

Education and wage inequalities in Greece: access to higher education and its effects on income

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Summary:

Educational system in Greece has always been at the center of the public discourse not only for the shortcomings in its design but also for the quality of the education offered. Specifically, during the last decades, the rise in wage inequalities had led the Greek and international literature to investigate the existence of a possible causal relationship between the level of education and income inequality.

In this framework, the present paper examines the relationship between tertiary education and economic inequality. Taking into consideration the fact that potential inequalities in access to education can hinder the redistributive role of education, the starting point of the study is the access to tertiary education. The design of the Greek education system with its inherent flaws and the long-established under-funding prevent university candidates from equal opportunities since the entrance to tertiary education institutions relies heavily on the economic background of their families. The economic crisis more than anything highlighted these inequalities mainly through the decline of the disposable household income and exacerbated even more the already crippled abilities of the education system due to the extensive cuts that took place during this time. Nevertheless, the quantitative data reveal that although the education private expenditure, relevant to access to tertiary education, has decreased it continues to have the larger share of the total education expenditure of the households. At the same time, the poor quality of education brings in the front line the issue of skills mismatch that keeps graduates cut off from the modern labour market and its needs.

Yet, in the relevant literature education in Greece seems to have a positive impact, over time, on income inequality by yielding higher returns in lower wages, before and even after the outburst of the economic crisis. The same results are verified as well by the empirical study presented in this paper for the years 2010 and 2017, chosen in order to survey potential deviations between the beginning and the end of the crisis period. Specifically, the results reveal that for both years under examination returns to education are higher at the lower parts of the wage distribution while the observed differences are analysed in the framework of the skills mismatch phenomenon.

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Education and wage inequalities in Greece: access to higher education and its effects on income

Introduction

Rising income inequalities, have caught the attention of the literature that has documented not only their presence but also possible causes and policies of remedy. Factors such as the trends of globalization, the skill-biased technological change, as well as changes in the different national labour markets, educational institutions and tax policies have been put forward as causes for the increasing income inequality. In this context, inequalities in access to higher education and inequalities in the wage distribution stemming from differences in the level of education attained are considered significant factors. Education is considered as a principal determinant of income and of the opportunities an individual might have in the labour market, and as such is often viewed as a significant policy tool against income inequality. Accordingly, access to education is considered an important factor which can affect wage inequality.

This paper focuses on Greece and aims to contribute to our understanding of the relationship between tertiary education and economic inequality. More specifically, given that in the Greek public discourse, education, in the form and quality provided by the state is usually criticized for its many shortcomings, the paper first seeks to investigate the access of Greek youth to tertiary education. Since the redistributive role of education can be undermined by differences in the opportunities to access the educational system, an examination of access to tertiary education is deemed necessary. In addition, the present paper aims to verify tertiary's education positive effect on economic inequality for the case of Greece, by gauging its impact on wage inequality.

The first part of the paper provides a brief overview of the Greek education system so as to set the framework for examining access to higher education. The second part surveys the public and private expenditures on secondary and tertiary education, as well as the impact of the recent economic crisis in order to reach conclusions as to whether inequalities in access to higher

education exist and to what extent. The third part draws the attention to the available empirical evidence on education and wage inequality in Greece by reviewing the literature's findings while the fourth part seeks to contribute to the existing literature by estimating returns to education on the wage distribution in Greece. To this purpose the method of quantile regression is employed on the relevant data for the years 2010 and 2017 in order to capture any potential differentiations in the trends at the beginning and at the “end” of the crisis across the wage distribution. The concluding section summarizes the findings and discusses future prospects.

Overview of the Greek education system

The Greek education system is centrally organized and supervised by the Ministry of Education and Religious Affairs. Over time it has undergone through many series of major reforms and institutional changes mainly due to the alteration of different Ministers and the consequent pursuit of their own agendas. The attempted changes often reflected aspirations to adopt acclaimed educational models implemented elsewhere, therefore affecting substantially the quality of the education provided and the continuity of the educational process. Despite all these changes, the education system in the modern Greek state has not been radically reformed since the restoration of democracy and the same norms have been followed for years in terms of its operational rationale and the way of access to tertiary education.

Education in Greece is divided into three levels- primary, secondary and tertiary- in all of which, education is freely provided by the Greek State.² The three levels and their duration are presented in Table 1. The Preschool, Primary School and Lower Secondary School (Gymnasium School) are included in compulsory education while the Upper Secondary School (Lyceum School), equivalent to High School, is non-compulsory. However, the majority of Greek students attend the Lyceum School as well since it serves as a stepping-stone to tertiary education and thus it is the level that usually undergoes the most changes. At the end of the third and final year, students from all Lyceum Schools, are required to take a double examination, one on the main core courses, for their school graduation, and one on courses of an additional elective orientation group.³ The latter constitutes the national general examination (Panhellenic Exams) that is the admission exam to the Greek universities.

² The Constitution of Greece, art. 16(4).

³ Today there are three orientation groups: Humanities, Science and Economics.

