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on employment prospects in Greece**

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The regionally diverse role of education on employment prospects in Greece

Ioannis Cholezas

Abstract

Using Labour Force Survey data the size and direction of the impact of education on employment prospects in Greece is explored along two axes: region and time. The findings suggest that educational attainment is important across regions at all times, but its impact on employment prospects varies along both axes. In general, more educated individuals enjoy an employment premium, but there are considerable differences across regions, especially with regards to higher levels of education, that should concern policy makers. Moreover, during the recession the employment premium of education decreased with the exception of post-graduate studies which seem to be recession proof and, thus, a legitimate choice to improve one's chances of being employed.

Keywords: Greece, region, education, employment premium, average marginal effects

JEL: J24, J64, O15, R23

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Η περιφερειακή διάσταση του ρόλου της εκπαίδευσης στις προοπτικές απασχόλησης: η ελληνική περίπτωση

Ιωάννης Χολέζας

Περίληψη

Με βάση τα δεδομένα της Έρευνας Εργατικού Δυναμικού μελετάται η διαχρονική επίδραση του εκπαιδευτικού επιπέδου και το μέγεθος αυτής στις προοπτικές απασχόλησης στην Ελλάδα σε δύο άξονες: την περιφέρεια και τον χρόνο. Αξιολογώντας την πορεία των οικονομικών μεγεθών, όπως το ΑΕΠ και η ανεργία, η περίοδος 2004-2019 χωρίζεται σε τρεις επιμέρους περιόδους: την περίοδο 2004-2008 κατά την οποία η οικονομία ανθεί, την περίοδο 2010-2013 όταν η οικονομία βυθίζεται στη δίνη της οικονομικής ύφεσης και την περίοδο 2015-2019, όταν η οικονομία αναπληρώνει αργά το χαμένο έδαφος. Τα ευρήματα στηρίζονται στην εκτίμηση της πιθανότητας απασχόλησης με τη βοήθεια ενός υποδείγματος πιθανομονάδας (probit) λαμβάνοντας υπόψη μια σειρά παραγόντων που διαμορφώνουν την προσφορά και ζήτηση εργασίας, μεταξύ των οποίων και το επίπεδο εκπαίδευσης του ατόμου. Η εκπαίδευση φαίνεται ότι επιδρά στην πιθανότητα απασχόλησης σε όλες τις περιφέρειες και διαχρονικά, αλλά η ένταση της επίδρασής της διαφέρει και ως προς τους δύο άξονες. Σε γενικές γραμμές, άτομα με περισσότερα έτη εκπαίδευσης απολαμβάνουν καλύτερες προοπτικές απασχόλησης, αν και υπάρχουν ουσιαστικές διαφορές μεταξύ των περιφερειών, ειδικά όσον αφορά στους απόφοιτους των υψηλότερων επιπέδων εκπαίδευσης, στοιχείο που πρέπει να προβληματίσει όσους ασκούν πολιτική, διότι μπορεί να προκαλέσει ανεπιθύμητες ροές ανθρώπινων πόρων μεταξύ των περιφερειών πριμοδοτώντας κάποιες ή τιμωρώντας άλλες. Επίσης πρέπει να προβληματίσει το εύρημα ότι η αγορά εργασίας σε κάποιες περιφέρειες δεν φαίνεται να αποδίδει καμία αξία σε κάποια επίπεδα εκπαίδευσης, όπως η ανώτερη δευτεροβάθμια. Επιπλέον, στη διάρκεια της οικονομικής ύφεσης το όφελος σε όρους απασχόλησης από ένα υψηλότερο εκπαιδευτικό επίπεδο μειώθηκε, πιθανόν ως αποτέλεσμα της υψηλής ανεργίας που απλώθηκε σε όλη την εκπαιδευτική κατανομή. Εξάιρεση φαίνεται να αποτελούν οι κάτοχοι μεταπτυχιακού τίτλου, οι οποίοι δεν επηρεάστηκαν από την ύφεση και, επομένως, εύλογα μπορεί να συμπεράνει κανείς ότι οι μεταπτυχιακές σπουδές αποτελούν μια καλή επιλογή προκειμένου να βελτιώσει κάποιος τις προοπτικές απασχόλησής του ανεξαρτήτως περιφέρειας διαμονής, αλλά σίγουρα περισσότερο σε κάποιες.

