whose family belongs to vulnerable social groups, such as families with 3 children, families with 4 children and above, Greek citizens of the Muslim Minority of Thrace, low income families or applicants whose family has a member with a permanent disability etc. Therefore, during the last years, many measures have been taken. For instance, during the period 2011-2013, the Ministry offered special places in every department for applicants coming from these social groups and from 2014 on these students have been allowed to transfer their place from a higher education

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<sup>2</sup> Law 3404/2005 (Government Gazette 260/issue A/17-10-2005): "Regulation of issues regarding the university and technological sector of high education and other provisions".

<sup>3</sup> Law 3848/2010 (Government Gazette 71/issue A/19-5-2010): "Upgrading of teacher role-establishment of assessment and meritocracy rules in education and other provisions".

<sup>4</sup> Law 4327/2015 (Government Gazette 50/issue A/14-5-2015): "Urgent measures for Primary, Secondary and Higher Education and other provisions".

Based on the new system the Faculties are grouped into four (5) scientific fields, depending on their fields of knowledge:

FIELD 1: Humanities, Law and Social Sciences, FIELD 2: Natural and Technological Sciences,  
FIELD 3: Health and Life Sciences, FIELD 4: Sciences of Education,  
FIELD 5: Sciences of Economy and Informatics



institution to another with a related department, in order to study in their city or to be as close as possible to it.

## 4. Data

In order to examine the issue of changes in preferences for specific degrees during the recession, we use data from the tertiary education enrollment system. We remind that, in Greece, the enrollment in higher education institutions takes place only after successfully participating in the Pan-hellenic Exams which are centrally coordinated by the Ministry of Education, Research and Religious Affairs. The Ministry is also responsible for all the tasks of the examinations, as well as for the number of entrants in each department. In this Thesis we are not going to investigate the advantages and disadvantages of such policies in an educational system. However, we exploit the fact that the Greek Examination System is a unique case. In contrast to the other European systems which have been already examined before, the whole procedure is centrally regulated and thus offers us many benefits regarding the collection and processing of data. Hence, we use panel data for all the undergraduate degrees offered in Greece from 2008 to 2016. This dataset contains the thresholds of the departments and the preferences which each department has accumulated. We point out that the overall number of entrants and consequently the number of entrants for each department may change from year to year due to the Ministry's decisions or other special conditions pertaining to each academic year. Furthermore, as regards the data, we have chosen those categories which concern the majority of applicants. In many cases, more than one threshold (and preferences) for a department existed. This happened because the Ministry applied some special policies from 2011 to 2013 in order to support specific groups of applicants such as applicants who belonged to families with 3 children or with 4 children and above, Greek citizens of the Muslim Minority of Thrace or others who satisfied some specific criteria, such as being a member of a low-income family or having a family member with a permanent disability. It has to be made clear that we choose the category which covers 90% of the available places and refers to the students who have successfully finished the 3rd grade of upper secondary schools called "Day Lykeia". In addition, we use annual data on youth unemployment from the World's Bank database. Finally, concerning the presentation of our data, we have to clarify that we use the official names of all higher education departments. So, we refer to these as they are presented in the Mixanografiko Deltio. The followed formation is department-university-city. Nevertheless, in some cases some modifications can be found. For instance departments of Aristotle University of Thessaloniki (AUTH) and of the

National and Kapodistrian University of Athens (NKUA) are presented only with the name of the department and after that the name of the city ,i.e., Thessaloniki or Athens respectively.

## 5. Methodology

The examination of our issue requires the simultaneous analysis of two large data groups, thresholds and preferences. Under no circumstances could we come to a safe conclusion only by using one of these data groups. We have to process them together in order to make use of the whole available information. Furthermore, it is also true that there exist many factors which affect the formation of both thresholds and preferences. So, the thresholds are affected by:

- 1) The difficulty of the examination tasks and consequently by the grades of the applicants.
- 2) Changes of the examination system, for example, a reduction of the number of examined subjects.
- 3) The aggregate supply of higher education institution places.<sup>5</sup>
- 4) The demand of applicants for specific degrees.
- 5) Other factors such as:
  - a) A shock or an incident irrelevant to the exams. For instance, as we will see later in our research, the intent of the Ministry of Education, Research and Religious Affairs about permanent appointment in primary schools had led many applicants to choose these departments until 2010. However, from 2009 on no one has been hired. Therefore, applicants have adjusted their preferences for other departments of other fields.
  - b) Reallocation of departments in scientific fields. For example, if a department was distributed in more scientific fields, it automatically became available for more applicants. This reallocation affects not only the thresholds, but also the preferences for the specific department.

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<sup>5</sup> Most of the times there are no significant changes in the supply of available places in each department. Therefore, we consider the number of available places as stable for the whole period. However, during recent years, some departments such as Police Academies have suffered from a severe reduction in their available places.

- c) The measures of the Ministry's social policy such as specific places for vulnerable social groups or the ability to transfer a place from one institution to another.

Except for the above factors, which partially affect the preferences there are also some others which have a more important contribution to their formation. The most considerable is that there is no restriction to the number of choices someone could include in his preference list, i.e. the Mixanografiko Deltio. Therefore, every applicant has the right to make a list with all available departments included, with respect to the scientific fields which he has already chosen. This has a double impact on the number of preferences. Firstly, students choose a large number of departments in order to ensure their entrance to a higher institution department and secondly, they start their list with the most popular choices, hoping that the other applicants will not choose them and eventually their thresholds will be reduced. Finally, we classify the departments in groups. The classification of departments is based on 3 criteria: <sup>6</sup>

- 1) The Scientific Field and examined subjects in the Pan-hellenic Examinations.
- 2) A department's program of studies.
- 3) Professional Rights.

Thus, the fields formed as below:

- 1) Foreign Languages and Literature
- 2) Theology and other related studies
- 3) Journalism and other related studies
- 4) Arts (Drama, Film, Music Studies etc.)
- 5) Education
- 6) Mathematics and Statistics
- 7) Physics and Earth Science
- 8) Biology, Chemistry and other related studies
- 9) Nursing and other Health Studies
- 10) Agriculture, Forestry and other Environmental Studies
- 11) Economics

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<sup>6</sup> In some cases the title of the department does not totally represent the professional rights of the alumni. Students "choose" their future professional rights through the different specializations which are offered. So, it is not so clear the general field in which these departments belong to.

- 12) Maritime Studies and Tourism
- 13) Business and Management, Finance, Accounting
- 14) Law
- 15) Psychology
- 16) Physical Education and Sport Science
- 17) Police and Military
- 18) Merchant Marine
- 19) Medicine
- 20) Dentistry
- 21) Veterinary Science
- 22) Pharmacy
- 23) Engineering and Computer Science
- 24) Philology, History and Archaeology
- 25) Social, Political, European and International Studies
- 26) Other

Table 5 displays the number of the departments which belong to each of the above fields. Based on this table, as well as on the top choices which each field had gathered, we create an index called weighted popularity index that is constructed in the following way:

$$\text{Weighted Popularity Index}_{f,t} = \frac{\text{number of top choices}_{f,t}}{\text{number of existing degrees}_{f,t}}$$

This index gives us a sign about what happened during the recession regarding the popularity of departments and consequently the specific fields of study in Greece (Table 6). To calculate the index we divide the aggregate number of top choices which all the departments of a specific field have accumulated over the aggregate number of the existing departments of this field and we examine the evolution of this index over time. We observe that some fields retained a smooth movement concerning the value of their index like Dentistry or Pharmacy departments, while some others had a more volatile movement like departments of Military and Police Academies. Moreover, Education

departments had sustained a significant drop, while the field of Psychology, as well as this of Maritime Studies and Tourism managed to triple the number of their index at the end of the period compared to its initial value. However, there is no doubt that Merchant Marine constitutes the most remarkable field. There is no comparison with the other fields as the number of the index skyrocketed after 2011.

Finally, in this section are presented the regressions which are used in order to examine firstly the effect of the recession on the demand for specific fields of study and secondly on the admission thresholds of degrees. In all cases we use the 420 departments which have retained their code in the Mixanografiko Deltio unchangeable. In other words, their function has not been disrupted by significant modifications. We point out that we follow the OLS method with Field/City/Institution fixed effects (FE) to check for unobservable time invariant characteristics that could drive students' preferences or thresholds of degrees. Thus, we use the following regressions:

$$\text{Thresholds}_{d,f,i,c,t} = b_0 + b_1c + e \quad (1)$$

$$\text{Top Choices}_{d,f,i,c,t} = b_0 + b_1c + e \quad (2)$$

$$\text{Thresholds}_{d,f,i,c,t} = b_0 + b_1i + e \quad (3)$$

$$\text{Top Choices}_{d,f,i,c,t} = b_0 + b_1i + e \quad (4)$$

*Where Top Choices<sub>d,f,i,c,t</sub> and Thresholds<sub>d,f,i,c,t</sub> indicate the number of first choices and the degree cutoff score which a specific degree d, in field f, in institution i, in city c and year t managed to gather. b<sub>0</sub> represents the constant term.*

These regressions investigate the effect of city location on applicants' top choices (regression 1) and on thresholds (regression 2). With the other two regressions we test for the effect of Higher Education Institution (i.e. University or TEI) on first choices (regression 3) and on thresholds (regression 4).

Regressions (5) and (6) investigate the effect of the annual youth unemployment on the number of ordered applications submitted in each field of study through the coefficient  $b_1$ .

$$Choices_{d,f,i,c,t} = b_0 + b_1u_t * f + b_2f + b_3c + e \quad (5)$$

$$Choices_{d,f,i,c,t} = b_0 + b_1u_t * f + b_2f + b_3c + b_4i + e \quad (6)$$

Where  $Choices_{d,f,i,c,t}$  indicate the number of first, second, third, later and aggregate choices which a specific degree  $d$ , in field  $f$ , in institution  $i$ , in city  $c$  and year  $t$  managed to gather.  $b_0$  represents the constant term and  $u_t$  youth unemployment.

Finally, we use regressions (7) and (8) in order to examine if top choices, aggregate choices and whether the fact an Institution is a University or TEI affect the thresholds.

$$Thresholds_{d,f,i,c,t} = b_0 + b_1Top Choices_{d,f,i,c,t} + b_2Agreegate Choices_{d,f,i,c,t} + b_3University or Tei + b_4f + b_5c + e \quad (7)$$

$$Thresholds_{d,f,i,c,t} = b_0 + b_1Top Choices_{d,f,i,c,t} + b_2Agreegate Choices_{d,f,i,c,t} + b_3University or Tei + b_4f + b_5c + b_6i + e \quad (8)$$

Where  $Thresholds_{d,f,i,c,t}$  indicates the degree cutoff score which a specific degree  $d$ , in field  $f$ , in institution  $i$ , in city  $c$  and year  $t$  formed. University or TEI is a dummy which takes 1 for University and otherwise 0 and tests



*whether the nature of the Higher Education Institution affects the thresholds of the departments.  $b_0$  represents the constant term.*

## 6. Empirical Results

This chapter has to do with the empirical investigation of the subject at hand. Therefore, we implement two different approaches. The first one is a comparative analysis and the second one is a regression analysis. The comparative analysis is based mainly on thresholds and takes place among specific departments so as to examine several effects which are not captured by the regressions<sup>7</sup>. Therefore, we implement 5 types of comparisons.

### 6.1. Comparative Analysis

#### Type 1

The first type of comparison is concerned with the preferences of applicants who were examined in the same tasks and, therefore, had the same available choices. In other words, we compare the thresholds of each department of every scientific field with all the others of the same field. By doing this we take into account the differences of the applicants' origins regarding the field of their examinations' tasks. Firstly, we test the case of FIELD 1: Humanities, Law and Social Sciences (Table 7). For the whole period 2008-2016, the most popular department was Law Athens and for the majority of the years the second and the third place in the list belonged to the other two Law departments i.e. Law Thessaloniki and Law Komotini. However, it is no use to compare only a Law department with the other two same departments. It is obvious that Law was the most popular choice, whatever the university and city among the applicants of the FIELD 1 might have been. Our purpose is to examine if there was a change in preferences for the whole group of the departments. In this type of comparison we exclude the other similar departments from the test and take into account only the most popular department from each group of departments. Consequently, we consider as the second most popular choice the first non-Law department<sup>8</sup>. As we see in the Table 7

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<sup>7</sup> The thresholds, as we have already mentioned, varies from 0 to 20000, however, some departments such as Foreign Languages and Literature, Architecture etc require students to take exams in some extra special subjects. The thresholds in these departments could exceed the restriction of 20000 points. Therefore we adjust these thresholds in order to be all on the same scale (i.e., 20000).