Table 1. Structure of the Greek Educational System

Kindergarten	2 year	Kindergarten	
Primary School	6 years	1 st grade	Compulsory
		2 nd grade	
		3 rd grade	
		4 th grade	
		5 th grade	
		5 th grade	
Lower Secondary School (Gymnasium School)	3 years	1 st grade	
		2 nd grade	
		3 rd grade	
Upper Secondary School (Lyceum School)	3 years	1 st grade	Non-Compulsory
		2 nd grade	
		3 rd grade	
State University	4 years ⁴	HEIs and TEIs	Non-Compulsory

Each year the Panhellenic Exams draw the nation's attention and they are considered a major event. This can be attributed to the inclination of the Greek population towards academic over-qualification and the subsequent high demand for tertiary education which is stronger in the younger age groups and has intensified during the last years, as shown in Table 2. Drawing comparisons from the data, we can observe how the age group of 25-34 stands out in each of the years chosen while there are big differences with other age groups, particularly those over 45 years

⁴ The duration of the studies at universities differs according to each sector. For most sectors the duration is at least four years. For Polytechnic Universities the duration is at least five years and at least six years for Medical Schools. For TEI's the duration of studies is 3 years and a half (seven semesters) and one semester of compulsory traineeship.

old. At the same time, we observe a general trend towards increasing participation in the tertiary education across all age groups in the recent decade.

Table 2. Population by age and attainment of tertiary education (ISCED levels 5-8), %

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
25-34	28.9	30.6	32.3	34.5	37.2	38.7	40.1	41	42.5	42.8
35-44	25.8	25.9	27.2	26.5	26.9	27.1	29.6	31.3	31.8	34.2
45-54	20.8	22.2	23.2	23.3	24.5	25.6	26.5	28.2	28.8	29.2
55-64	14.1	15.6	17.6	19.2	20.8	21.1	20.2	20.9	22	21.9

Source: Eurostat

This tendency of over-qualification is often associated with the public sector in Greece.⁵ Employment in the public sector has been extremely popular among the Greek population, especially in the pre-crisis decades, as it is highly protected and offers the advantages of job security and high wages with relatively low working hours. Given the fact that in most cases high level education is a prerequisite for being employed in the public sector, the strong demand for tertiary education became deeply rooted in the population and a university degree is considered as an indispensable qualification.

The fact that during Lyceum, students prepare to participate in a series of highly demanding exams and compete for a place in a university, has greatly upgraded its importance both for the students and their families while at the same time it has downgraded its educational role and has encouraged the practice of memorization as a learning tool instead of offering more innovative and modern learning practices. The current design that puts emphasis on the examination procedures deprives students from cultivating their own inherent abilities and prevents innovative methods of learning to be established and to upgrade the quality of education. The poor quality of the Greek education can also be perceived by the continuous low performance of Greek students in the OECD's PISA results. The assessment's aim is to evaluate students in skills such as critical thinking, problem solving and analysis and data processing. Greeks students have repeatedly

⁵ See among others Psacharopoulos and Papakonstantinou (2004) and Tsakoglou and Cholezas (2005).

failed to score above the OECD students' average. To put it in numbers, according to the 2018 results, that do not bear much differences to the ones of the previous rounds, 2 out of 10 students in Greece are not able to perform standard problem solving in all three areas examined- reading, mathematics and science. These results demonstrate a reality where the education system and its relevant shortcomings in funding, staff and quality are a primary factor in producing underachieving students.

Tertiary education is provided by public institutions, which are established as Highest Education Institutions (AEIs) (universities) and as Technological Education Institutions (TEIs). The latter mostly regard the acquisition of applied knowledge and skills. Although tertiary education studies are free of charge in undergraduate and doctoral level, masters are typically offered on pay. At present there are 25 AEIs and 12 TEIs operating in Greece.

A significant number of private sector institutions of primary and secondary education are established as well, as shown in Table 3, which are equivalent to the public schools. According to the data, the number of private schools is disproportionately higher in the pre-school and primary levels indicating that the demand and needs of Greek parents cannot be covered by the existing public structures. Regarding tertiary education, the establishment of private institutions is currently prohibited.⁶ However, at present, there are 11 colleges established and operating in Greece.⁷ The study programmes offered by these institutions are subject to validation agreements with foreign universities which are monitored by the Ministry of Education.⁸ Since 2015 the degrees offered are considered equivalent to those offered by AEIs for the rating and the wage evolution of the employees.⁹

⁶ The Constitution of Greece, art. 16(8).

⁷ Hellenic Colleges Association, 2019

⁸ Law 3696/2008, Government Gazette 117 A'

⁹ Opinion No. 276/2015 of the Legal Council of the State.

Table 3. Public and Private education institutions, 2016/2017

Level	Public	Private
Kindergarten	5056	616
Primary School	4346	163
Secondary School	725	98
Upper Secondary School	255	92

Source: Ministry of Education and Religious Affairs and Author's calculations

Most Greek students however attend public schools. During the 2008/09 term, 34.876 students were enrolled in private schools of general secondary education while at the same period 531.385 students were enrolled in the respective public schools.

Public and private expenditure on education and the effects of the economic crisis

Expenditure on education can significantly affect its quality, especially in times of financial distress. Even though education is a public good offered freely in Greece, families have to make significant investments before and during the course of their children's university studies. In this spirit, public and private expenditures in education will be examined as well as the impact of the economic crisis in order to survey the extent to which inequalities in access to education are produced.