I. Introduction

Since the beginning of the fiscal crisis in 2008 Greece suffered losses more than a quarter of its GDP while employment dropped considerably, and unemployment soared to unprecedented levels. In 2019, after a slow growth since 2017, the GDP was still more than 23% smaller compared to 2008¹. The impact on the labour market was severe. The employment rate for people over 15 years old fell from approximately 49% in 2008 to almost 37% in 2013 and increased gradually to almost 43% in 2019. Empirical evidence (Mitrakos et al., 2010 and Kanellopoulos et al., 2013) shows that during the economic recession education proved to be a valuable and rational investment from an individual's point of view in terms of both better employment prospects and monetary returns. Building on previous work with micro data that can verify the importance of personal attributes -education included- in determining both the unemployment probability (e.g., Mitrakos et al., 2010) and unemployment differences between regions (López-Baro and Motellón, 2011), this paper takes a slightly different turn and focuses on the diversified role of education on employment prospects across regions and the way that role has changed during the past fifteen years.

The first question I wish to answer is whether -*ceteris paribus*- a specific level of educational attainment contributes similarly to employment chances across regions, i.e., whether graduating from a specific level of education is associated with the same employment premium or penalty across regions. A negative answer would suggest that education is treated differently across regional labour markets; that could offer a legitimate argument to move from one region to another in order to improve one's employment chances. The second question is whether education's contribution to the probability of being employed varied during the past fifteen years especially considering the intense economic fluctuations experienced meanwhile. To that end three periods are defined: 2004-2008, when the economy was growing fast, the labour market was doing well and the employment rate was high; 2010-2013, when labour market conditions worsened due to the economic recession leading to a bigger than 10 percentage points drop in the employment rate; and 2015-2019, when the labour market started to slowly recover following a weak upturn of the economic activity.² If the answer is positive, then the contribution of education to employment prospects depends on economic conditions and, thus, cannot be taken as granted. Due to the big fluctuations of economic activity over the time span chosen, Greece is an ideal case study.

II. Theoretical background

Regional labour markets are not identical and may respond differently to the same exogenous stimulus (Elhorst, 2003). Even though they belong to the same country, i.e., they have the same labour market institutions, wage setting regimes, social security settings, etc., (Layard et al. 1991, OECD, 1994; Bean, 1994; Scarpetta, 1996), there are often big

¹ GDP fall is calculated using data from the Eurostat at chain linked volumes (2010=100) and market prices (2008: €247.8 billion, 2019: €190.5 billion). The smallest GDP was recorded in 2016 (€182 billion).

² Years 2020 and 2021 are deliberately excluded from the analysis due to the unusual conditions in the labour market caused by the pandemic and the associated state measures to protect public health. Years 2009 and 2014 are also excluded from the analysis to avoid mixing trends in the labour market.

differences in key labour market variables like unemployment or employment rates (Elhorst, 1995; Taylor and Bradley, 1997; European Commission, 1999). These differences may imply inefficiencies in the operation of regional economies and labour markets and, thus, there are benefits to be realised in remedying them (Taylor, 1996). Clearly, it is even more crucial to mend such inefficiencies, e.g., the low rate of human capital utilisation implied by low employment rates, when the economy is in recession.

Studies that explore labour market diversities across regions in Greece specifically rely either on nation-wide surveys, e.g., the Labour Force Survey (LFS), or small-scaled targeted surveys that usually involve specific regions and confirm the existence of regional and spatial labour market differences regarding employment prospects. Even though Greece is a small country, several sources of existing regional variation in economic activity and the labour market have been identified in the past. For example, diversely endowed regions adapted differently to the deindustrialisation of the country and the accession to the EU back in the 1980s.³ Typically, there are poorer employment opportunities reflected in high unemployment rates in regions near the north borders of the country due to the relocation of mostly small businesses across the borders (i.e., falling labour demand), to benefit from lower taxes and wages (Labrianidis 2005). The deterioration of the business environment during the economic recession reinforced this trend further.⁴ On the other hand, employment opportunities are usually scarcer in the rural areas of west and north-west Greece (Monastiriotes, 2009); partly because the manufacturing activity is concentrated around Thessaloniki and Athens. Central Greece and south-west Peloponnese specialise in agriculture, while service activities are concentrated in large cities and the islands, due to tourism. These facts can partly explain both the varying employment prospects across regions and the different responses to the external shock the crisis represented.

In the same context, Ioannides and Petrakos (2000) emphasize the role of the uneven distribution of urban centres across the country, coupled with the frequency and intensity of the business cycle, on the regions' success to respond to evolving economic conditions. The geography of Greece, i.e., several islands, mountainous and remote areas, also had an adverse impact on the availability of skilled labour force, infrastructure, and supply of investment projects. Moreover, pre-existing imbalances coupled with weak cross-regional adjustment mechanisms, argues Monastiriotes (2011), were likely intensified by policies implemented over the past ten years to contain the adverse effects of the economic recession leading to a cumulative process of regional divergence.