<sup>8</sup> The same is valid for the other comparisons among the departments of the same field.

until 2011 the second most preferred group of departments was Primary Education. The first three years (2008-2010) the thresholds of Primary Education Thessaloniki were in the second place, while in 2011 Primary education of Athens substituted them. Furthermore, from 2012 and on different departments of Psychology consecutively rose in the second place. Hence, we conclude that Law has retained its leading position without being affected by the crisis, while there were significant changes regarding the second most popular choice. Regarding the FIELD 2: Natural Sciences, the most popular department throughout the years was Biology Athens (Table 8). However, when we deal with the second most preferred choice, the issue becomes more complex. In 2008, as well as during the period 2013-2015 applicants chose an informatics department called Informatics and Telecommunications Athens after all the departments of Biology. On the other hand, from 2009 until 2012 things had changed as the Chemistry Athens department formed the second highest threshold among the non-biology departments. So, we observe that maybe Biology had retained its position regarding the preferences of applicants for the whole period, but also that when the severe repercussions of the crisis made their first appearance, applicants changed their minds about their best option. Table 9 represents the thresholds of FIELD 3: Health and Life Sciences. In this case, applicants from this field seemed to have been unaffected by the recession. Departments of Medicine were constantly the first in the list while Dentistry departments followed them in the second place. Perhaps the most substantial conclusions of our first type of comparisons come from the next field, as these conclusions are closely related to the economic situation of the country. In this FIELD the leading departments are the polytechnic departments (Table 10). However, the thresholds of these departments did not follow the same patterns. Until 2010 the list had the following form: Civil Engineering NTUA, Electrical and Computer Engineering NTUA and Mechanical Engineering NTUA. In 2011 things changed and remained so for the rest of the period. As the building and construction sector collapsed, applicants were unwilling to enroll in a department which is closely connected with this sector. Therefore, the department of Civil Engineering became the third priority during the crisis. Furthermore, if we examine the thresholds of the other Civil Engineering departments across the country, we observe that things were much worse. There were many applicants who completely abandoned the idea of enrolling in these departments and chose a degree from a different scientific field. In other words, a department which was famous and, until recently, in high demand, became an uninteresting choice. So, the case of FIELD 4: Technological

Sciences is quite similar with the case of FIELD 1 which we have already examined. The last comparison of this type refers to the FIELD 5: Sciences of Economy and Administration (Table 11). In this FIELD we do not observe any significant change. Both departments of Accounting and Finance (firstly that of Athens University of Economics and Business (AUEB) and secondly that of University of Macedonia in Thessaloniki) were the most preferred choices, regarding their thresholds for the whole period. The department of Business Administration AUEB followed always in the third place.

## **Type 2**

Based on the conclusions of the previous comparison we continue our investigation with the next type of comparisons. With the second comparison type we test for the paired effects of the city campus and employment prospects. Therefore, we choose two special groups of departments, Primary Education and Civil Engineering. During recent years, these two sectors have collapsed. After 2009, no appointment of permanent teachers has taken place, only some substitute teacher recruitment when there were vacant posts to be filled on a temporary basis. In addition, we examine the sector of construction. The financial crisis has had a severe impact on all professions related to construction, whether individuals held a university degree or were unskilled laborers. Civil engineers constitute one of the most characteristic examples. Hence, in each case, we compare the department with the highest threshold with the department which had the lowest threshold. We point out that the most popular departments in both tests were based in Athens, while the departments with the lowest thresholds are located in Rhodes (regarding primary education) and in Xanthi (regarding civil engineers). In Figure 1 and 2 the movements of the differences between the highest and the lowest threshold for each category are depicted. We observe that in both cases the differences started increasing from 2010 and thereafter, something which corroborates with the conclusions of the first type of comparisons. After that, we insert one more department in our test, the department of Special Education of the University of Thessaly, located at the city of Volos. This department constitutes a unique department as it is the only one which fully specialized in Special Education. Some years ago, the Ministry announced that it is going to hire, for the first time, permanent and non-temporary teachers specialized on the education of people with learning disabilities or other disorders and impairments

(hearing, visual etc). This, combined with the fact that the simple departments of Primary Education would have poor future prospects led applicants to choose this department. In Figure 3 we see the differences between the Primary Education Athens thresholds (highest thresholds among Primary Education departments) and the Special Education department. Although the second one was located in a not so popular destination for studies as Athens, applicants from 2012 changed their minds about this degree. The difference started decreasing and eventually in 2015 the department of Special Primary Education formed the highest threshold between all of the departments of Primary Education (Figure 4)<sup>9</sup>.

### **Type 3**

The next comparison is partially similar to the previous one. It is concerned with the effect of security regarding the sector of departments. Consequently, we investigate whether the security of the public sector (i.e., a permanent position and salary) push applicants to choose departments which lead to this. Therefore, we calculate the differences between the thresholds of the eight Military Academies and the corresponding civil departments with the highest thresholds. We note that all these Military departments are Officers Academies. Figures 5-12 represent our results. In all cases, the thresholds of military departments were higher than those of civil departments. The only exception was the departments of Medicine (Figure 7), with the Medicine department of University of Athens having a higher threshold until 2011. From 2012 on the Medicine department of Non Commissioned Officer Army Academy (SSAS) had overcome it. Furthermore, in the majority of cases the differences became larger after 2011, the year during which the severe impacts of recession made their first appearance in Greek Higher Education System. Consequently, financial crisis led many applicants to prefer the Military departments due to the security of the public sector.

### **Type 4**

Although we conclude that applicants had preferred the military departments from the corresponding civil departments we are not so sure about what is occurred when they choose only among the departments of the Army. Thus, we continue with the tests of the

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<sup>9</sup> We do not take into account the thresholds of 2016 because they are biased due to the reallocation of departments among the scientific fields. For the period 2008-2015 there was no change in their distribution.

ranking effect in Police and Military Academies. In other words, we examine if there are differences in preferences regarding the rank of the alumni after their graduation. For this reason, we compare the thresholds of Military and Police Officers Academies with the corresponding Non-Officers Academies and we examine their differences.

Firstly, we test the case of Police (Figure 13). It is obvious that from 2012 on a significant decrease regarding the difference between the officers and non-officers academies' thresholds took place. We ought to point out that Police academies had suffered from a severe reduction in their available places. It is possible that this phenomenon partially owes to this restriction. However, no one can deny that the financial crisis removed all applicants' second thoughts about their future rank. The conclusions from the comparisons between Military's Academies (Figures 14 and 15) are identical. Individuals did not care if they became officers or not. They only aimed to enroll in this type of Academies.

## **Type 5**

Finally, we examine the case of new-entry departments in the Mixanografiko Deltio. In this test we compare not only the thresholds of new-entry departments, but also the first, second, third choices which each department has managed to accumulate. We do not have a sufficient sample for these degrees, so we examine the last two years of our period mainly due to their special characteristics. In 2016 three new departments (i.e. Theology-Islamic Studies at the Aristotle University of Thessaloniki, Fire Officers Academy and Firemen Academy) became available. As we see in Figure 16, the Fire Officers Academy gathered by far more choices as top choice. More than 900 applicants chose this department as their first choice, while 172 chose the Firemen Academy and only 21 the department of Islamic studies. As regards the second choice, the Firemen Academy accumulated the most of these. The explanation for this phenomenon is simple. The majority of applicants who wanted to enroll in the Firemen academy chose firstly the corresponding Officers Academy and if they failed to enroll they chose as second option the Non-Officers Fire Academy. Furthermore, there is a difference between the first choices of Officers and the second choices of Non-Officers. This has to do with the rank effect. Many of the students who wanted to be Fire Officers might fill the further list positions with other relative departments. Hence, they chose other Officer departments of Police and Army and after them they chose all the Non-Officer

Academies of all sectors. On the other hand, there is no comparison to the choices of the civil department. It is true that the nature of the department of Islamic Studies is special and so it is expected that it will not be so popular among the applicants. Therefore, we expand our sample for one more year and examine the previous academic year. In 2015 two new choices appeared in the Ministry's system. The department of Environmental Engineering at the University of Western Macedonia (with a campus in the city of Kozani) and the Architecture department at the University of Ioannina. Both of them were polytechnic departments. In Figure 17 we can see the choices of applicants for them for their first year of function. Their numbers are bigger than the relative ones for the department of Islamic Studies, but they were by far lower than the Fire Academies numbers. Consequently, we conclude that whatever the field of department is, the preferences are significantly lower than those of non-civil departments. Therefore, as we saw before, during a crisis applicants prefer the security of the public sector and a better ranking evaluation after their graduation. The conclusions from the analysis of their thresholds (Figure 18) are similar. Thresholds of Fire Academies were by far higher than all the other departments, whatever the field or the examination year was.

## **6.2. Econometric Analysis**

The second part of this chapter has to do with the results of the econometric procedure. Tables 12 and 13 present the outputs of the first four regressions. Firstly, we examine the effect the city-campus of the department has on thresholds (regression 1), as well as on top choices concerning this department (regression 2). Without a shadow of a doubt the city plays a significant role in both the formation of thresholds and top choices (Table 12). As regards thresholds, we observe that regional cities faced the biggest negative impact. For example, departments of small cities like Agios Nikolaos, Grevena, Karpenisi and Lixouri formed thresholds reduced by around 9000-9500 points. On the other hand, departments of bigger cities formed higher thresholds. Volos, Xanthi and Patra are the most characteristic examples. However, we have to point out that Athens and Thessaloniki are affected by the number of available departments which are located in them. In these two cities the majority of the departments are located. So, the analysis of thresholds becomes a complicated issue when we are talking about these cities due to

their variety of institutions and departments. A possible solution to this problem is the regression 2. In the second column of Table 12 presented how cities affect the applicants concerning their first choices. Almost in all cases the number of top choices was reduced. The only exceptions are the cities of Athens and Thessaloniki. In other words these two cities are the most preferred ones for the applicants.

After that, we do exactly the same investigation about the institutions. Based on the regression's 3 outputs (Table 13), we observe that universities formed higher thresholds than TEIs. This also happens in the two central cities (i.e. Athens and Thessaloniki). For instance, thresholds are increased by around 7500 points in the Aristotle University of Thessaloniki, 8610 points in the Athens University of Economics and Business, 7237 in the National and Kapodistrian University of Athens, 9759 in the National Technical University of Athens and 7747 in the University of Macedonia. However, the most significant increase is coming from the departments of Military and Police Academies with 9810 points. Things are not so complicated when we have to do with the top preferences. The above institutions affect top choices, too. Nevertheless, there exists one important change. Merchant Marine Academy is by far on the top of the list of institutions which affect the number one choices, while, as we have already seen, does not affect the thresholds. That means that the number of applicants who want to enroll on this department has increased during the crisis, although the overall level of individuals who managed to do this is almost the same based on the volatility of the Academy's thresholds.

Regressions 5 and 6 investigate the effect of annual youth unemployment on the number of ordered applications submitted in each field of study. We estimate them using the OLS method and we focus on the coefficient  $b_1$ , which measures the effect of youth unemployment on the popularity of each field relative to a benchmark field. We consider Economics as benchmark due to its relatively smooth movement of the weighted popularity index. Moreover, we include fixed effects regarding the field, the city and the institution (Table 14, 18, 19). Furthermore, we do not have to forget that there is no restriction regarding the minimum or maximum choices which an applicant could include in his list. This fact, as we have already mentioned, affects both thresholds and



choices. Therefore, we will focus only on the top choices (Table 14)<sup>10</sup>. Based on these outputs we observe that six fields are affected by recession. In four cases the increase of youth unemployment leads to an increase in top choices, while in other two it leads to a decrease. So, Law appears to gain more top applications as a field due to the crisis. For each additional unit of youth unemployment Law increases its top choices as a field of studies by almost 25 preferences (24.853) and after that follows the Academy of Merchant Marine (22.370), Psychology (17.161) and Medicine (8.711). In contrast, top choices for Education departments had been reduced for around 5.590 applications and for departments of Police and Military the reduction almost reached a level of minus 5 (-5) applications<sup>11</sup>. The output for Education departments is consistent with the previous one from the comparative analysis. During recession applicants have changed their preferences about these departments due to the negative future prospects for permanent appointments in public schools. However, the interpretation of the output for Military and Police departments is not so easy. First of all, these departments suffered from a severe reduction in their available places. In addition, they offer an immediate, permanent and secure position in the Greek State. These facts increased the competition among applicants for these academies during the crisis and led to higher thresholds. Police and Military Academies belong to the group of departments with the highest thresholds. So, all these factors discouraged many students with mediocre or low scores in Pan-hellenic Examinations to include these departments in their list. In many cases, only applicants with high scores choose them, actually on top of their list because of their higher probabilities to enroll. Therefore, high thresholds have appeared and at the same time a small reduction regarding their top preferences occurred. On the other sectors there is no significant change.

Finally, we want to examine how top and aggregate choices affect the cutoff scores, as well as if the nature of the Higher Education Institution (University or TEI) is statistically significant. Table 15 indicates that in both cases of fixed effects all these factors affect the formation of admission thresholds. The most important variable is the dummy of the institution. Thus, if a department constitutes a university's department

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<sup>10</sup> Our results derived from the other choices do not significantly differ from these of top choices. See Tables 18 and 19 in appendix.

<sup>11</sup> Our data do not include certain special categories of applicants for the last years of our examined period concerning some departments of Police and Army. However, the preferences of these applicants do not constitute a significant part of the aggregate preferences for these academies.

then its thresholds will be increased for more than 4000 points. Thresholds seem to be affected more by top choices than by aggregate choices. One more top choice will increase the threshold by almost 1.5 points, while one more aggregate choice will increase the threshold only by around 0.25.