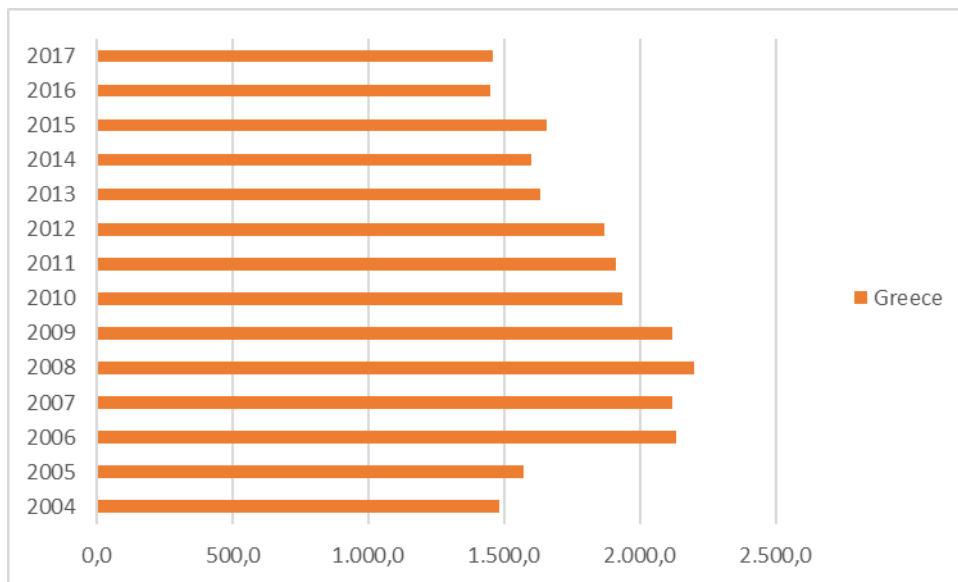
2.1 Public expenditure

Public expenditure on secondary and tertiary education in Greece has been lagging behind the European average even before the economic crisis. In a sector that has long been dysfunctional and has failed to keep up with European standards, the impact of the economic crisis was extensive and deprived it even of its basic means. Over time, education has ranked between the fourth and fifth place in government expenditures, behind social protection, health and social services (IOBE 2019a). Compared to EU-28 public expenditures, in 2007 education absorbed 7.6% of

the general government expenditure in Greece, while the corresponding rate for the EU-28 was 10.9%. Such data indicates that the education sector was lagging behind long before the crisis.

Public expenditures were severely affected by the financial crisis and the ensuing recession. During the period 2008-2016 GDP declined by 26% (in real terms), while the level of national debt skyrocketed to 181.1% by 2018. The austerity policies imposed by the three Economic Adjustment Programmes led to severe cuts in public spending (Figure 1). Accordingly, public education's budget faced a reduction of 36%, which was implemented through a reduction of educational personnel's wages and a reduction of operational expenses.

Figure 1. Total general government expenditure on tertiary education, million euros



Source: Eurostat

The cost of human resources of the education sector, referring mainly to the wages of the educational and administrative staff, were significantly reduced from 2010 onwards, while the largest reduction in labour costs occurred in higher education. Under such circumstances, the quality of the education offered was severely affected and the importance of the private sector in substituting public structures increased.

The freeze on the recruitment of public servants imposed in the context of the austerity measures was extended as well in schools and universities. At the same time, the major reform that took place in the pension system led many people-close to retirement age- to accelerate their

retirement plans in order to get a pension under the “old” and more generous system (Anastasatou and Tsakloglou 2019). This combination, and counting in the fact that a significant number of skilled academics decided to move abroad in search of better working and research opportunities, led to severe personnel shortages, since no new staff was being hired to replace the retirees. As a result, many institutions and schools relied mainly on temporary staff, hired on short-term contracts, an element that heavily compromised the quality of education and the services offered in public schools and universities.

In comparison to the primary and secondary education level, where the reduction in labour costs for the educational staff was kept under 10% during the period 2008-2012, the reduction in the labour costs of the personnel of tertiary education reached 18% (Fragiskou and Paplomatas 2014). If one takes into consideration the continuous flow of students' enrolling in tertiary education and therefore their increasing number, these developments are even more alarming. At the same time, substantial reductions in the operational budgets also forced many schools and higher education institutions to cover the maintenance costs at a bare minimum level. Giousmpasoglou, Marinakou and Paliktzoglou (2016) observe that many Greek universities came to the verge of collapse due to the harsh austerity measures. In 2011 and 2012 the national education budget was reduced by more than 5% while in 2015 a total budget of 877 million euros was allocated to Tertiary education from which, less than 30% was destined to infrastructure, equipment and research (Giousmpasoglou, Marinakou and Paliktzoglou 2016). Under such circumstances the quality of public education has been compromised and the role of the private market has been upgraded.

2.2 Private expenditure

The eagerness for a place in a university, combined with the shortcomings of the Lyceum schools to adequately prepare students for their entrance examinations has created during the last decades a parallel market of private education. Crammer schools (*frontistiria*) and private tutors offer parallel teaching of school's material and foreign languages courses, mainly in order to better prepare students for the highly competitive Panhellenic Exams. Practically that means that for at least two years, families must cover supplementary private education expenses which, over the years, have come to stand above the state's spending per student (Psacharopoulos and Papakonstantinou 2005). As a result, secondary education traditionally had the lion's share in the allocation of the private education expenditure; in 2004, secondary education absorbed 55% of

private education expenditure. Overall, before the crisis, a significant increase was observed- private education expenditure rose from 2.8 billion euros in 2004 to 3.2 billion euros in 2008.