However, that does not rule out the existence of important spill-over effects causing regional variation (Lolos and Papapetrou, 2012), especially where there are no mechanisms to internalise those spill-over effects. Tourism, for instance, operates as a channel enabling a region to affect other areas by absorbing the excess supply of labour and, therefore, improving regional employment opportunities (Alexiadis and Eleftheriou, 2010). On the other hand, there is no evidence of spill-over effects for policy interventions aimed at relieving regions from shocks (Monastiriotes, 2009); perhaps due to the type of state

³ Some regions, e.g., those who had a favourable physical environment or were more densely populated (i.e., urban centres), managed to develop the tertiary sector to counterbalance the declining secondary sector, i.e., manufacturing, while others did not.

⁴ According to the World Bank (2020) Greece ranks 79th and Bulgaria 61st out of 190 countries in the ease of doing business in 2020.

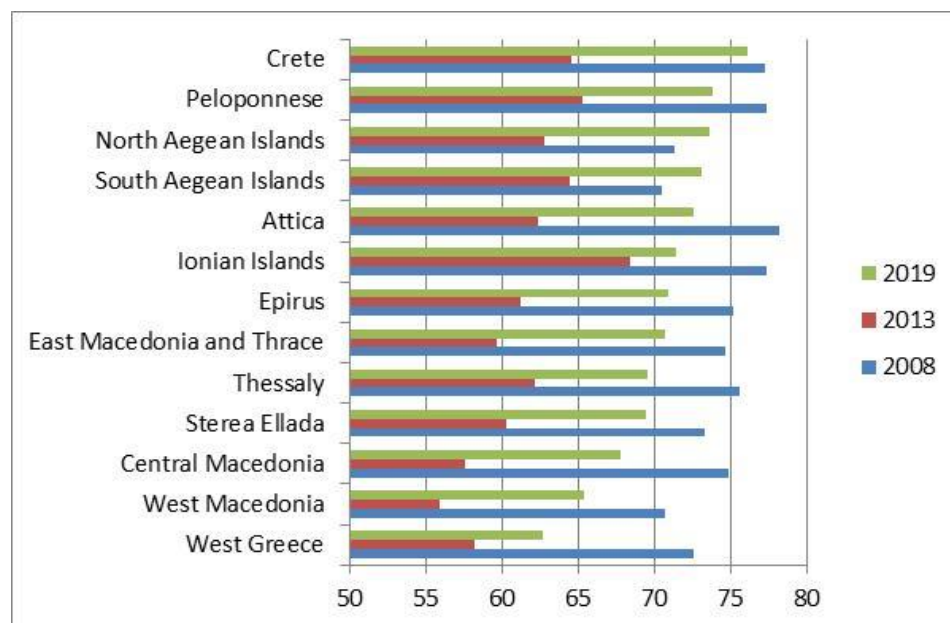
interventions chosen. Moreover, it is reported that past unemployment spells negatively affect the duration of employment spells blocking the region's capacity to fight unemployment. It is not unlikely for such a mechanism to operate in some regions, but not in others, leading to uneven results coming from the same shock (Theodosiou and Zarotiadis, 2010). In a more targeted analysis of Greece, Prodromidis (2008, 2012) focuses on municipalities. The author's findings support the existence of considerable heterogeneity regarding labour market variables, i.e., employment, participation, etc., that call for policy actions considering the spatial peculiarities and the links between neighbouring areas, to implement a more effective employment and, ultimately, growth policy.

The link between education and employment in Greece has been explored in a handful of studies. For instance, Rodokanakis and Vlachos (2012) argue that the impact of education on the unemployment probability differs across regions and time; thus, it is difficult to draw generalised conclusions about its effect. Monastiriotes and Martelli (2013), on the other hand, investigate the role of education, amongst other productivity determining attributes, and suggest that education has a statistically significant (marginal) impact only in Athens, Thessaloniki and the two partly industrialised regions of West Macedonia and Sterea Ellada. Their findings suggest two things. First, there is a deficiency of skilled jobs in Greece (i.e., weak demand) and second, there is a mismatch between skills supplied and demanded, which they label market deficiency. Finally, Kanellopoulos et al. (2013) confirm previous findings that the link between education and unemployment probability varies across regions and time.