## 7. Conclusions

The main purpose of this Thesis was to investigate if financial crisis has affected the Greek Higher Education System. In particular, we have tried to answer the question whether recession has affected the preferences of individuals regarding specific degrees. Therefore, we used a combination of datasets sourced from the Greek Ministry of Education, Research and Religious Affairs concerning the choices of applicants from their enrollment-preference list, called Mixanografiko Deltio, as well as the thresholds of all existing higher education departments for the period 2008-2016. In order to include all the available information we have used two different approaches, one non-econometric comparative analysis and a second regression analysis. The first substantial result is that although Greek GDP started to decline in 2008, the Greek Higher Education System started been affected by the recession from 2011 and onwards. As regards the results of our tests, these are consistent with the majority of the other relevant studies. There is no doubt that recession affected this aspect of our life, too. To be more specific, we observe that fields of studies with a leading position in applicants' preferences have not only retained their positions, but also the interest for them has increased. Law and Medicine departments continued to be on the top concerning their thresholds. Furthermore, they managed to augment their top preferences. On the other hand, departments related to Education suffered from the most severe reduction in both their thresholds and preferences. In addition, it is obvious that the crisis brought sector of Psychology to the surface. The significant increase of interest for a degree in Psychology associated with the exacerbating mental health of the Greeks due to the crisis (Economou et al., 2013, Drydakis, 2015). That is not something unusual, as many studies demonstrate that the economic consequences of the financial crisis have exerted important effects on the mental health of individuals (Uutela, 2010, McInerney et.al, 2013). The most significant modification seems to be that of Merchant Marine Academies. These departments have managed to skyrocket the preferences towards them. In other words, more applicants want to enroll in these academies in order to pursue a career in the high-paying marine sector. We do not have to forget that even during the latest severe global financial crisis, the commercial shipping industry of Greece remained among the leading ones. However, this increased interest was not followed by higher thresholds. That means that applicants with low scores choose them due to the lack of other better options, while applicants with high scores in the exams

choose these academies as last choices only in case of failing to enroll in other departments. The only difference with the literature is in the case of departments of Military and Police. We observe a slight decrease towards them contrary to other researches which indicate a significant increase (Goulas and Megalokonomou, 2018). Nevertheless, in the period of our investigation there were some other factors which had a negative impact on these departments. Fewer available places due to austerity measures led to higher competition for these departments. So, thresholds were skyrocketed, forcing the applicants with mediocre and low scores not to include them in their preference list because of their low probabilities to enroll. In other words, in these departments the effect of crisis is easier observed in thresholds (i.e. the “academic quality” of applicants who want to enroll) and not in preferences (i.e. the quantity of applicants who want to enroll). Also, we have already mentioned that our data do not include the preferences of some special categories of applicants for the last years of our examined period concerning these departments. However, it is also true that the result derived from the whole sample will not significantly differ from the present one, as these preferences constitute a small part of the aggregate choices for these academies. Finally, regarding the cities and the institutions, it is obvious that the two central cities (i.e. Athens and Thessaloniki) continue not only to accumulate the majority of preferences, but also the departments located there form higher thresholds (the Aristotle University of Thessaloniki, the Athens University of Economics and Business, the National and Kapodistrian University of Athens, the National Technical University of Athens and the University of Macedonia). Actually, even in the case of departments with very poor future prospects such as the departments of Primary Education or Civil Engineering, these of Athens and Thessaloniki partially retain their momentum.

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## **Laws**

Law 3404/2005 (Government Gazette 260/issue A/17-10-2005): "Regulation of issues regarding the university and technological sector of high education and other provisions".

Law 3848/2010 (Government Gazette 71/issue A/19-5-2010): "Upgrading of teacher role-establishment of assessment and meritocracy rules in education and other provisions".

Law 4327/2015 (Government Gazette 50/issue A/14-5-2015): "Urgent measures for Primary, Secondary and Higher Education and other provisions".

## **Presidential Decrees**

Presidential Decree 69-80 (Government Gazette 119/issue A'/28-5-2013)

Presidential Decree 82, 83 (Government Gazette 123/issue A'/3-6-2013)

Presidential Decree 84-86 (Government Gazette 124/issue A'/3-6-2013)

Presidential Decree 87, 88 (Government Gazette 129/issue A'/5-6-2013)

Presidential Decree 89, 90 (Government Gazette 130/issue A'/5-6-2013)

Presidential Decree 91-93 (Government Gazette 131/issue A'/5-6-2013)

Presidential Decree 94 (Government Gazette 132/issue A'/5-6-2013)

Presidential Decree 95, 96 (Government Gazette 133/issue A'/5-6-2013)

Presidential Decree 97-99 (Government Gazette 134/issue A'/5-6-2013)

Presidential Decree 100,101 (Government Gazette 135/issue A'/5-6-2013)

Presidential Decree 102,103 (Government Gazette 136/issue A'/5-6-2013)

Presidential Decree 104,105 (Government Gazette 137/issue A'/5-6-2013)

Eurydice: National Page of Austria  
Eurydice: National Page of Denmark  
Eurydice: National Page of Finland  
Eurydice: National Page of France  
Eurydice: National Page of Germany  
Eurydice: National Page of Greece  
Eurydice: National Page of Italy  
Eurydice: National Page of The Netherlands  
Eurydice: National Page of Spain  
Eurydice: National Page of Sweden  
Eurydice: National Page of The United Kingdom (England)

## Tables and Figures

Table 5: Number of departments per field and year

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Foreign Languages and Literature	11	11	11	11	11	10	10	10	10
Theology and other related studies	12	12	12	11	12	12	12	12	13
Journalism and other related studies	5	5	5	5	5	5	5	5	5
Arts (Drama, Film, Music Studies etc.)	15	15	15	15	15	15	15	15	15
Education	24	24	24	24	24	24	24	24	24
Mathematics and Statistics	11	11	11	11	11	11	11	11	11
Physics and Earth Science	10	10	10	10	10	10	10	10	10
Biology, Chemistry and other related studies	12	12	12	12	12	12	12	12	12
Nursing and other Health Studies	33	36	36	36	36	34	34	34	34
Agriculture, Forestry and other Environmental Studies	48	48	48	34	45	34	34	34	34
Economics	10	10	10	10	10	11	11	11	11
Maritime Studies and Tourism	11	11	11	8	9	12	12	12	12
Business and Management, Finance, Accounting	39	40	40	39	40	37	37	37	37
Law	3	3	3	3	3	3	3	3	3
Psychology	4	4	4	4	4	4	4	4	4
Physical Education and Sport Science	5	5	5	5	5	5	5	5	5
Police and Military	21	21	23	22	23	21	21	21	23
Merchant Marine	2	2	2	2	2	2	2	2	2
Medicine	7	7	7	7	7	7	7	7	7
Dentistry	2	2	2	2	2	2	2	2	2
Veterinary Science	2	2	2	2	2	2	2	2	2
Pharmacy	3	3	3	3	3	3	3	3	3
Engineering and Computer Science	98	100	100	99	99	97	97	99	99
Philology, History and Archaeology	20	20	20	20	20	20	20	20	20
Social, Political, European and International Studies	17	17	17	17	17	16	16	16	16
Other	69	79	79	74	75	51	52	52	52
Total Number of available degrees	494	510	512	486	502	460	461	463	466



Table 6: Weighted Popularity Index

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Foreign Languages and Literature	159	167	236	300	290	226	179	193	197
Theology and other related studies	56	45	69	76	90	54	54	54	40
Journalism and other related studies	146	120	173	174	184	124	127	132	119
Arts (Drama, Film, Music Studies etc.)	73	71	118	137	138	105	112	124	132
Education	382	350	343	398	416	215	228	244	172
Mathematics and Statistics	111	142	163	187	213	155	152	148	119
Physics and Earth Science	85	97	115	116	148	129	127	118	106
Biology, Chemistry and other related studies	82	87	111	143	215	208	224	224	253
Nursing and other Health Studies	133	112	216	218	237	163	154	163	166
Agriculture, Forestry and other Environmental Studies	24	20	36	62	71	86	90	80	67
Economics	226	209	243	274	370	254	233	256	267
Maritime Studies and Tourism	48	42	55	111	116	90	97	100	144
Business and Management, Finance, Accounting	138	117	152	173	172	139	128	128	145
Law	932	808	1075	1456	2255	1412	1225	1238	1169
Psychology	322	268	453	667	1041	743	729	781	799
Physical Education and Sport Science	296	271	362	463	556	448	467	505	533
Police and Military	257	283	384	378	364	222	196	189	234
Merchant Marine	192	170	403	1214	984	825	1114	959	1017
Medicine	258	270	358	517	815	538	508	555	675
Dentistry	266	266	263	342	503	332	259	267	301
Veterinary Science	79	67	121	172	335	210	216	208	249
Pharmacy	255	230	288	355	440	273	221	262	293
Engineering and Computer Science	118	109	145	159	212	148	140	139	120
Philology, History and Archaeology	149	160	192	229	260	178	163	157	168
Social, Political, European and International Studies	92	103	113	114	128	114	123	131	139
Other	67	53	75	78	77	76	83	82	75

Table 7: Comparison between FIELD 1 department thresholds

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Law Athens	18978	18893	18893	18608	18879	18571	18714	18223	18229
Primary Education Thessaloniki	18780	18887	18711	17710	17415	16199	16345	15733	13595
Primary Education Athens	18696	18856	18550	17806	17731	16609	16860	16075	14670
Psychology Panteion	18049	17789	18059	17699	18204	17739	18081	17478	17381
Psychology Thessaloniki	17625	17574	17943	17638	18184	17881	18197	17596	17517
Psychology Athens	17463	17446	17769	17496	18115	17794	18205	17751	17725

Table 8: Comparison between FIELD 2 department thresholds

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Biology Athens	18331	18599	18632	17773	17908	17392	18245	17677	18335
Chemistry Athens	17334	17819	17941	16851	16852	16274	17086	16653	17011
Informatics and Telecommunications Athens	17351	17787	17822	16684	16829	16359	17221	16707	16919
Biotechnology Agricultural University of Athens	16113	16332	16774	15027	15773	14870	15484	15413	17765

Table 9: Comparison between FIELD 3 department thresholds

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Medicine Athens	19306	19476	19453	19153	19170	18916	19233	18924	19063
Dentistry Athens	18857	19128	18991	18487	18553	18039	18629	18115	18580

Table 10: Comparison between FIELD 4 department thresholds

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Civil Engineering NTUA	19090	19356	19241	18483	18184	17225	18106	16785	17130
Electrical and Computer Engineering NTUA	19089	19306	19234	18917	18914	18471	19072	18540	18628
Mechanical Engineering NTUA	18915	19137	19112	18699	18759	18176	18943	18309	18467

Table 11: Comparison between FIELD 5 department thresholds

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Accounting and Finance AUEB	18474	18536	18635	17844	17914	16838	17775	17257	16863
Accounting and Finance Macedonia (Thessaloniki)	18208	18358	18505	17836	17858	16953	17063	17007	16059
Business Administration AUEB	17941	18158	18161	17181	17178	15830	16699	16409	15738

Table 12: The effect of city location on the formation of the thresholds and top choices

	Dependent Variable	
	Thresholds	Top Choices
$b_0$ (constant)	16415.08 (0.000)***	316.52 (0.000)***
Agios Nikolaos	-9670.19 (0.000)***	-259.41 (0.005)***
Agrinio	-5557.49 (0.000)***	-274.12 (0.000)***
Aigio	-1633.75 (0.084)*	-171.52 (0.064)*
Alexandroupolis	-321.41 (0.520)	-180.58 (0.000)***
Arta	-7364.36 (0.000)***	-242.36 (0.000)***
Athens	-2089.09 (0.000)***	-30.47 (0.127)
Chalkida	-6739.08 (0.000)***	-262.04 (0.000)***
Chania	-4174.41 (0.000)***	-261.78 (0.000)***
Chios	-4325.75 (0.000)***	-251.78 (0.000)***
Corfu	-4227.49	-211.65

	(0.000)***	(0.000)***
Corinth	-2919.52 (0.000)***	-273.86 (0.000)***
Didymoteicho	-5058.08 (0.000)***	-215.97 (0.020)**
Drama	-9235.75 (0.000)***	-281.64 (0.002)***
Florina	-2107.47 (0.002)***	-240.14 (0.000)***
Grevena	-8979.64 (0.000)***	-277.75 (0.002)***
Heraklion	-4074.69 (0.000)***	-231.04 (0.000)***
Igoumenitsa	-6184.19 (0.000)***	-244.52 (0.008)***
Ioannina	-2732.12 (0.000)***	-199.33 (0.000)***
Kalamata	-5877.57 (0.000)***	-276.92 (0.000)***
Karditsa	-4935.15 (0.000)***	-278.93 (0.000)***
Karpenisi	-9505.75 (0.000)***	-297.08 (0.001)***
Kastoria	-7210.41 (0.000)***	-246.91 (0.000)***
Katerini	-8393.52 (0.000)***	-273.64 (0.003)***
Kavala	-8586.93 (0.000)***	-266.21 (0.000)***
Kilkis	-9218.41 (0.000)***	-271.64 (0.003)***
Komotini	-2785.82 (0.000)***	-148.99 (0.000)***

Kozani	-7470.65 (0.000)***	-282.07 (0.000)***
Lamia	-4919.77 (0.000)***	-260.39 (0.000)***
Larissa	-4719.65 (0.000)***	-246.36 (0.000)***
Lixouri	-9451.30 (0.000)***	-287.30 (0.002)***
Mytilene	-6149.27 (0.000)***	-266.95 (0.000)***
Nafpaktos	-8358.86 (0.000)***	-271.86 (0.003)***
Nafplio	-4655.97 (0.000)***	-272.08 (0.003)***
Orestiada	-6292.64 (0.000)***	-271.08 (0.000)***
Patra	-1562.36 (0.000)***	-180.26 (0.000)***
Rethymnon	-2948.18 (0.000)***	-156.94 (0.000)***
Rhodes	-4825.44 (0.000)***	-208.16 (0.000)***
Samos	-4408.38 (0.000)***	-268.23 (0.000)***
Serres	-7107.38 (0.000)***	-264.19 (0.000)***
Siteia	-4049.97 (0.000)***	-247.08 (0.007)***
Sparti	-5294.12 (0.000)***	-269.82 (0.000)***
Spetses	-9113.41 (0.000)***	-302.97 (0.014)**
Syros	-4545.19	-257.97

	(0.000)***	(0.005)***
Thessaloniki	-1892.94 (0.000)***	3.10 (0.885)
Thiva	-8654.97 (0.000)***	-283.08 (0.002)***
Trikala	-4568.30 (0.000)***	-188.30 (0.042)**
Tripolis	-2925.19 (0.002)***	-262.86 (0.004)***
Veroia	-1754.01 (0.164)	-302.97 (0.014)**
Volos	-1256.42 (0.000)***	-208.13 (0.000)***
Xanthi	-1267.17 (0.005)***	-263.72 (0.000)***
Zante	-9387.41 (0.000)***	-297.75 (0.001)***
City F.E.	✓	✓
R <sup>2</sup>	0.38	0.15