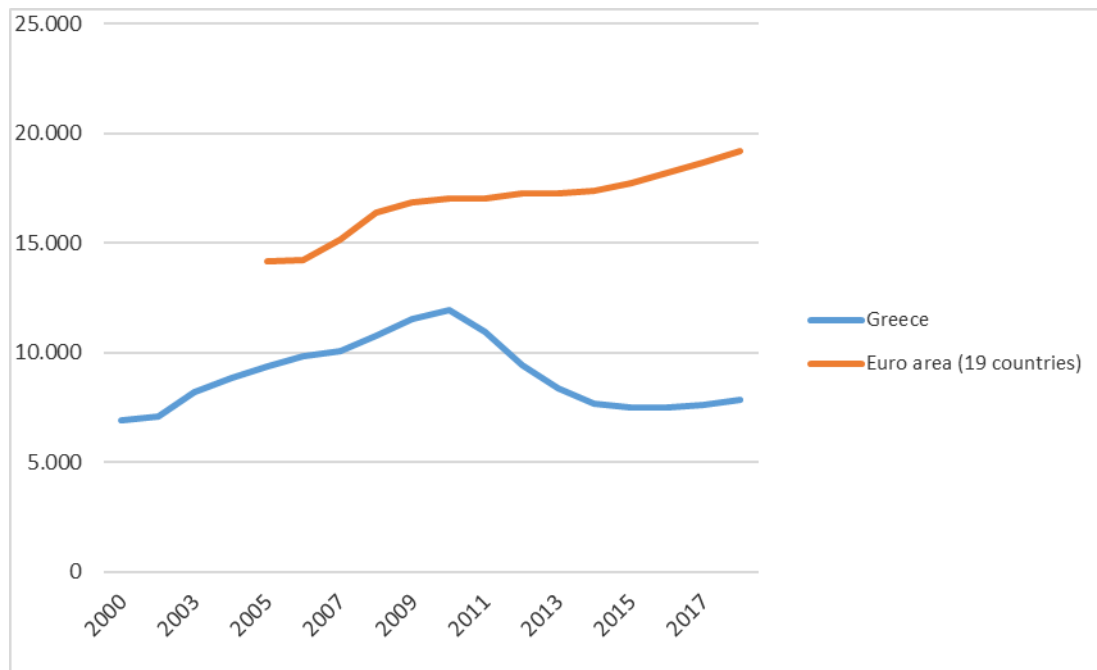
The economic crisis affected greatly the households' expenditures on education by compressing them downwards. A significant decline of families' expenditure on private schools was recorded during this period- out of the total family expenditure on secondary education, 15% was for private schools in 2004 while the same rate in 2016 fell to 12% (IOBE, 2019a).

In 2017 the average level of gross household adjusted income per capita in Greece had fallen to 66.6% of the EU-28 average.¹⁰ The unemployment rate rose to 27.5% in 2013, the highest rate recorded during the crisis and labour market insecurity became the norm in Greek society. The financial distress under which households were found after 2009 led to a sharp drop in the disposable household income (Figure 2). As a result, numerous families were found with one or both parents out of employment, forcing households to cut back on basic expenses and compromising their ability to support private investments on education that could enhance students' chances in getting into a university.

Consequently, secondary education expenses fell to 51% in 2010 and to 49% in 2016, but maintained the first place in the family education budget (IOBE 2019a). It is interesting to note that while the expenses on private schools declined sharply revealing a high elasticity demand, a low elasticity demand is revealed for supplementary secondary education as the expenses on crammer schools remained steadily high. During the years of the economic crisis the share of crammer schools in private expenditures has grown from 33% in 2010 to 37% in 2016. Consequently, despite the aforementioned difficulties, the number of students that enrolled in public universities after school remained steady and even increased slightly as presented in Figure 3.

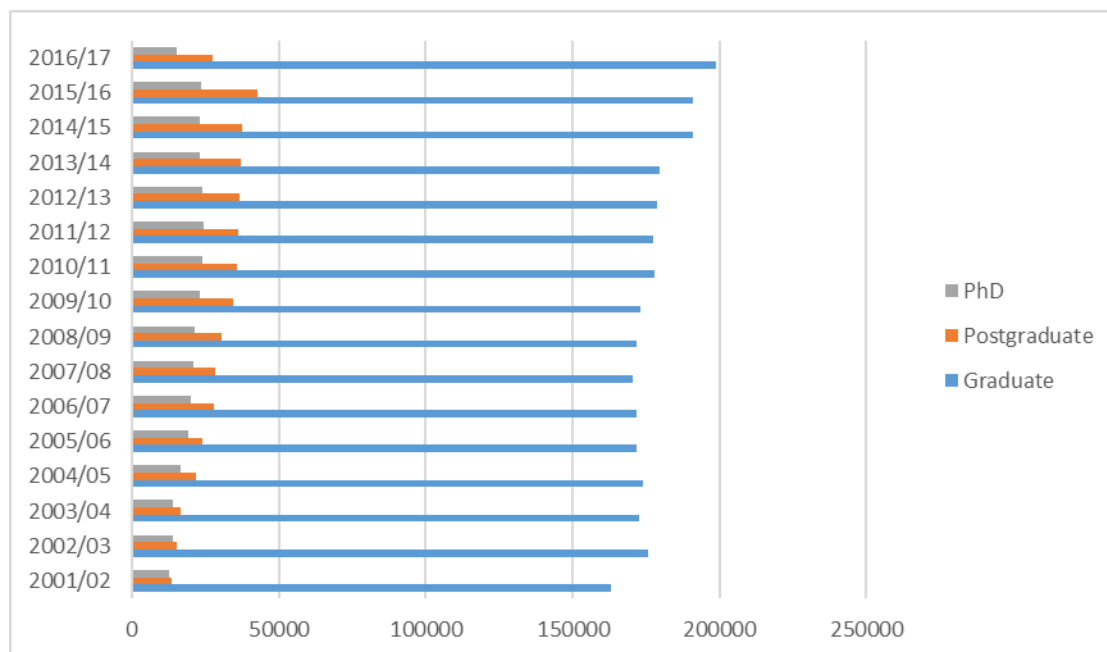
¹⁰ Eurostat 2019.