III. Labour market state of play

Even before the economic recession, there were noteworthy differences across regional labour markets in Greece (Graph 1). Back in 2008 the employment rate ranged from 70.5% in South Aegean Islands to 78.2% in Attica. Even though the employment rate declined everywhere in the following years (2010-2013), the employment gap, i.e., the difference between the maximum and the minimum employment rate across regions, grew bigger. Monastiriotes (2011) argued at the beginning of the recession that planned austerity policies by construction and due to the heterogeneity of regions, with respect to reliance on public expenditure, public sector cuts, changes in incomes and taxes, would cause an additional region-specific shock on top of the one inflicted by the fiscal crisis itself. Hence, in 2013 the employment gap across Greek regions stood at 12.5 percentage points ranging from 55.9% in West Macedonia to 68.4% in the Ionian Islands. In the last period of slow economic recovery, the employment rates increased countrywide, but - interestingly enough - the gap widened even further to 13.5 percentage points in 2019. Crete stands out amongst regions; the employment rate peaked at 76.2% while West Greece lies at the other side of the spectrum with an employment rate of 62.7%. The widening of the employment gap means that regional labour markets moved at different speed both during the recession and the following recovery. For example, since 2013 the employment rate increased by more than 11 percentage points in Crete and East Macedonia and Thrace but only 3.1 percentage points in the Ionian Islands and 4.4 percentage points in West Greece.

Graph 1 Employment rates for people aged 25-54 by region



Source: Labour Force Survey (LFS) sample.

Note: ranking by 2019 employment rate.

The economic theory suggests that being employed has a lot to do with education (Becker, 1964). This is verified when comparing employment rates by level of education attained. More educated individuals are more likely to be employed. The employment rate in Greece in 2019 for someone who has completed compulsory education is over 58% while the respective figure for a post-graduate is 87%. According to the human capital theory (Becker, 1964) this is justified for two reasons. First, education is directly and positively associated with labour productivity and, second, more educated people are more willing to work to compensate for the cost (direct and indirect) of their investment in education. Moreover, more education may be used to signal higher inherent ability, which is linked to productivity and, thus, better employment prospects.

It is less straightforward to justify the size of the regional variation both within region (and across levels of education) and between regions (for the same level of education). Graph 2 allows comparisons across both these axes. The standard deviation of the employment rate for the same level of education⁵, which I use as a measure of volatility, is the biggest amongst post-graduates (6.2 percentage points) and graduates from compulsory education (6.1 percentage points) and the smallest amongst upper secondary education graduates (3.7 percentage points) and AEI⁶ graduates (3.9 percentage points)⁷. These differences do not seem to be linearly associated with the level of education, but they suggest that residing in a specific region is more important when one is either poorly or very well educated.

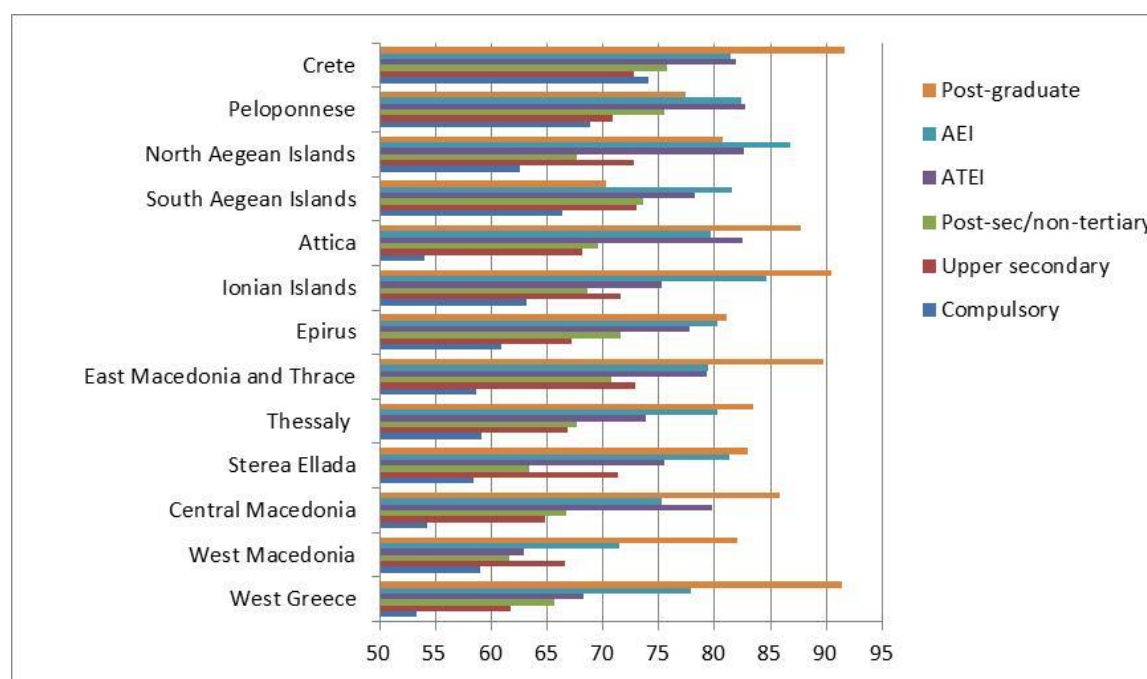
⁵ Employment rates (and standard deviations) are reported in (the last row of) Table A1 in the appendix.