Table 13: The effect of the institution on the formation of the thresholds and top choices

	Dependent Variable	
	Thresholds	Top Choices
$b_0$ (constant)	7789.31 (0.000)***	41.59 (0.640)
Agricultural University of Athens	6728.22 (0.000)***	70.58 (0.460)
Aristotle University of Thessaloniki	7522.83 (0.000)***	337.72 (0.000)***
Aspete	3248.20 (0.000)***	8.40 (0.934)
ASTE	-690.08 (0.473)	33.68 (0.753)
Athens University of Economics and Business	8610.31 (0.000)***	441.68 (0.000)***
Democritus University of Thrace	6453.90 (0.000)***	70.39 (0.441)
Ecclesiastical Academy	1337.36 (0.113)	-19.41 (0.836)
Harokopio University	7028.71 (0.000)***	83.37 (0.397)
Ionian University	4398.28 (0.000)***	63.27 (0.507)
Merchant Marine Academy	1423.46 (0.139)	722.12 (0.000)***
Military and Police Academies	9810.53 (0.000)***	240.70 (0.008)***
National and Kapodistrian University of Athens	7237.82 (0.000)***	429.26 (0.000)***
National Technical University of Athens	9759.39 (0.000)***	518.02 (0.000)***
Panteion University of Social and Political Sciences	7433.17	168.91

	(0.000)***	(0.070)*
Technical University of Crete	6411.13	25.22
	(0.000)***	(0.794)
TEI of Athens	4935.44	106.51
	(0.000)***	(0.238)
TEI of Chalkida	1567.37	9.38
	(0.068)*	(0.921)
TEI of Crete	1595.29	20.21
	(0.057)*	(0.828)
TEI of Epirus	3379.65	76.21
	(0.000)***	(0.425)
TEI of Ionian Islands	-793.58	-17.59
	(0.410)	(0.869)
TEI of Kalamata	297.10	-12.90
	(0.737)	(0.895)
TEI of Kavala	398.84	13.07
	(0.637)	(0.889)
TEI of Lamia	2348.82	3.62
	(0.007)***	(0.970)
TEI of Larissa	2003.03	16.77
	(0.016)**	(0.857)
TEI of Messolonghi	266.91	3.07
	(0.808)	(0.980)
TEI of Patra	4389.26	89.13
	(0.000)***	(0.356)
TEI of Piraeus	3663.62	85.41
	(0.000)***	(0.358)
TEI of Serres	1144.00	9.95
	(0.183)	(0.917)
TEI of Thessaloniki	4460.55	123.93
	(0.000)***	(0.175)
TEI of Western Macedonia	-346.55	-2.54
	(0.680)	(0.978)



University of Crete	6541.38 (0.000)***	100.18 (0.273)
University of Ioannina	6567.50 (0.000)***	79.91 (0.384)
University of Macedonia	7747.21 (0.000)***	290.44 (0.002)***
University of Patras	7397.57 (0.000)***	90.81 (0.317)
University of Peloponnese	5453.80 (0.000)***	9.25 (0.921)
University of Piraeus	7568.80 (0.000)***	137.56 (0.141)
University of Sterea Ellada	5871.74 (0.000)***	19.12 (0.894)
University of the Aegean	3751.80 (0.000)***	23.09 (0.800)
University of Thessaly	7615.71 (0.000)***	61.78 (0.499)
University of Western Greece	3312.93 (0.001)***	-9.30 (0.935)
University of Western Macedonia	6968.35 (0.000)***	22.15 (0.822)
Institution F.E.	✓	✓
R <sup>2</sup>	0.59	0.28

Table 14: The effect of unemployment on the formation of the top and second choices

	Dependent Variable			
	Top Choices		Second Choices	
	(1)	(2)	(3)	(4)
Unemployment*Foreign Languages and Literature	-0.860 (0.746)	-0.860 (0.726)	-3.597 (0.046)**	-3.597 (0.034)**
Unemployment*Theology and other related studies	-3.044 (0.252)	-3.044 (0.215)	-4.527 (0.012)**	-4.527 (0.007)***
Unemployment*Journalism and other related studies	-3.088 (0.354)	-3.088 (0.316)	-4.450 (0.049)**	-4.450 (0.037)**
Unemployment*Arts (Drama, Film, Music Studies etc.)	-1.746 (0.482)	-1.746 (0.446)	-3.393 (0.044)**	-3.393 (0.032)**
Unemployment*Education	-5.590 (0.014)**	-5.590 (0.008)***	-6.397 (0.000)***	-6.397 (0.000)***
Unemployment*Mathematics and Statistics	-1.733 (0.514)	-1.733 (0.480)	-2.926 (0.105)	-2.926 (0.085)*
Unemployment*Physics and Earth Sciences	-1.877 (0.490)	-1.877 (0.455)	-3.124 (0.091)*	-3.124 (0.072)*
Unemployment*Biology, Chemistry and other related studies	1.674 (0.520)	1.674 (0.486)	0.073 (0.966)	0.073 (0.964)
Unemployment*Nursing and other Health Studies	-1.304 (0.554)	-1.304 (0.522)	-2.692 (0.072)*	-2.692 (0.056)*
Unemployment*Agriculture, Forestry and other Environmental Studies	-1.132 (0.619)	-1.322 (0.530)	-2.445 (0.113)	-2.524 (0.083)*
Unemployment*Maritime Studies and Tourism	-1.146 (0.702)	-0.707 (0.799)	-3.425 (0.092)*	-3.194 (0.096)*
Unemployment*Business and Management, Finance, Accounting	-2.256 (0.316)	-2.272 (0.275)	-3.836 (0.012)**	-3.875 (0.007)***
Unemployment*Law	24.853 (0.000)***	24.853 (0.000)***	17.571 (0.000)***	17.571 (0.000)***
Unemployment*Psychology	17.161 (0.000)***	17.161 (0.000)***	14.200 (0.000)***	14.200 (0.000)***
Unemployment*Physical Education and Sport Science	5.426 (0.103)	5.426 (0.078)	2.833 (0.210)	2.833 (0.184)

Unemployment*Police and Military	-4.978 (0.033)**	-4.978 (0.021)**	-4.790 (0.002)***	-4.790 (0.001)***
Unemployment*Merchant Marine	22.370 (0.000)***	22.370 (0.000)***	16.607 (0.000)***	16.607 (0.000)***
Unemployment*Medicine	8.711 (0.003)***	8.711 (0.001)***	5.808 (0.004)***	5.808 (0.002)***
Unemployment*Dentistry	-0.305 (0.948)	-0.305 (0.944)	-0.928 (0.771)	-0.928 (0.758)
Unemployment*Veterinary Science	2.367 (0.615)	2.367 (0.586)	0.720 (0.822)	0.720 (0.811)
Unemployment*Pharmacy	-1.402 (0.726)	-1.402 (0.704)	-3.376 (0.214)	-3.376 (0.187)
Unemployment*Engineering and Computer Science	-1.512 (0.455)	-1.485 (0.427)	-2.863 (0.037)**	-2.873 (0.026)**
Unemployment*Philology, History and Archaeology	-1.943 (0.414)	-1.943 (0.376)	-2.522 (0.118)	-2.522 (0.097)*
Unemployment*Social, Political, European and International Studies	-2.289 (0.351)	-2.289 (0.312)	-3.271 (0.049)**	-3.271 (0.037)**
Unemployment*other	-2.818 (0.186)	-2.926 (0.137)	-3.946 (0.006)***	-3.991 (0.003)***
Field and City F.E.	✓	✓	✓	✓
Institution F.E.		✓		✓
R <sup>2</sup>	0.41	0.50	0.50	0.56

Table 15: The effect of the top and aggregate choices on the formation of the thresholds

	Dependent Variable	
	Thresholds	
	(1)	(2)
Top Choice	1.443 (0.000)***	1.524 (0.000)***
Aggregate Choices	0.244 (0.000)***	0.283 (0.000)***
University_or_TEI	4225.12 (0.000)***	4447.29 (0.000)***
Field and City F.E.	✓	✓
Institution F.E.		✓
R <sup>2</sup>	0.78	0.80

Figure 1: Difference between thresholds of Primary Education Athens and Primary Education Aegean (Rhodes)

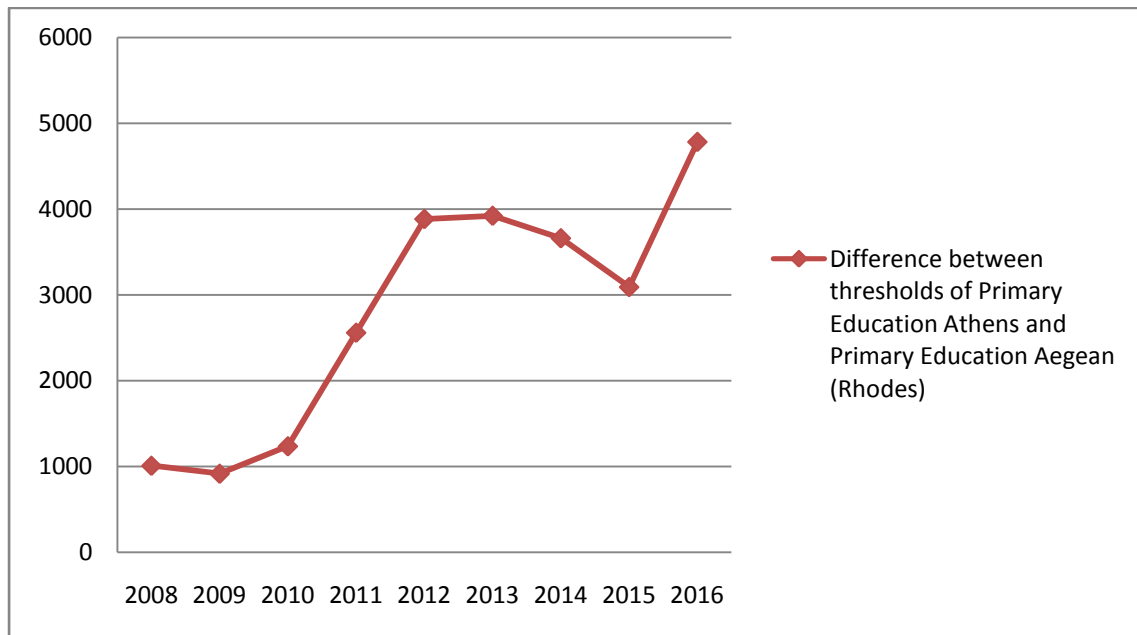


Figure 2: Difference between thresholds of Civil Engineering NTUA and Civil Engineering Thrace (Xanthi)

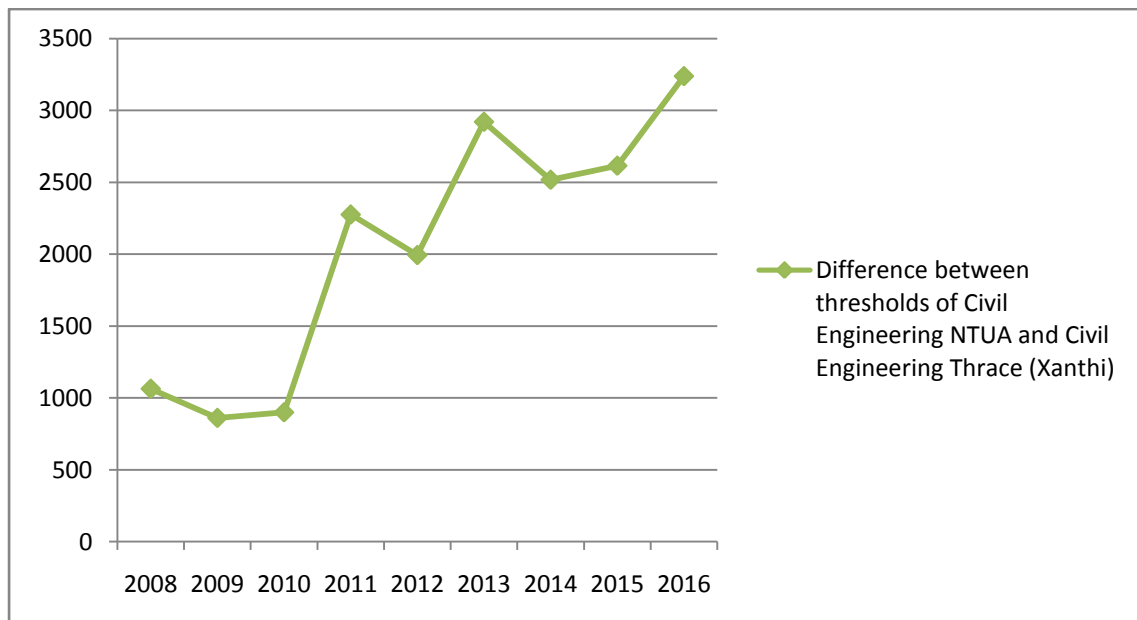


Figure 3: Difference between thresholds of Primary Education Athens and Primary Special Education Thessaly (Volos)