Figure 2. Median Equivalized Household Income (euros)



Source: Eurostat

Figure 3. Number of enrolled students in tertiary education, by type



Source: ELSTAT

Preparation for the national exams covers only a part of the education costs that households have to cover in regard to higher education. At the level of tertiary education, the largest share of expenditures is absorbed by postgraduate studies (Master's) that are offered on pay in the Greek education system. Although there are also the hidden expenses of the university students' living costs, especially if the university of their choice is located in another area or town than their hometown, Master's hold the dominant place in private investment on tertiary education in both the pre-crisis and post-crisis period. In particular, a paradox has emerged, evident also in Figure 3. Expenses on postgraduate studies, after declining in 2010, demonstrated a significant rise during the years of the crisis reaching 86% of the annual household expenditure on tertiary education compared to 64% in 2008 (IOBE 2019a).

The data presented above verifies the inclination of the Greek population towards academic over-qualification and the notion that more academic credentials are able to guarantee a place in the labour market. The entrance to tertiary education thus depends to a large degree on the financial ability to prepare students for the examination process and the private sector, in the form of supplementary education, has a significant role to such an extent that can impact students' life decisions or exams' outcomes. The inherent faults in the design of the education system leave room for inequalities in access to education that became more pronounced under the effects of the economic crisis. It is noted that from 2010 onwards, the unemployment rates of university students' parents have risen, while there was also a continued rise (from 2001 to 2014) in the share of university students coming from families with a "high" or "very high" social and educational background (IOBE 2019b) painting thus a clear image of inequality. Such students are usually over-represented in highly demanding faculties, such as medicine, law, economics or engineering, where significant investments are needed to be made by the families in order to guarantee access to the university (Tsakloglou and Cholezas 2005). On the contrary, less well-off students are found to be the majority in faculties of humanities.

In addition, the ability to obtain further qualifications through a postgraduate degree also depends largely on households' economic ability. Therefore, the current design of the education system and the way in which it operates has an inherent tendency towards inequality, since students from less wealthy economic backgrounds cannot afford the costs of supplementary

education that could secure them a place in a public university or pursue further education through a postgraduate programme.

In light of the above evidence, which gives a clear image of the investment households make in order to gain access to tertiary education, the next section explores the relationship between education and wage inequalities as it has been surveyed in the existing literature.

Education

Education is often seen as a policy tool for tackling inequality and allocating resources effectively. Specifically, for Greece, the provision of free education services allows for resources to be progressively redistributed from wealthier households to the less privileged ones, creating, in theory, a framework for equal access to education and equal opportunities to employment at a later stage. However, as examined in the previous section, equal access to higher education is not fully supported by the current state of the education system. Furthermore, empirical evidence verifies the long-lasting presence of wage inequality in the Greek labour market, specifically under the prism of education.

3.1 Empirical Evidence

Patrinos (1995) based on 1977's data of the Special Wages and Salaries Survey estimated a positive relationship between a father's educational level and returns to schooling for his child. A possible explanation put forward regards the job attainment process in Greece and mainly the potential contacts and networks of communication that a father with a better educational and social background might have. Following this argument, job search for an individual coming from a more privileged family background might prove more profitable and yield positive results in education returns; family is a strong and decisive institution that determines a child's life chances to a substantial degree (Corak 2016). Similar results are estimated by Tsakloglou and Antoninis (2001), using the 1993/94 House Budget Survey, who also find a positive relationship between the educational level of a father and his child's returns to schooling, while different returns are estimated for different education levels. Their results indicate that over-time Greece can be classified as a low-return country where more education does not necessarily lead to increasing wage benefits in the labour market.

Other studies find different results. Before the economic crisis, returns to education have been found to be higher in the lower bottom of the wage distribution with the overall effect to be wearing off, despite the continuous educational upgrade of the Greek workforce. In particular, Pereira and Martins (2000) using evidence for the 1980-1995 period and estimating quantile regressions of Mincer equations, find that returns to education were higher for those at the bottom deciles indicating that those found at the lower part of the wage distribution have greater returns on education. It is remarkable the fact that out of the fifteen European countries analyzed Greece was the only case, alongside with Germany, to demonstrate higher returns to education at the lower wage distribution, while a clearer pattern of higher returns to the upper quantiles emerged from the rest of the countries. Education in the two countries, seems to have a significant contribution in reducing the intra-education income inequality. However, in the overall distribution, returns are decreasing giving a negative slope in the relationship between wages and educational attainment.