⁶ AEI stands for Higher/Tertiary Education Institution also referred to as University.

⁷ Post-secondary non-tertiary education and ATEI, i.e. Technical Higher Education Institutions, lay somewhere in the middle with a standard deviation of 4.3 and 5.9 percentage points respectively.

Second, there is considerable volatility in the employment rates of graduates from different levels of education within a given region.⁸ The standard deviation in South Aegean Islands is as low as 5.5 percentage points followed by Peloponnese (5.7 percentage points). In other words, getting more education in those regions does little to improve one’s employment prospects. On the other hand, West Greece, and Attica face more than double that volatility in employment rates across levels of education with 13.3 and 12.2 percentage points respectively. This means that getting more education improves the chances of being employed more in those regions with a high volatility in employment rates.

Graph 2 Employment rates in 2019 for people aged 25-54 by region and level of education completed



Source: Labour Force Survey (LFS) sample.

Note: ranking by 2019 employment rate (highest to lowest).

Hopefully it has been established so far that regional employment rates differ substantially by level of education. The next section attempts to determine the contribution of every single level of education to the regional employment probability considering several other factors. For example, previous work (Cholezas and Kanellopoulos, 2015), and the lower female employment rate compared to male, verify that gender is an important determinant of employment. Hence, its effect should not be mistakenly attributed to education.

IV. Data and methodology

The sample consists of individuals aged 25-55 and is drawn from the Labour Force Survey (LFS) conducted by ELSTAT (i.e., the Hellenic Statistical Authority) four times per year. The age bandwidth is chosen to avoid self-selection to education or retirement. To consider an

⁸ Employment rates (and standard deviations) are reported in (the last column of) Table A1 in the appendix.

individual as employed she/he must have had at least one hour of paid employment in the week preceding the interview. This definition is standard, and it relies on the definition of unemployed by the ILO.

Being employed or not is a binary outcome. Let us typically assume there is a latent variable that determines whether someone is employed or not: when the latent variable is bigger than 0, the person is employed; otherwise she/he is not employed. A probit model is used to estimate the probability of employment of the following form:

$$\Pr(Y_i = 1) = \Phi(\beta X_i) \quad (1)$$

where $Y=1/0$ when the individual is employed/unemployed or inactive, $X=$ a matrix of independent variables, which will be discussed next, and Φ is the cumulative normal distribution. Since the LFS tracks every individual for six consecutive quarters, the same individual can appear in the sample more than once. Thus, clustering is used⁹ to estimate standard errors. Three augmented employment equations are estimated: before (period 2004-2008), during (period 2010-2013) and after (period 2015-2019) the recession. They represent fundamentally different periods of economic performance: growth, recession, and slow recovery.

There are several attributes that affect the probability of being employed and, thus, should be included in equation (1). Note that the nature of the data employed allows for the use of personal attributes mainly, i.e., supply side determinants, which include gender, age, and educational attainment. Previous employment (Bentolila and Bertola, 1990; Emerson, 1998), i.e. the dynamic nature of employment, individual heterogeneity (Heckman, 1981), and the effect of past unemployment spells (Arulampalam et al., 2000) are not accounted for because that would require a different estimation strategy. Moreover, following previous work (e.g. Kanellopoulos et al., 2013), six dummies for aggregate levels of education are used; namely compulsory education (completed lower secondary at most), upper secondary (reference group), post-secondary non-tertiary, ATEI (tertiary technical education institutions), AEI (university) and post-graduate studies, including both first and second level of post-graduates. The number of years since graduation is used as a proxy for work experience, which is believed to be closely linked to productivity and, thus, it can improve the chances of getting a job in the first place up to a certain point (Mitrakos et al., 2010). Being a male in Greece also seems to be associated with better employment chances (Cholezas and Kanellopoulos, 2015).

Another attribute, that is likely to affect the employment probability, is the country of origin: being a native might improve employment prospects in some regions, but worsen them in others, depending on the productive structure of it and the associated demand for skills. It is not uncommon for immigrants to concentrate in sectors of economic activity, such as construction, agriculture, tourism, and housework, especially before the crisis (Cholezas and Tsakoglou, 2009). Marriage can also have an impact on the employment probability, because of both prejudices (e.g., married women devote more time to housework and, thus, less energy at work, married individuals tend to have a lower turnover rate) and more or less intense efforts to get a job or willingness to lower one's expectations, e.g., the reservation wage. Being the head of the household, i.e., bearing the main responsibility for its well-

⁹ See <http://www.stata.com/manuals13/rprobit.pdf> for a relevant discussion.

being, works the same way. The presence of children below 12 in the household that need care could also narrow employment choices and, thus, decrease the chances of getting a job. Finally, having other household members employed (the actual variable is the share of employed persons in the household) may relieve the pressure to accept a job offer or could provide a role model and have the opposite effect.