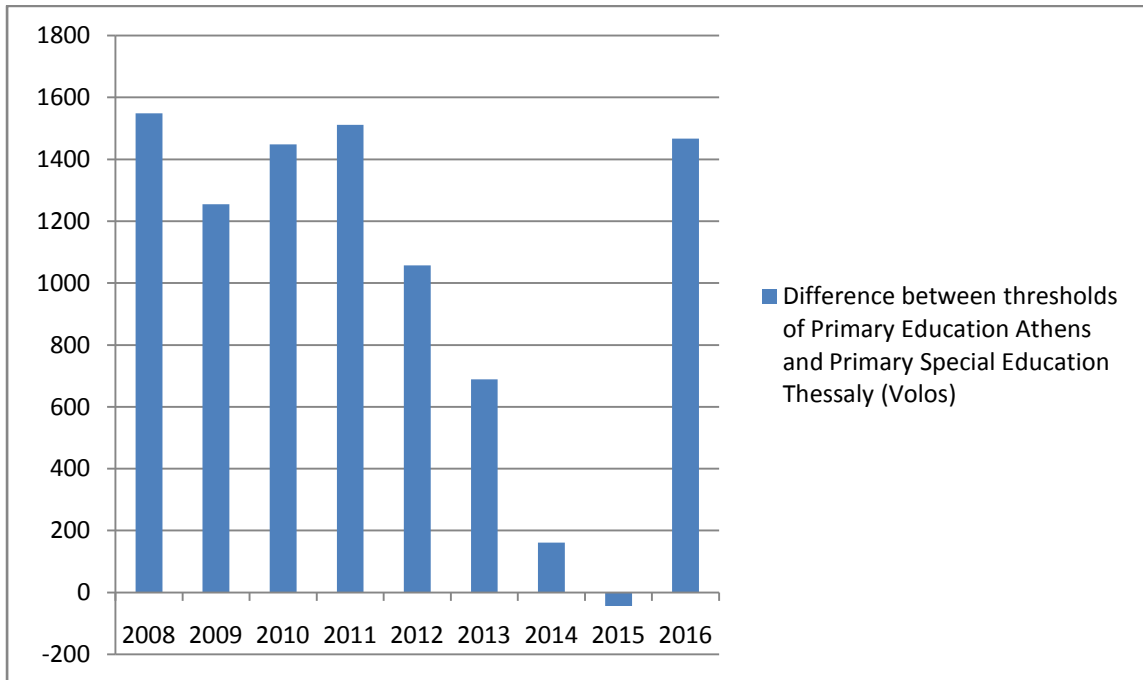


Figure 4: Thresholds of different Primary Education Departments

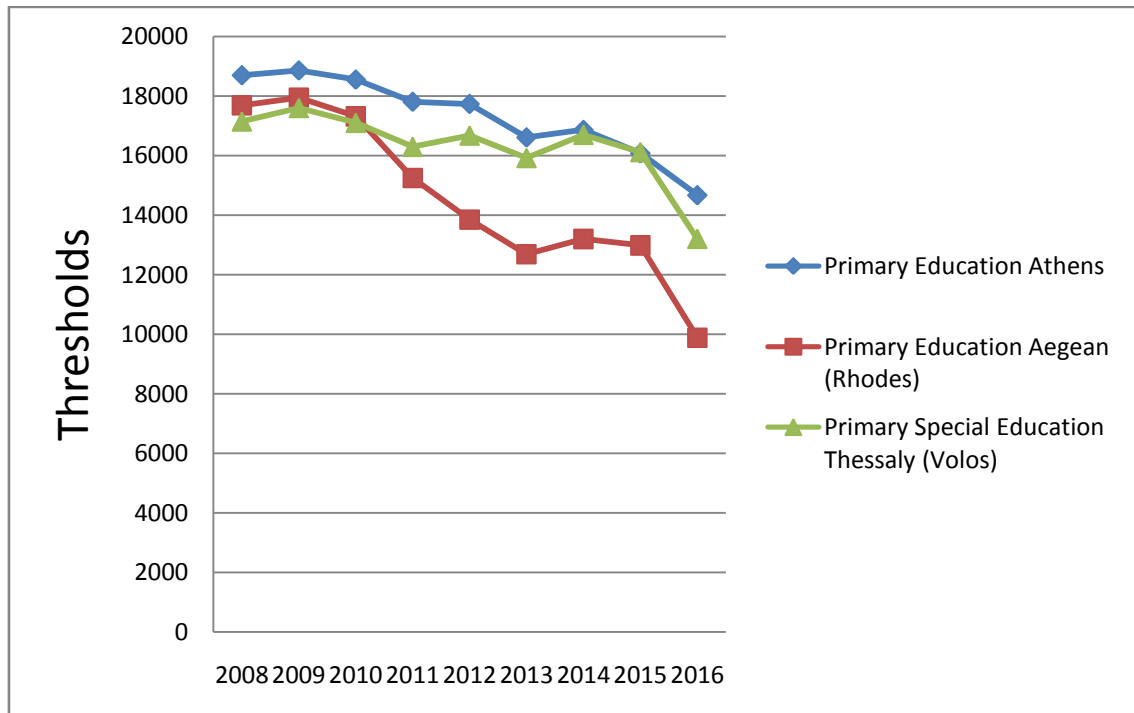


Figure 5: Difference between thresholds of Non Commissioned Officer Army Academy (SSAS) – Law and Law Athens

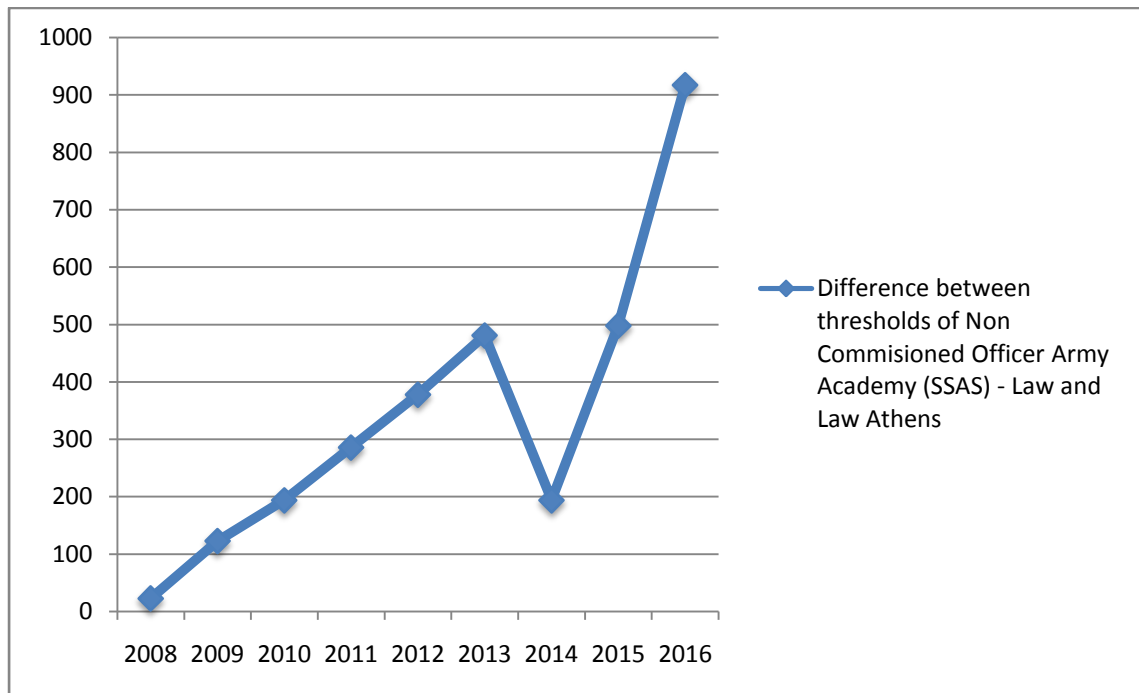


Figure 6: Difference between thresholds of Non Commissioned Officer Army Academy (SSAS) – Psychology and Psychology Panteion

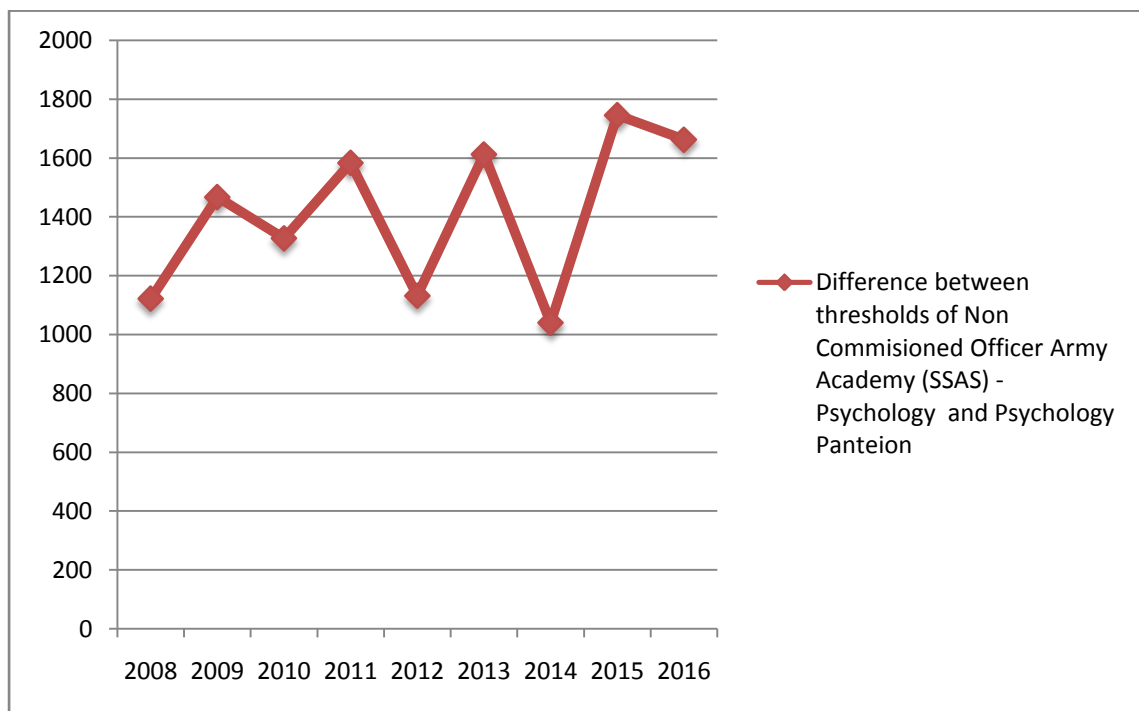


Figure 7: Difference between thresholds of Non Commissioned Officer Army Academy (SSAS) – Medicine and Medicine Athens

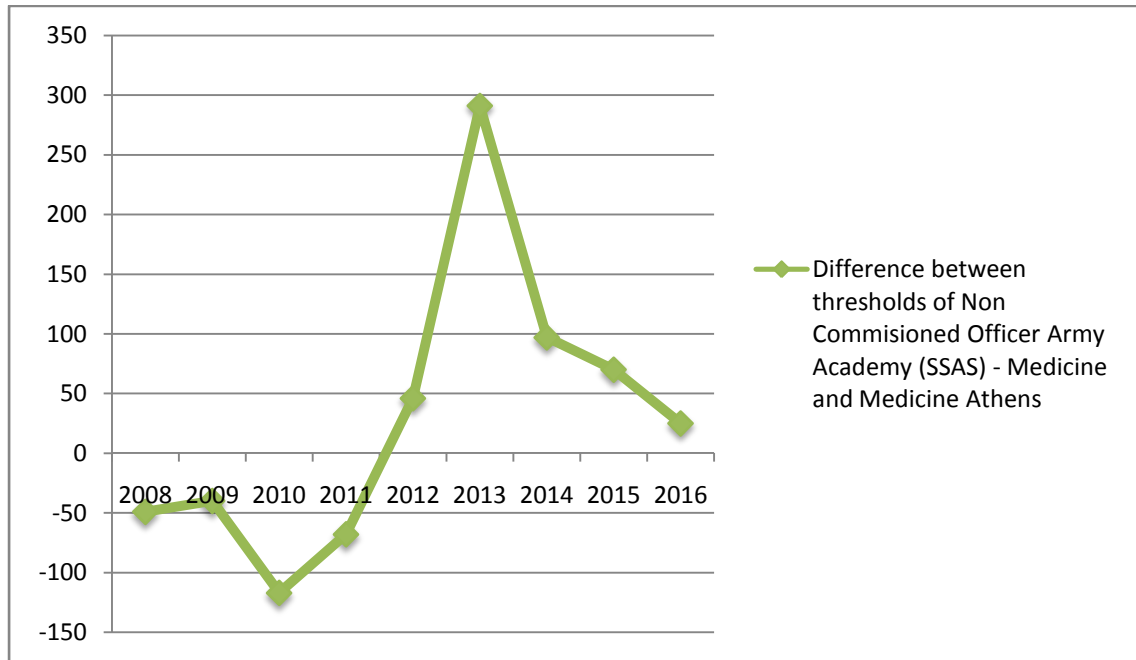


Figure 8: Difference between thresholds of Non Commissioned Officer Army Academy (SSAS) – Dentistry and Dentistry Athens

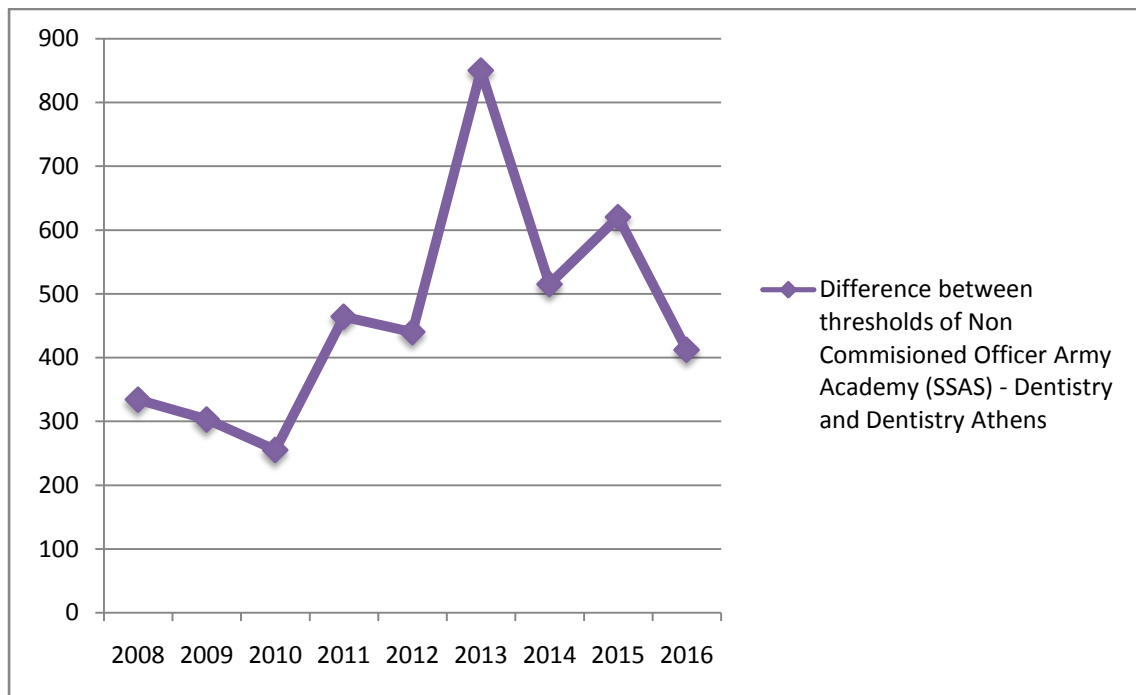




Figure 9: Difference between thresholds of Non Commissioned Officer Army Academy (SSAS) – Pharmacy and Pharmacy Athens