Chletsos and Roupakias (2018) on the other hand make an important distinction between the pre-crisis and the after-crisis period in order to note any potential differences in the pattern of education and wage inequality in Greece. With the use of two Labour Force Surveys for 2006 and 2016, it is estimated that for the ten-year span, returns to education have increased. However, in the period before the crisis it is observed that returns to education are higher at the bottom end of the wage distribution, a pattern that seems to be disturbed in the after-crisis period where returns to education seem to be moving towards the top of the distribution. A possible explanation put forwards by the authors is based on the phenomenon of skills mismatch, where during the period of the economic crisis, overqualified individuals were occupied in low-paid jobs. As a result, the higher returns to the upper quantiles seem to be "virtual" since they have not increased per se but only seem to be increasing due to the higher than usual concentration on people with high education credentials to the lower parts of the wage distribution.

Investigating further the skills mismatch issue, it is important to note that during the crisis, Greek governments have implemented a series of reforms, stemming from the Economic Adjustment Programmes, that among other things, aimed at creating a more flexible and open labour market. At the same time, unemployment rose to extreme highs and wages were adjusted downwards. Despite the fact that holders of tertiary education degrees have had, over time, the lowest

unemployment rates, as shown in Table 4, the skills mismatch phenomenon was strengthened during the crisis when high-skilled individuals were employed in low-paid jobs that require lower or no skills, magnifying the phenomenon of overqualified employees that has been long been present in Greece (Petrinos 1997). Skills mismatch is seen as a factor contributing to wage inequality since it distorts the returns to education. Interestingly, Barcena-Martin, Budria and Moro-Edigo (2012) using data from the period 1994-2001, estimate for 12 European countries, that mismatched employees, graduates of tertiary education, earn on average 11.7% less than well-matched employees. The individual results for Greece amount to an average 17,4% loss on wage, while the higher losses are located in the intermediate levels of the wage distribution. Even before the crisis, the expansion of education has been rapidly leading to the “production” of many university graduates that, during the crisis, could not be absorbed appropriately in the private sector, while the public sector was also reduced in size. More generally, the over time declining return to higher education, before the crisis, indicates that the demand for highly skilled, in the sense of academic credentials, individuals in the Greek labour market is limited since they cannot be effectively absorbed.

This bring us back to the issue of quality in the Greek education offered in both schools and universities as the massive number of graduates that is annually produced seems to be cut off from the needs and the reality of the labour market. As a result, many employment posts are left empty and many individuals with significant prior investments on education remain out of the labour market. Reckoning also the phenomenon of brain drain that has led skilled labour force to abandon the Greek labour market, the Hellenic Federation of Enterprises (SEV) observes that more than academic titles and technical skills, enterprises are struggling to locate candidates with high horizontal skills, such as problem solving, teamwork ability, pro-active and initiative-taking orientation or an enhanced learning ability, that can be primarily developed within the framework of formal education. This changing pattern in the demand for skills can be used in order to explain rising income inequality in the labour market since it undermines the contribution of the education acquired.

In 2019 one in three Greeks was reported to be occupied in a job, which required a lower set of skills than their own, while the phenomenon of overqualified labour was increased by 60,6% between 2008 and 2019 (SEV 2019).

Table 4. Unemployment rate (%) by education attainment level (15-74 years old, both sexes)

	Less than primary, primary and lower secondary education (ISCED levels 0-2)		Upper secondary and post-secondary non-tertiary education (ISCED levels 3-4)		Tertiary education (ISCED levels 5-8)	
	EU-28	Greece	EU-28	Greece	Eu-28	Greece
2005	19.6	8.9	9.3	12	5	8
2006	20.1	8.2	8.3	10.8	4.6	7.3
2007	17.6	7.6	7	9.9	4	7.1
2008	14.6	7.5	6.5	8.9	3.8	6.4
2009	15.5	9.5	8.4	11.1	5	7.5
2010	22.7	12.7	9	14.6	5.4	10
2011	26.4	18.1	8.9	20.3	5.5	14.2
2012	28	26	9.6	27.7	6.1	18.4
2013	29.9	29.8	10	31.2	6.4	20.4
2014	28.3	28.2	9.4	30.2	6.1	20
2015	25.1	26.7	8.7	27.6	5.6	19.9
2016	22.2	26.4	7.8	26.2	5.1	18
2017	18.1	24.3	6.9	23.9	4.5	16.5
2018	15.5	22.3	6.2	21.8	4.1	14.2

Source: Eurostat

Summarizing the existing evidence presented in this section, we observe that in the case of Greece, given the fact that returns to education are estimated to be higher in the lower parts of the wage distribution, education seems to contribute to income redistribution. However, this

conclusion should be qualified, given the pre-crisis trend for declining overall returns to education and the existence of the skills mismatch phenomenon and inequalities in access to higher education.

Quantitative Analysis

In this section we perform a statistical estimation for returns to education on different quantiles of the wage distribution, using the quantile regression method, for Greece in 2010 and 2017. The analysis follows the approach used by Biagetti and Scicchitano (2011) who examine the effect of education to the wage distribution for eight European countries, Greece included. The main goal is to note if any differences exist between the two years under examination given the fact that major developments regarding the labour market conditions took place in the period between these years, which could well have impacted the returns to education.