On the demand side the peculiarities of every region's labour market are expected to impact employment opportunities irrespective of personal attributes (Kanellopoulos et al., 2015). For example, low educated individuals probably have better chances of finding a job in a region that relies heavily on sectors that employ primarily low skilled individuals. Besides, regional diversity is the motivation for this paper in the first place. Therefore, thirteen dummies for regions are used to capture region specific effects. Moreover, interaction terms between education and region are used to estimate the effect of every region on the impact of education on the employment probability. The urban nature of the area of residence might also be crucial in getting a job since it can be associated with more opportunities for people with certain attributes and fewer for others (Mitrakos et al., 2010). *Ceteris paribus* seasonality might also affect employment probabilities since some economic activities are more seasonally sensitive, e.g., tourism, agriculture, construction. Finally, the economic cycle, although it is rather univocal within each period, can favour or limit job opportunities, so dummies for the year the interview was conducted are included (reference year: first year in every period).

V. Results

To answer the first question set in the introduction average marginal effects¹⁰ are calculated and reported in Table 1 for period 2015-2019 based on the estimation results of equation (1), which are reported in Tables A2, A3 and A4 in the appendix. First of all, *ceteris paribus* compulsory education does not change the probability of employment compared to the reference group, i.e., upper secondary education graduates, at least in most regions. In those regions that it does, it is associated with a penalty of about 3 percentage points (West Greece) at most. The fact that upper secondary education does nothing to boost employment probabilities suggests that its added value is not appreciated by the employers, i.e., they could as easily hire either a compulsory or an upper secondary education graduate. On the other hand, in eight out of the thirteen regions the impact of post-secondary non-tertiary education is statistically significant and positive. Having graduated from post-secondary education is associated with an employment premium ranging from approximately 2.5 percentage points (Peloponnese) to almost 6 percentage points (Ionian Islands). However, there are five regions in which post-secondary education graduates have the same employment probabilities with upper secondary education graduates or even compulsory education graduates, e.g., East Macedonia and Thrace. It is somewhat shocking to realise that in some regions six additional years of education do nothing to improve employment prospects and this is something that should trouble policy makers and stir up a discussion as to what makes those regions different.

¹⁰ The average marginal effect equals the average of all changes caused in the probability of being employed by a small (zero to one) change in a single continuous (or dummy) independent variable. Note that all other covariates are used as they are observed.

Tertiary education, on the other hand, is a completely different story. A degree from a Higher Technical Education Institution (ATEI) improves employment prospects in almost all regions with the exception of West Macedonia and Sterea Ellada. The improvement ranges from 4.6 percentage points (Peloponnese) to more than 9 percentage points (South Aegean and Ionian Islands) compared to the reference group. These findings suggest that -ceteris paribus- a person in Attica has a stronger motive to acquire more education than in West Macedonia, because that would improve employment prospects more in the former.

This is even more apparent when University (AEI) is concerned. It is the first level of education the graduates of which have better employment prospects than the reference group irrespective of the region they reside. The smallest premium is found in North Aegean Islands and the largest in the Ionian Islands. Note that the difference is a bit smaller than 6 percentage points indicating a widening gap across regions as we move up the education ladder. Note also that North Aegean Islands is the only region where university graduates benefit from a smaller employment premium than ATEI graduates. The results are similar regarding post-graduate studies with employment prospects improving considerably everywhere. The employment premium ranges from approximately 11% in Peloponnese to almost 21% in the Ionian Islands increasing the gap across regions to 10 percentage points. Clearly employment premiums associated with post-graduate studies are the biggest. Moreover, the variation across regions is considerable and it increases for higher levels of education. Probably because the higher the level of education completed the more diverse the employment opportunities are; especially when considering the high skills mismatch in the Greek labour market¹¹.