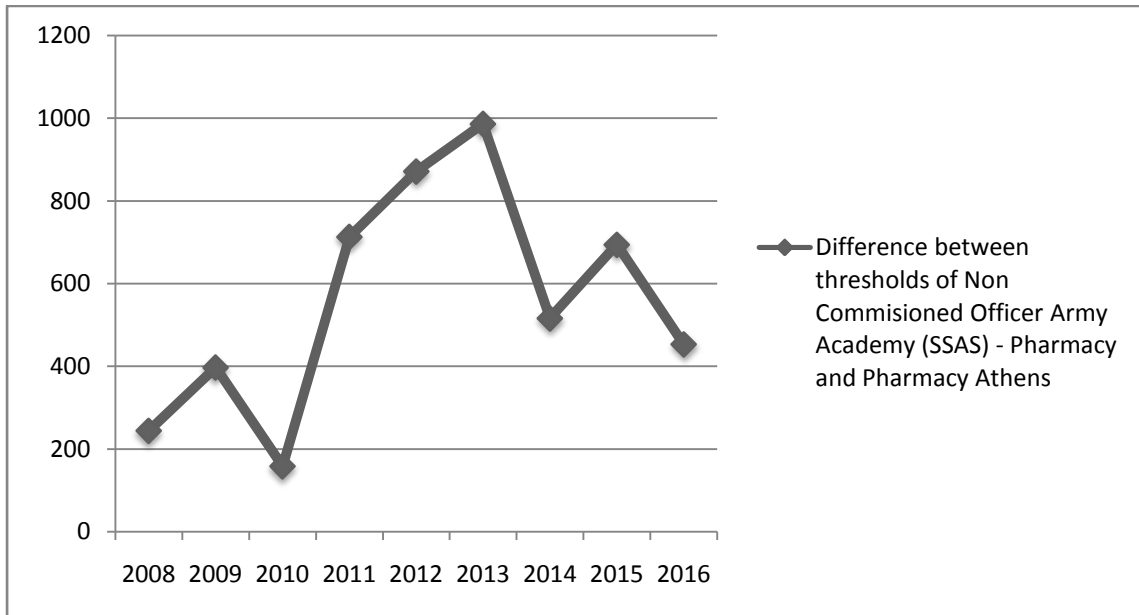


Figure 10: Difference between thresholds of Non Commissioned Officer Army Academy (SSAS) – Veterinary Medicine and Veterinary Medicine Thessaloniki

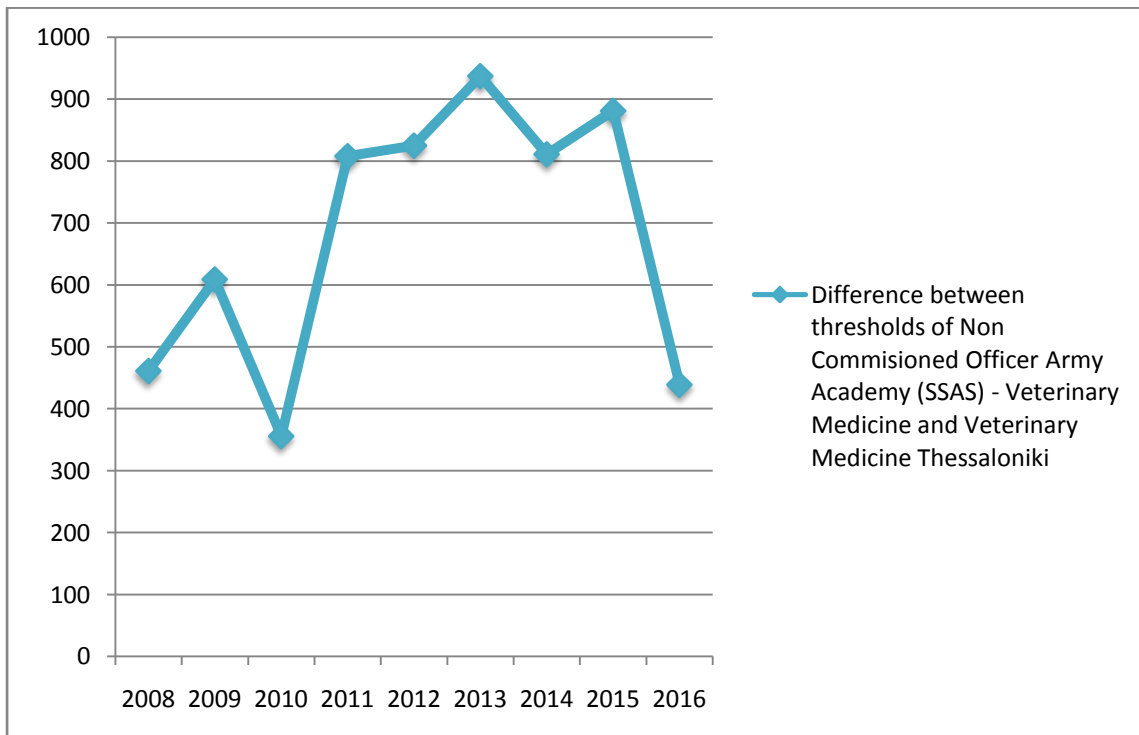


Figure 11: Difference between thresholds of Military School Nursing Officers (SAN) and Nursing Athens

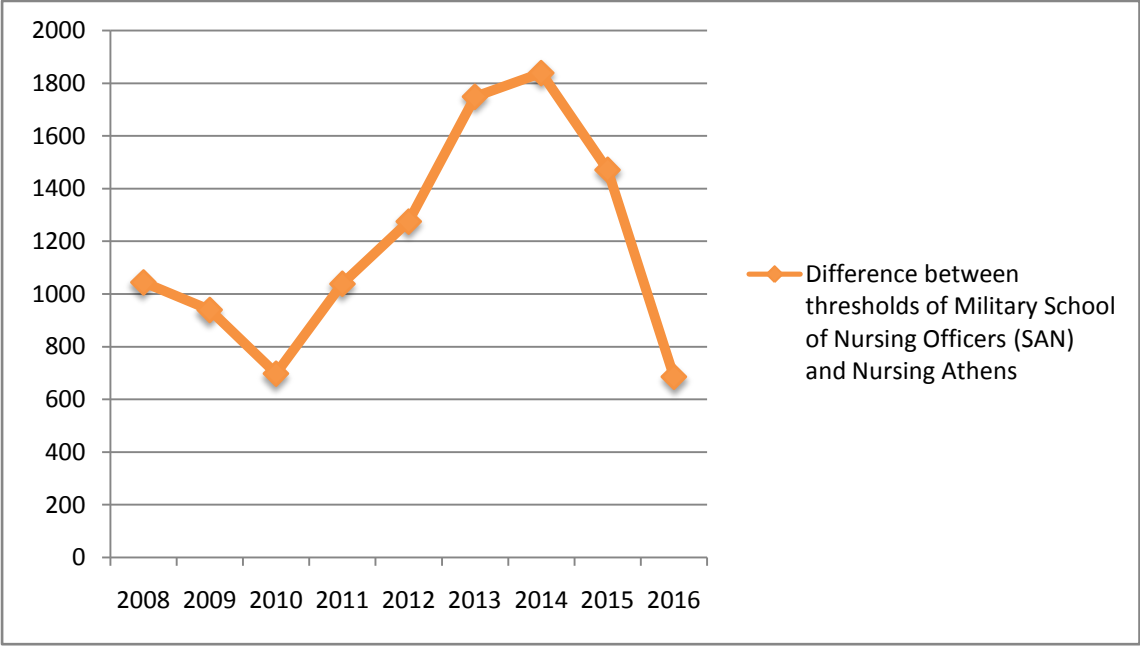


Figure 12: Difference between thresholds of Non Commissioned Officer Army Academy (SSAS) – Economics and Economics AUEB

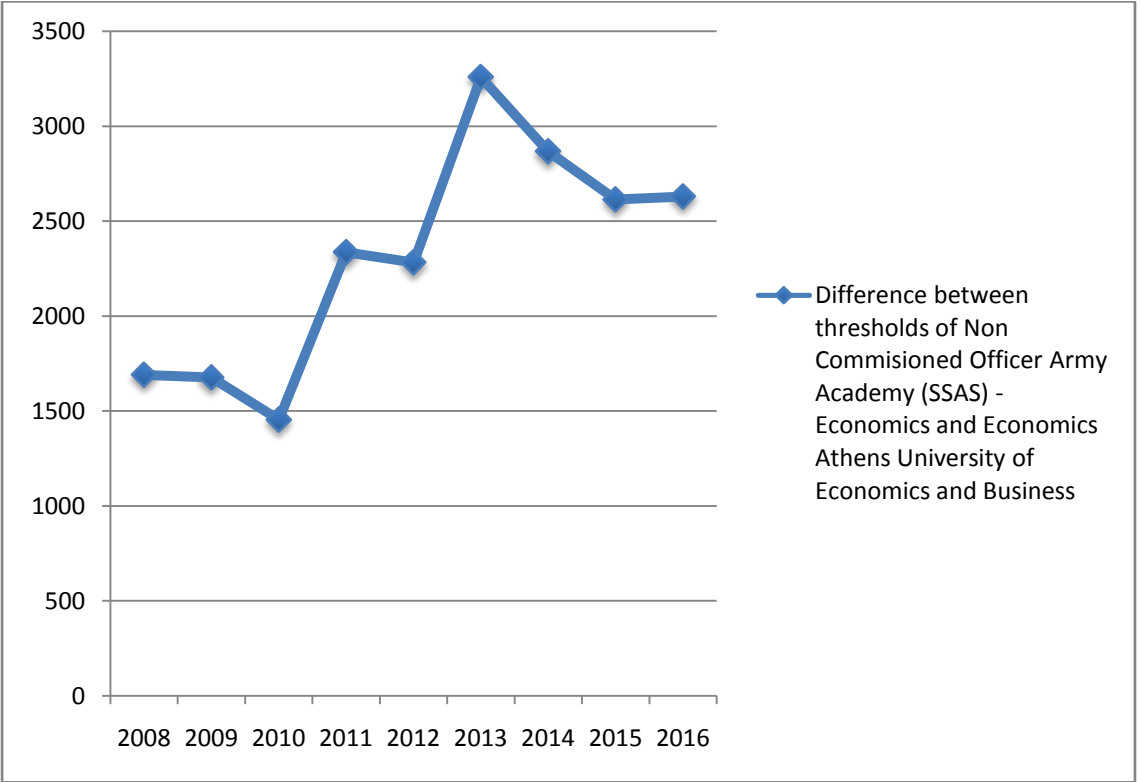


Figure 13: Difference between thresholds of Police Officers School and Police Constable School

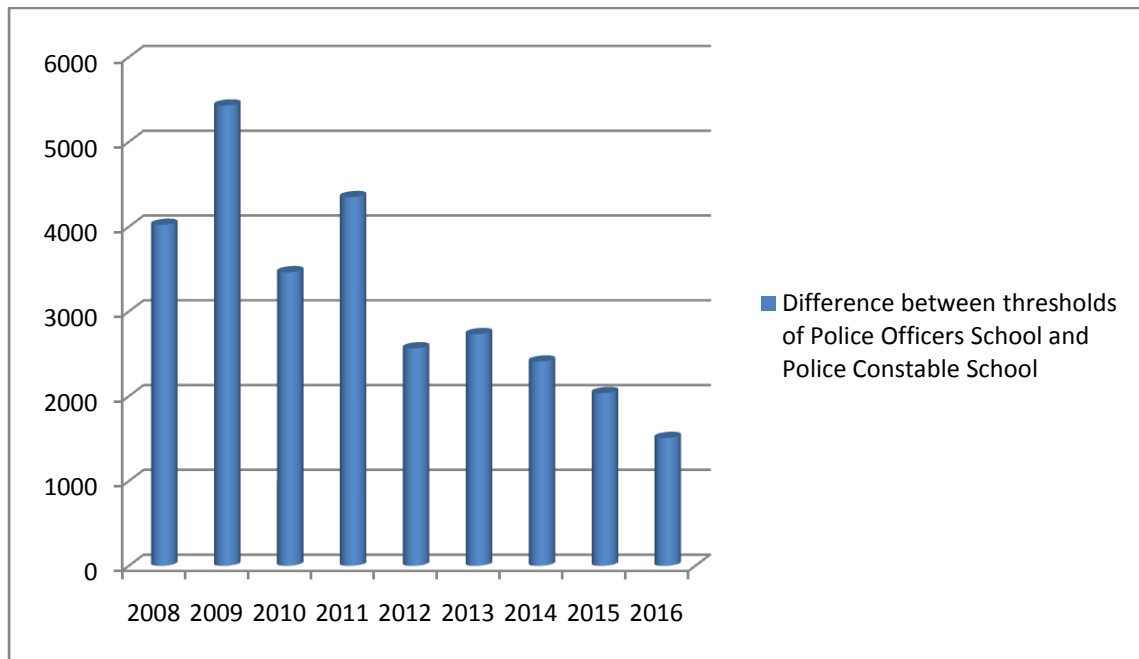


Figure 14: Difference between thresholds of Hellenic Army Academy Evelpidon (SSE) – Weapons and Military School of Combat Support Officers (SMY) - Weapons