4.1 Data selection and description

The analysis focuses on Greece with data retrieved from the Eurostat EU-SILC database for the years 2010 and 2017, in order to capture any differentiations in the observed patterns between the beginning and the end of the economic crisis.

Following the approach of Biagetti and Scicchitano (2011), the analysis focuses on male full-time employees, aged between 25 and 65 years old. The reason why women are disregarded lies in potential selectivity issues due to their low participation rate in the labour market (Chletsos and Roupakias, 2018). The age span of 25 to 65 seeks to capture the “productive years” of an individual under the assumption that people younger than 25 are most likely to be still enrolled in tertiary education and not be able to actively participate in the labour market, while people older than 65 are most likely to be in their pension years. In regard to years of education, the EU-SILC database does not provide such a variable. Instead, the level of education is provided using the International Standard Classification of Education (ISCED) of UNESCO. As a result, the minimum legal number of years required for the completion of each level has been assigned in order to calculate the years of education.¹¹

¹¹ For 2010 the 1997 ISCED classification was used while for 2017 the latest classification of 2011.

Following the study by Biagetti and Scicchitano (2011), the dependent variable is the logarithmic gross monthly wage. Years of education is the first variable used as a regressor, the number of years in paid work variable is used as a proxy for individual work experience and serves as the second regressor while its square is the third and last regressor in order to account for non-linearities. After dropping observations with missing data, for each variable individually, the summary statistics for the variables are presented in Table 5.

Table 5. Summary statistics of the variables

Year	Variable	Obs.	Mean	Std. Dev.	Min	Max
2010	Wage	1.633	1597	936.86	230	12.417
	Education	2.788	12.4	3.6	1	20
	Work Experience	2.794	20.8	10.74	0	51
Year	Variable	Obs.	Mean	Std. Dev.	Min	Max
2017	Wage	11.112	1128.356	677.33	57.5	12.417
	Education	12.550	12.8	3.6	0	21.5
	Work Experience	37.540	25.4	13.81	0	50

4.2 Econometric approach

Following the practice most used in the literature,¹² both OLS and quantile regression models are estimated in order to compare the results. In contrast to an OLS model, quantile regression is frequently adopted in similar studies as it can capture the effect of the regressors at different points of the distribution instead of the conditional mean given by a classic OLS approach (see Koenker and Bassett 1978). As a result, we can observe how the effect of education changes across different levels of wages.

First, OLS models are estimated for the two periods in the following form:

$$\ln w_i = \alpha_i + \beta_1 E + \beta_2 S + \beta_3 S^2 + u_i$$

¹² See among others Pereira and Martins (2000), Biagetti and Scicchitano (2011), Chletsos and Roupakias (2018).

where E stands for years of education and S stands for work experience. The results of the OLS estimations are presented in Table 5.

The quantile regression model estimated has the following form:

$$Quant_{\theta}(\ln w_i) = \beta_{\theta 1}E + \beta_{\theta 2}S + \beta_{\theta 3}S^2 + u_{\theta i}$$

where $u_{\theta i} = Quant_{\theta}(\ln w_i) - \beta_{\theta 1}E - \beta_{\theta 2}S - \beta_{\theta 3}S^2$

Taking into consideration that the estimators are subject to the minimization of the squared residuals for each quantile, the regressors are estimated based on the below equation:

$$\beta_{\theta i} = \min \sum_i Quant_{\theta}(\ln w_i - \beta_{\theta 1}E - \beta_{\theta 2}S - \beta_{\theta 3}S^2)$$

4.3 Results

As shown in Table 6, OLS returns to education have been estimated as well as conditional returns to seven quantiles of the wage distribution, from the lowest quantile ($\theta 95$) to the top ($\theta 05$). In both cases positive and statistically significant at the 1% level effects are estimated. Regarding the OLS estimation, 2017 yields a higher coefficient (5.7%) than in 2010 (4.9%). In the quantile approach we can observe that for both periods, the returns of education to wage are higher at the bottom of the wage distribution rather than at the top quantiles. This effect seems to wither away while moving to the upper quantiles; this trend is stronger in 2017 than in 2010. Practically, that means that one more level of education e.g. from graduate to postgraduate level, increased the lower wages (the lowest part of the distribution) by 6.2% in 2010 and by 6.5% in 2017. The same contribution for the wages at the top of the distribution amounted to 4.7% and 3.9% for the respective years. Consequently, the results are in accordance with the rest of the existing literature that has shown higher returns to the lower quantiles of the wage distribution.