Table 1 Average marginal effect by level of education and region, 2015-2019 (%)

| | Compulsory | Post-sec | ATEI | AEI | Post-grad |
|---------------------------|------------|----------|---------|----------|-----------|
| Crete | 0.5 | 5.0 *** | 7.1 *** | 7.2 *** | 12.3 *** |
| Peloponnese | -1.1 | 2.5 * | 4.6 *** | 7.6 *** | 10.9 *** |
| North Aegean Islands | -1.9 | 3.6 | 9.0 *** | 5.3 *** | 15.2 *** |
| South Aegean Islands | 0.2 | 3.2 ** | 9.1 *** | 10.5 *** | 12.2 *** |
| Attica | -1.6 ** | 3.6 *** | 8.6 *** | 9.0 *** | 14.0 *** |
| Ionian Islands | 0.6 | 5.9 *** | 9.1 *** | 11.0 *** | 20.8 *** |
| Epirus | 2.2 * | 4.7 ** | 8.0 *** | 10.4 *** | 16.0 *** |
| East Macedonia and Thrace | 0.7 | 0.9 | 5.7 *** | 7.9 *** | 17.0 *** |
| Thessaly | -0.9 | 3.6 ** | 5.2 *** | 8.7 *** | 17.1 *** |
| Sterea Ellada | -2.4 ** | -1.1 | 2.1 | 9.2 *** | 16.1 *** |
| Central Macedonia | -1.4 * | 2.7 *** | 7.2 *** | 7.8 *** | 14.3 *** |
| West Macedonia | -1.9 | -0.4 | 2.4 | 6.0 *** | 20.2 *** |
| West Greece | -3.1 *** | -0.3 | 6.8 *** | 9.9 *** | 13.9 *** |

Notes: (*)(**)(***) statistical significant estimator at 1%(5%)10% level of significance. Upper secondary education graduates are the reference group. The table can be read either horizontally, i.e. to compare average marginal effect across levels of education and within a specific region, or vertically, i.e. to compare the average marginal effect of a specific level of education across regions. Compulsory = up to lower secondary (Gymnasium), Post-sec = post-secondary non-tertiary education, ATEI =

¹¹ According to the European skills index calculated by CEDEFOP, Greece ranked last amongst 31 European countries in skills matching in 2020.

Higher Technical Education Institution, AEI = Higher Education Institution/University, Post-grad = post graduate studies.

These findings suggest, for instance, that university graduates improve their employment prospects more in Attica than in Crete or post-graduates have a smaller employment premium in Attica than in Thessaly, always compared to the reference group in each region. The different impact of education across regions and time is consistent with previous findings regarding unemployment probabilities by Rodokanakis and Vlachos (2012) and Kanellopoulos et al. (2013). The fact that higher levels of education have a statistically significant impact on employment probabilities in all regions seems to contradict Monastiriotes and Martelli (2013), but different methodological frameworks may be responsible for that.

Table 2 Predicted employment probabilities by level of education and region, 2015-2019 (%)

| | Compulsory | Post-sec | ATEI | AEI | Post-grad | SD |
|---------------------------|------------|----------|------|------|-----------|-----|
| Crete | 64.4 | 63.9 | 71.4 | 71.6 | 77.0 | 7.1 |
| Peloponnese | 64.2 | 65.3 | 70.0 | 73.1 | 76.7 | 6.0 |
| North Aegean Islands | 62.3 | 64.3 | 73.3 | 69.6 | 79.6 | 7.8 |
| South Aegean Islands | 63.9 | 63.7 | 73.6 | 75.1 | 76.9 | 6.3 |
| Attica | 62.8 | 64.5 | 73.3 | 73.7 | 78.9 | 7.0 |
| Ionian Islands | 62.7 | 62.0 | 71.9 | 74.1 | 84.9 | 9.4 |
| Epirus | 65.4 | 63.3 | 71.1 | 73.4 | 79.0 | 6.6 |
| East Macedonia and Thrace | 65.7 | 64.9 | 70.9 | 73.1 | 82.5 | 7.4 |
| Thessaly | 64.9 | 65.7 | 70.6 | 74.0 | 82.0 | 6.8 |
| Stereia Ellada | 62.4 | 64.7 | 66.7 | 73.8 | 80.5 | 5.2 |
| Central Macedonia | 64.2 | 65.6 | 72.4 | 73.0 | 79.0 | 7.0 |
| West Macedonia | 65.1 | 66.8 | 68.9 | 72.2 | 84.5 | 6.3 |
| West Greece | 62.8 | 65.9 | 72.3 | 75.2 | 78.8 | 5.5 |
| SD | 1.2 | 1.3 | 1.9 | 1.5 | 2.7 | - |

Note: SD stands for standard deviation. All estimates are statistically significant at the 1% level of significance. Compulsory = up to lower secondary (Gymnasium), Post-sec = post-secondary non-tertiary education, ATEI = Higher Technical Education Institution, AEI = Higher Education Institution/University, Post-grad = post graduate studies.

However, our findings so far say nothing about the actual employment prospects and they do not allow for comparisons between regions. To compare regions with each other, Table 2 presents predicted employment probabilities¹² by level of education and region. Two remarks are in order. First, volatility across regions increases as we move up the education ladder as indicated by the increasing standard deviation (see last row in Table 2). This is consistent with the assumption that more education opens up employment opportunities.