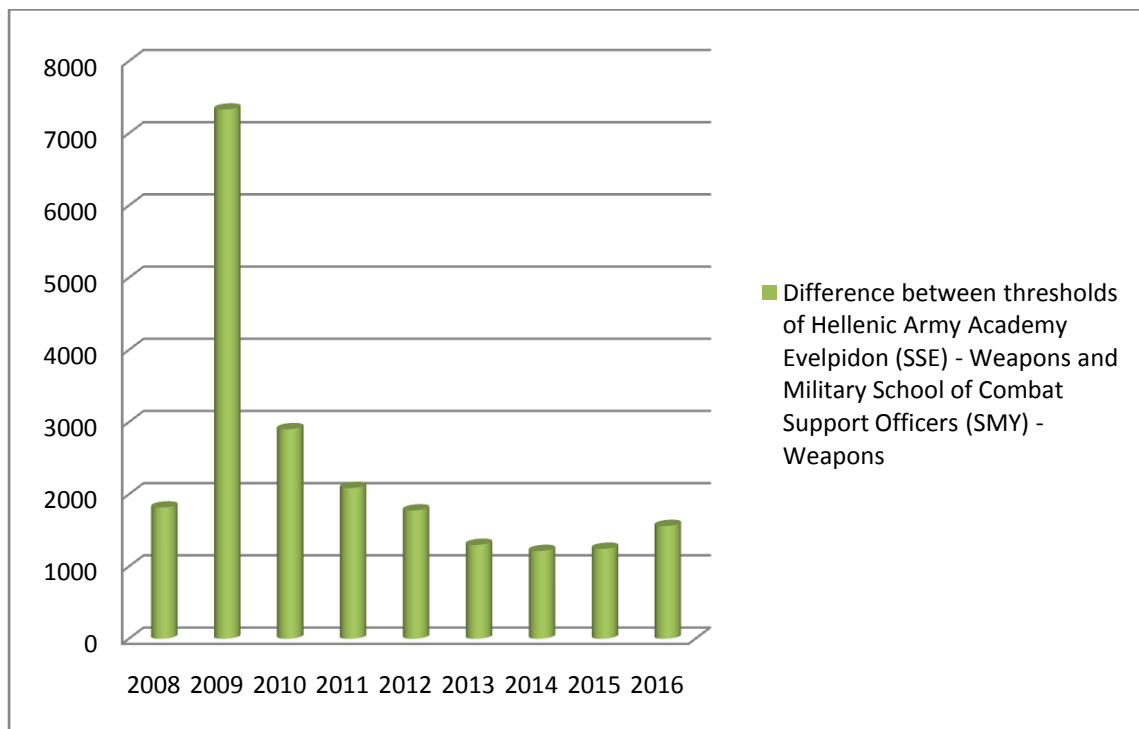


Figure 15: Difference between thresholds of Hellenic Army Academy Evelpidon (SSE) –Corps and Military School of Combat Support Officers (SMY) - Corps

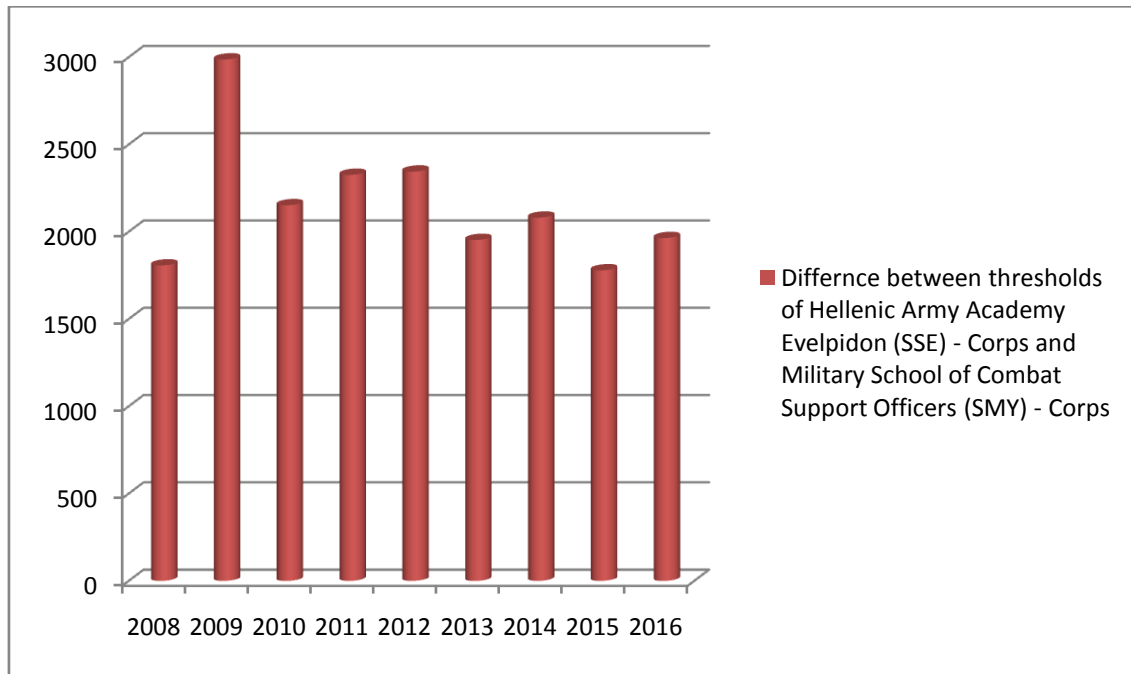


Figure 16: Comparison between preferences of new-entry departments for 2016

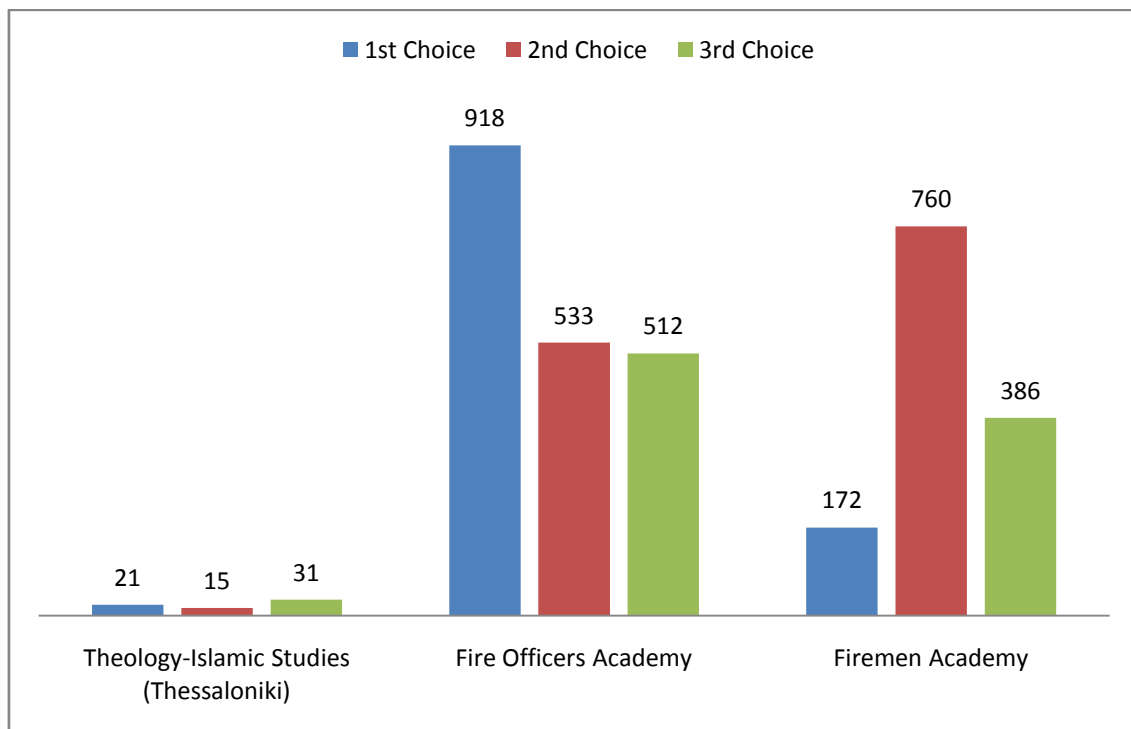


Figure 17: Comparison between preferences of new-entry departments for 2015

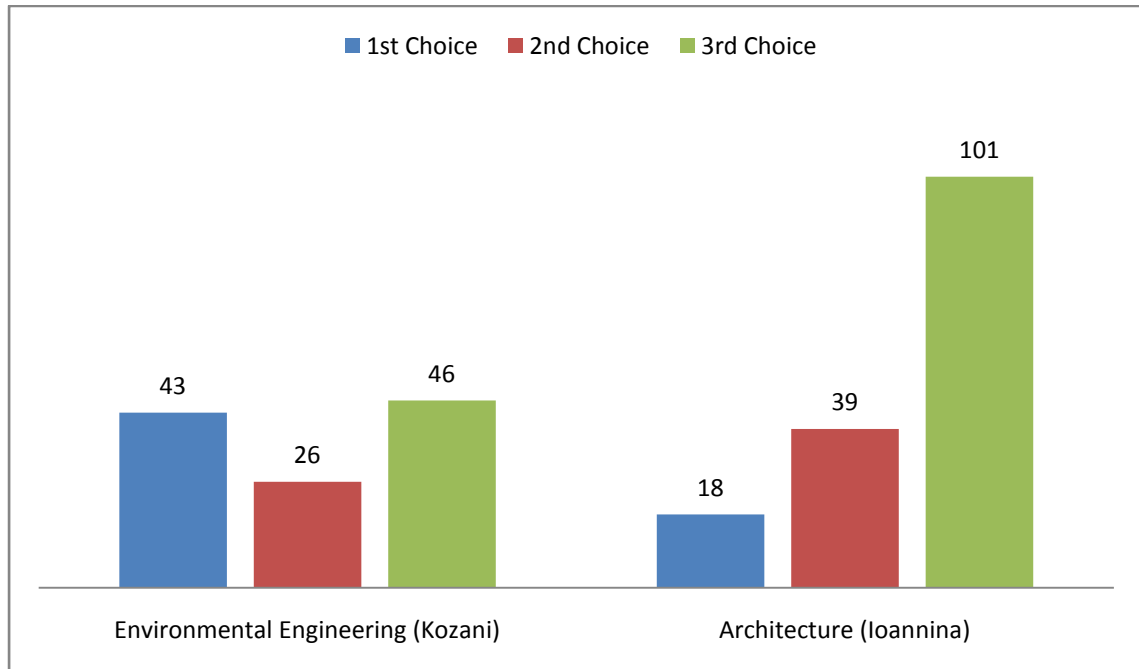
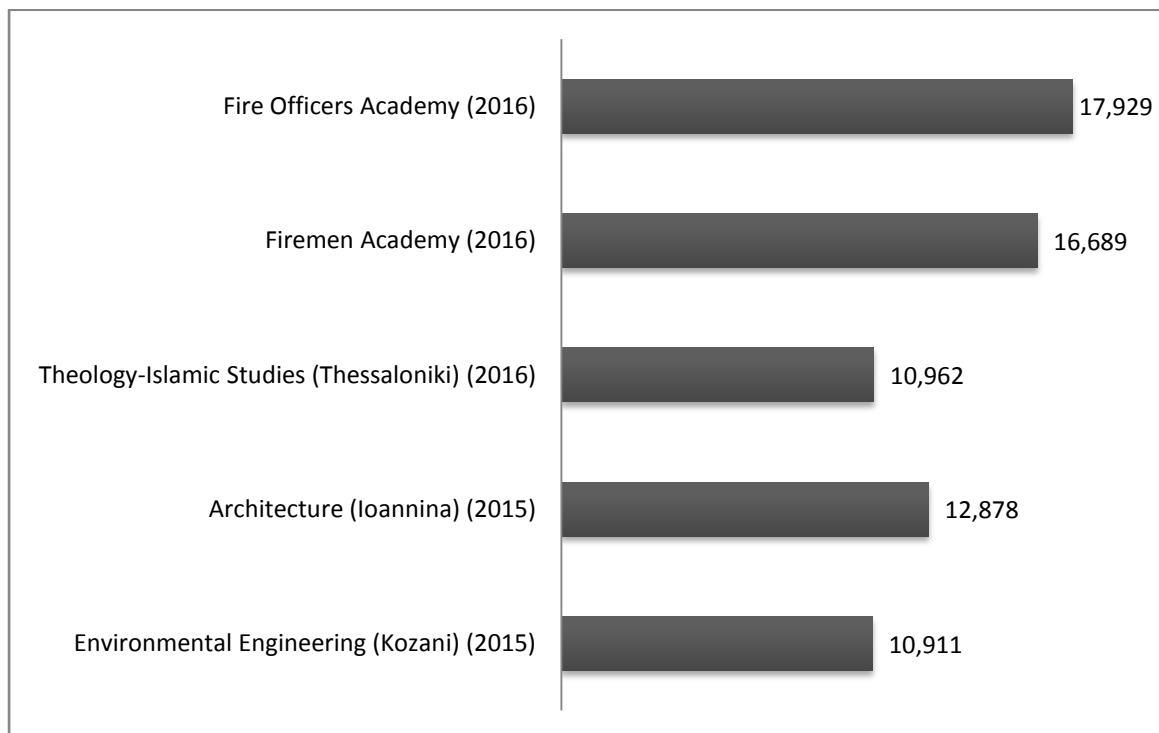