Table 6. Estimations of returns to education

	OLS	θ95	θ90	θ75	θ50	θ25	θ10	θ05	Number of obs.
2010	0.050 (0.002)	0.062 (0.005)	0.055 (0.004)	0.049 (0.003)	0.045 (0.002)	0.048 (0.002)	0.048 (0.005)	0.047 (0.01)	2075
2017	0.057 (0.001)	0.065 (0.003)	0.06 (0.003)	0.057 (0.002)	0.056 (0.001)	0.054 (0.002)	0.047 (0.002)	0.039 (0.004)	4967

Table 6. Estimations of returns to working experience

	OLS	θ95	θ90	θ75	θ50	θ25	θ10	θ05	Number of obs.
2010	0.040 (0.03)	0.034 (0.016)	0.034 (0.006)	0.038 (0.004)	0.035 (0.003)	0.040 (0.004)	0.044 (0.007)	0.049 (0.012)	2075
2017	0.032 (0.001)	0.030 (0.006)	0.027 (0.005)	0.033 (0.003)	0.033 (0.002)	0.035 (0.002)	0.031 (0.003)	0.030 (0.003)	4967

Regarding the second regressor, working experience as measured by the years in paid work, in 2010 the impact of working experience on the wage distribution seems to fluctuate more than in 2017. In both years, working experience has a greater contribution on wage at the top quantiles of the distribution which is higher in 2010- 4.9% at the top 5% of the wage distribution in 2010 versus 3% at the top 5% of the wage distribution in 2017. The same impact amounted to 3.4% and 3% for the respective years for the 95% of the wage distribution- the lower wages. Overall, working experience as a determinant of wage seems to have lost its previous effect- as recorded in 2010- over the wage distribution, something that could possibly be attributed to the fact that during the crisis many employees were forced to accept jobs irrelevant of their previous working experience, and skills. Comparing returns of working experience to the returns of education, we can observe that in 2010, working experience has a smaller effect on wages, across the distribution with its effect growing stronger towards the upper quantiles- in contrast to what is noted for education. Although the same is observed for 2017 as well, a smaller effect of working experience compared to education, in the post-crisis year, the effect of experience in determining the wages seems to

fluctuate less and moving between 2.7% and 3.5% across the wage distribution, with the highest impact to be recorded in the middle-wages (3.3% in θ_{50} and 3.5% in θ_{25}).

Returning to education, the image given by the 2017 estimations is clearer since there is an apparent trend of higher returns to education moving downwards across the wage distribution, an important finding considering the prior years of hard austerity measures, recession and high unemployment. On the other hand, the estimations of 2010 seem less uniform at least until the median of the distribution. At the beginning of the economic crisis, returns to education seem to be steadily higher in the lower quantiles, yielding a minimum of 4.5% to a maximum of 6.2% contribution to wage, while the results seem mixed at the upper quantiles. Compared to 2010, in 2017 returns to education have increased, except for the two top quantiles of the distribution, shrinking the differences between the different levels. This pattern in times of weak labour demand as was the case for Greece- the unemployment rate reached 23.6% in 2016 and 21.5% in 2017- is a potential outcome of the fact that the less qualified workers were disproportionately affected by the crisis (Blundell, Crawford and Jin 2014). Suffice to mention that in Greece, low skilled employees experienced a dramatic decline in their employment rate by 40.5% in 2013 and by 47.1% in 2016 in contrast to the employment rate of highly skilled employees that fell only by 2% between 2007 and 2013 (Filinis, Karakitsios and Katsikas 2018). This can be partially attributed to the collapse of the construction sector that absorbs the majority of unskilled workers. During the crisis construction activity significantly shrank and the relevant employment rates declined severely. In 2007 the said sector absorbed 11.7% of the total employment of the Greek economy, a rate that fell to 8.1% in 2017 (IOBE 2019c)

In sum, and since education returns seem to increase both overall and in the lower quantiles, we could conclude that during the crisis education has played a positive redistributive role.

Conclusions

The present paper has sought to investigate the relationship between education and economic inequalities, under the prism of access to higher education, and the latter's impact on the wage distribution. The relationship of inequalities and education was shown to be present and strong in Greece mainly regarding access to universities. The education system seems to be outdated and currently unable to serve the needs of a modern European labour market, while at the same time

we find it to be relatively low in the priorities of governments' funding agendas. Nevertheless, Greece has traditionally been producing a great number of university graduates, a tendency that is mainly maintained and supported by the private sector and the significant investments that households make in order to secure a place in a public university. The socio-economic background of students has come to have a heavier weight on their educational course and potentially on the career opportunities they may have as future labour market participants in a society where public and free education is perceived as an important institution.

As a result, a paradox emerges where the Greek population has high typical qualifications, but a significant lack of skills, indispensable to the enterprises of a modern economy. An outdated education system that undergoes significant changes in short periods of time, understaffed and with limited educational value, is only expected to produce graduates of high qualifications "on paper".

At the same time, empirical findings of the relevant literature show that education contributes at the redistribution of income in Greece. Returns to education are observed to be higher at the lower wages of the wage distribution, a finding that is also verified by the quantitative analysis conducted in this study. For both years examined- 2010 and 2017- returns to education are higher for lower wages, an important finding considering the adverse economic circumstances that prevailed during the past decade. Working experience on the other hand, is found to yield greater returns at higher wages more in 2010 than in 2017 indicating that in the year after the economic crisis working experience does not have the same potential in determining the wages. In studying the differences between the pre-crisis and the post-crisis results, both in the literature and the present quantitative analysis, the issue of skills mismatch arises as an explanatory factor and as a factor that undermines the contribution of both education and working experience in the wage distribution. Taking all of the above into consideration, and in order to tackle inequalities in accessing tertiary education as well as battling the modern reality of skills mismatch in the labour market, radical and extensive reforms in education are deemed necessary towards a modern system that acknowledges the skills and talents of individual students and acts as a bridge to the labour market.

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