Figure 18: Comparison between thresholds of new-entry departments for 2015 and 2016



## Appendix

Table 16: Descriptive Stats

	Thresholds	1 <sup>st</sup> Choices	2 <sup>nd</sup> Choices	3 <sup>rd</sup> Choices	Outside Top 3 Choices	Aggregate Choices
Mean	13416.87	193.8175	189.0889	185.3992	4013.781	4582.087
Median	13654.50	94.00000	120.0000	130.0000	3687.500	4265.500
Maximum	19476.00	3817.000	3068.000	2942.000	15606.00	17284.00
Minimum	868.0000	0.000000	3.000000	2.000000	30.00000	68.00000
Std. Dev.	3521.203	295.3743	216.3502	193.1133	2689.646	2859.719
Skewness	-0.383778	4.334538	3.903160	4.063403	0.772655	0.762230
Kurtosis	2.536475	30.32098	30.32913	36.93945	3.522158	3.635315
Jarque-Bera Probability	126.6297 0.000000	129400.3 0.000000	127231.7 0.000000	191824.2 0.000000	419.0494 0.000000	429.5972 0.000000
Sum	50715768	732630.0	714756.0	700809.0	15172094	17320289
Sum Sq. Dev.	4.69E+10	3.30E+08	1.77E+08	1.41E+08	2.73E+10	3.09E+10
Observations	3780	3780	3780	3780	3780	3780

Table 17: Changes in Universities and TEIs

2008-2012	2013-2016
Universities	
University of Sterea Ellada (was established in 2009)	Repealed. The departments have merged with others or, in the case of the departments of Lamia, transferred their administration to the University of Thessaly and their campus has remained in the same city.
University of Western Greece	Repealed. The departments transferred their administration to the University of Patra. However, the campus of the departments remained in the city of Agrinio.
Technological Education Institutes (TEIs)	
TEI of Chalikida TEI of Lamia	TEI of Stereas Elladas was established as a result of the merging of the former TEI of Chalkida and former TEI of Lamia.
TEI of Messolonghi TEI of Patra	TEI of Westren Greece was established as a result of the merging of the former TEI of Patra and former TEI of Messolonghi.
TEI of Kalamata	Renamed as TEI of Peloponnese
TEI of Kavala	Renamed as TEI of Eastern Macedonia and Thrace
TEI of Larissa	Renamed as TEI of Thessaly
TEI of Serres	Renamed as TEI of Central Macedonia

Note: The majority of merges in universities and TEIs was only on administrative level. Only few departments repealed or transferred the location of their campuses in other cities. Consequently, the renaming of some institutions did not change anything as regards the opinion of the applicants about them. Therefore, we refer to them with their initial names for the whole period.

Table 18: The effect of unemployment on the formation of the third and outside Top 3 choices

	Dependent Variable			
	Third Choices		Outside Top 3 Choices	
	(1)	(2)	(3)	(4)
Unemployment*Foreign Languages and Literature	-4.137 (0.012)**	-4.137 (0.008)***	-56.071 (0.005)***	-56.071 (0.001)***
Unemployment*Theology and other related studies	-4.694 (0.004)***	-4.694 (0.002)***	-28.853 (0.149)	-28.853 (0.102)
Unemployment*Journalism and other related studies	-4.385 (0.033)**	-4.385 (0.026)**	-16.155 (0.519)	-16.155 (0.465)
Unemployment*Arts (Drama, Film, Music Studies etc.)	-3.613 (0.019)**	-3.613 (0.014)**	3.247 (0.862)	3.247 (0.843)
Unemployment*Education	-6.382 (0.000)***	-6.382 (0.000)***	51.275 (0.003)***	51.275 (0.000)***
Unemployment*Mathematics and Statistics	-3.157 (0.055)*	-3.157 (0.045)**	-6.314 (0.752)	-6.314 (0.720)
Unemployment*Physics and Earth Sciences	-3.034 (0.072)*	-3.034 (0.059)*	-16.248 (0.427)	-16.248 (0.368)
Unemployment*Biology, Chemistry and other related studies	0.009 (0.995)	0.009 (0.994)	31.953 (0.103)	31.953 (0.064)**
Unemployment*Nursing and other Health Studies	-2.880 (0.035)**	-2.880 (0.027)**	58.176 (0.000)***	58.176 (0.000)***
Unemployment*Agriculture, Forestry and other Environmental Studies	-2.485 (0.078)*	-2.568 (0.057)*	51.839 (0.002)***	51.840 (0.000)***
Unemployment*Maritime Studies and Tourism	-4.343 (0.019)**	-4.102 (0.021)**	-39.730 (0.078)*	-43.126 (0.030)**
Unemployment*Business and Management, Finance, Accounting	-4.014 (0.004)***	-4.104 (0.002)***	-0.624 (0.970)	-0.781 (0.958)
Unemployment*Law	12.254 (0.000)***	12.254 (0.000)***	-28.382 (0.346)	-28.382 (0.285)
Unemployment*Psychology	11.156 (0.000)***	11.156 (0.000)***	5.652 (0.834)	5.652 (0.813)
Unemployment*Physical Education and Sport Science	2.252 (0.275)	2.252 (0.254)	-4.237 (0.865)	-4.237 (0.848)
Unemployment*Police and Military	-3.985 (0.006)***	-3.985 (0.004)***	-50.982 (0.003)***	-50.982 (0.001)***



Unemployment*Merchant Marine	-2.361 (0.419)	-2.361 (0.397)	-14.007 (0.693)	-14.007 (0.654)
Unemployment*Medicine	5.397 (0.003)***	5.397 (0.002)***	-4.436 (0.844)	-4.436 (0.823)
Unemployment*Dentistry	-3.368 (0.249)	-3.368 (0.227)	2.574 (0.942)	2.574 (0.934)
Unemployment*Veterinary Science	-3.331 (0.254)	-3.331 (0.232)	-7.184 (0.839)	-7.184 (0.818)
Unemployment*Pharmacy	-3.536 (0.154)	-3.536 (0.136)	12.610 (0.675)	12.610 (0.635)
Unemployment*Engineering and Computer Science	-2.993 (0.017)**	-3.036 (0.011)**	29.603 (0.052)**	29.404 (0.028)**
Unemployment*Philology, History and Archaeology	-1.845 (0.210)	-1.845 (0.190)	6.850 (0.701)	6.850 (0.664)
Unemployment*Social, Political, European and International Studies	-3.030 (0.046)**	-3.030 (0.037)**	23.283 (0.207)	23.283 (0.152)
Unemployment*other	-4.045 (0.002)***	-4.092 (0.001)***	26.022 (0.104)	26.022 (0.066)*
Field and City F.E.	✓	✓	✓	✓
Institution F.E.		✓		✓
R <sup>2</sup>	0.47	0.52	0.60	0.69

Table 19: The effect of unemployment on the formation of the aggregate choices

	Dependent Variable	
	Aggregate Choices	
	(1)	(2)
Unemployment*Foreign Languages and Literature	-64.666 (0.002)***	-64.666 (0.000)***
Unemployment*Theology and other related studies	-41.121 (0.053)*	-41.121 (0.033)**
Unemployment*Journalism and other related studies	-28.080 (0.293)	-28.080 (0.245)
Unemployment*Arts (Drama, Film, Music Studies etc.)	-5.506 (0.782)	-5.506 (0.760)
Unemployment*Education	32.906 (0.073)*	32.906 (0.047)**
Unemployment*Mathematics and Statistics	-14.132 (0.507)	-14.132 (0.464)
Unemployment*Physics and Earth Sciences	-24.286 (0.265)	-24.286 (0.219)
Unemployment*Biology, Chemistry and other related studies	33.711 (0.106)	33.711 (0.074)*
Unemployment*Nursing and other Health Studies	51.299 (0.003)***	51.299 (0.001)***
Unemployment*Agriculture, Forestry and other Environmental Studies	45.776 (0.012)**	45.425 (0.006)***
Unemployment*Maritime Studies and Tourism	-48.646 (0.043)**	-51.129 (0.019)**
Unemployment*Business and Management, Finance, Accounting	-10.731 (0.552)	-11.034 (0.500)
Unemployment*Law	26.297 (0.412)	26.297 (0.365)
Unemployment*Psychology	48.171 (0.095)*	48.171 (0.065)*
Unemployment*Physical Education and Sport Science	6.275 (0.814)	6.275 (0.795)
Unemployment*Police and Military	-64.737 (0.000)***	-64.737 (0.000)***

Unemployment*Merchant Marine	22.608 (0.549)	22.608 (0.508)
Unemployment*Medicine	15.482 (0.519)	15.482 (0.477)
Unemployment*Dentistry	-2.028 (0.957)	-2.028 (0.952)
Unemployment*Veterinary Science	-7.428 (0.844)	-7.428 (0.828)
Unemployment*Pharmacy	4.294 (0.893)	4.294 (0.882)
Unemployment*Engineering and Computer Science	22.234 (0.171)	22.008 (0.134)
Unemployment*Philology, History and Archaeology	0.539 (0.977)	0.539 (0.975)
Unemployment*Socia, Political, European and International Studies	14.692 (0.454)	14.692 (0.409)
Unemployment*other	15.211 (0.373)	15.012 (0.332)
Field and City F.E.	✓	✓
Institution F.E.		✓
R <sup>2</sup>	0.60	0.67

Table 20: Top 20 departments based on their average thresholds (2008-2016)

Rank	Department	Average Threshold
1	Non Commissioned Officer Army Academy (SSAS) - Psychology	19226
2	Non Commissioned Officer Army Academy (SSAS) - Medicine	19153
3	Medicine Athens	19034
4	Non Commissioned Officer Army Academy (SSAS) - Law	18996
5	Non Commissioned Officer Army Academy (SSAS) - Dentistry	18993
6	Hellenic Air Force Academy - Ikaron (SI) Engineers (SMA)	18975
7	Non Commissioned Officer Army Academy (SSAS) - Economics	18951
8	Non Commissioned Officer Army Academy (SSAS) - Pharmacy	18917
9	Medicine Thessaloniki	18863
10	Non Commissioned Officer Army Academy (SSAS) - Veterinary Medicine	18767
11	Medicine Patra	18694
12	Electrical and Computer Engineering NTUA	18678
13	Medice Ioannina	18551
14	Medice Thessaly (Larisa)	18534
15	Medicine Crete (Heraklion)	18488
16	Mechanical Engineering NTUA	18474
17	Law Athens	18434
18	Medicine Thrace (Alexandroupolis)	18406
19	Dentistry Athens	18341
20	Dentistry Thessaloniki	18306

Table 21: Top 20 group of departments based on their average thresholds  
(2008-2016)

Rank	Group of departments	Average Threshold
1	Medicine	18653
2	Dentistry	18323
3	Law	18160
4	Pharmacy	18112
5	Veterinary Medicine	17832
6	Psychology	17672
7	Biology	17594
8	Electrical and Computer Engineering	17418
9	Mechanical Engineering	17240
10	Chemical Engineering	17179
11	Accounting and Finance	16977
12	English Language and Literature	16783
13	Architecture	16042
14	Civil Engineering	15787
15	Chemistry	15667
16	Physiotherapy (TEI)	15665
17	Philology	15351
18	Physics	14803
19	Speech and Language Therapy (TEI)	14785
20	History and Archaeology	14662
-	Primary Education	13858
-	Merchant Marine	9238

Note: We do not consider all the departments of Army and Police as a group due to the many differences between them. Groups consist of departments bearing exactly the same name and not according to their field of study as in the case of regressions. Therefore, only departments which could form a group are included.

Table 22: Top 20 departments based on the average of the sum of their Top 3 preferences (2008-2016)

Rank	Department	Average Top 3 preferences
1	Law Thessaloniki	3613
2	Law Thrace (Komotini)	3293
3	Law Athens	3114
4	Primary Education Thessaloniki	2939
5	Medicine Thessaloniki	2641
6	Primary Education Athens	2419
7	Psychology Thessaloniki	2407
8	Electrical and Computer Engineering NTUA	2397
9	Psychology Panteion	2250
10	Medicine Athens	2248
11	Accounting and Finance AUEB	2141
12	Mechanical Engineering NTUA	2131
13	Business Administration AUEB	2067
14	Economics AUEB	1998
15	Economis UOM (Thessaloniki)	1968
16	Police Constable School	1916
17	Physical Education and Sport Science Thessaloniki	1882
18	Electrical and Computer Engineering Thessaloniki	1850
19	Psychology Athens	1799
20	Economis Thessaloniki	1694

Table 23: Top 20 group of departments based on the average of the sum of their Top 3 preferences (2008-2016)

Rank	Group of departments	Average Top 3 preferences
1	Law	3340
2	Psychology	1880
3	Accounting and Finance	1797
4	Medicine	1430
5	Primary Education	1410
6	English Language and Literature	1396
7	Electrical and Computer Engineering	1345
8	Physical Education and Sport Science	1301
9	Mechanical Engineering	1125
10	Merchant Marine	1092
11	Economics	1063
12	Physiotherapy (TEI)	1060
13	Business Administration (Universities)	1015
14	Pharmacy	910
15	Civil Engineering	877
16	Biology	833
17	Philology	824
18	Speech and Language Therapy (TEI)	790
19	Informatics (Universities)	781
20	Aesthetics and Cosmetic Science (TEI)	752

Note: We do not consider all the departments of Army and Police as a group due to the many differences between them. Groups consist of departments bearing exactly the same name and not according to their field of study as in the case of regressions. Therefore, only departments which could form a group are included.