¹² Predicted employment probabilities are calculated using the probit estimation results reported in the appendix. While an average marginal effect of a covariate reveals how much the probability of being employed changes when a small change in the covariate occurs, the predicted probability of being employed reveals what the actual probability of being employed is.

Second, regions differ substantially. The smallest expected employment rates' standard deviation across levels of education is found in Peloponnese and the biggest in the Ionian Islands (see last column in Table 2). This means that in the former the benefit from more education in terms of employment opportunities is smaller than the latter. Finally, Table 2 allows for comparisons between regions and it can provide an argument for moving from one region to another to improve one's employment prospects.

The second question to be answered is whether changing economic conditions affected the average marginal effect of education on employment prospects across regions (Graph 3). Post-secondary non-tertiary education graduates enjoyed an employment premium which decreased in period 2010-2013, i.e. when the economy was in recession, and then it recovered in period 2015-2019. However, in most regions it still falls short of period 2004-2008. There are exceptions though; in Thessaly, for example, there is a premium only during the last period, while in West Macedonia there was a premium only during the first period. ATEI graduates show their premium declining during the recession in most regions and it has not recovered to its pre-crisis levels despite the increase during the last period in some of them, e.g., Crete and West Greece. Nevertheless, there are exceptions to this pattern also. In West Macedonia and East-Macedonia and Thrace, for instance, the employment premium for ATEI graduates marginally increased during the recession, but then fell in the period of slow recovery (2015-2019), while in Crete and North Aegean Islands the premium is bigger than ever recently.

The situation is not much different for AEI graduates. The employment premium declined during the recession in almost all regions and then made up for some of the lost ground during the slow recovery that followed. AEI graduates in North Aegean Islands and West Macedonia suffered the biggest losses since 2004-2008, while in Epirus, the Ionian Islands and Attica the employment opportunities remained unaltered throughout the time span studied. The employment premium for those with post-graduate studies exhibits a different, more volatile pattern across regions compared to other levels of education. The U-shape pattern is observed only in two regions, Thessaly and Central Macedonia, but the employment premium is bigger in period 2015-2019 than period 2004-2008. With the exception of West Macedonia and North Aegean Islands post-graduates enjoy a bigger employment premium in the recovery period than the slow growth period, while in four regions the biggest premium was recorded during the recession. These findings suggest that post-graduates, contrary to other levels of education, improved their employment opportunities over time in most regions despite the recession or perhaps because of it.

VI. Conclusions and policy implications

More education is associated with improved opportunities of being employed and higher levels of education graduates enjoy an employment premium. However, that premium is constant neither across regions nor over time. Relying on the labour force survey three periods of time were explored characterised by diverse economic conditions, namely a growth period (2004-2008), a recessionary period (2010-2013) and a slow recovery period (2015-2019), and 13 regions in Greece to verify this claim. The most interesting findings and policy implications are the following.

First, education is important in shaping employment prospects, in some regions more than others, while higher levels of education have a greater impact than lower levels of

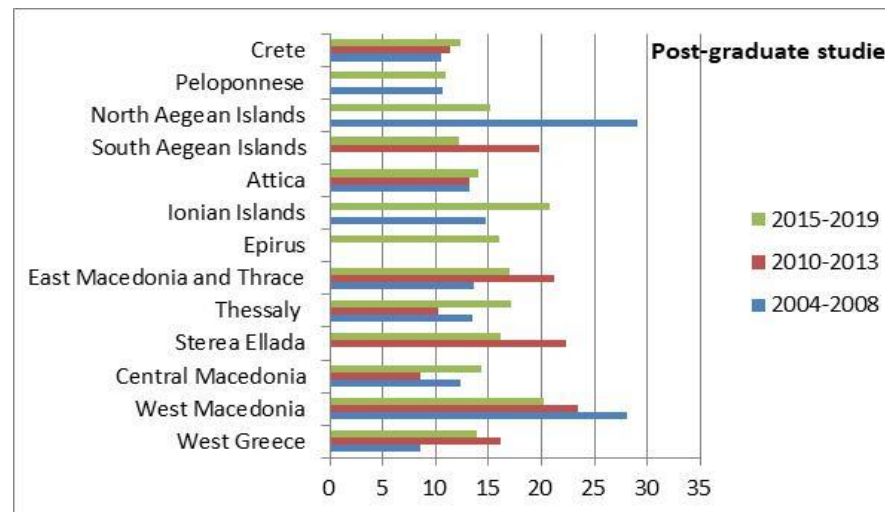
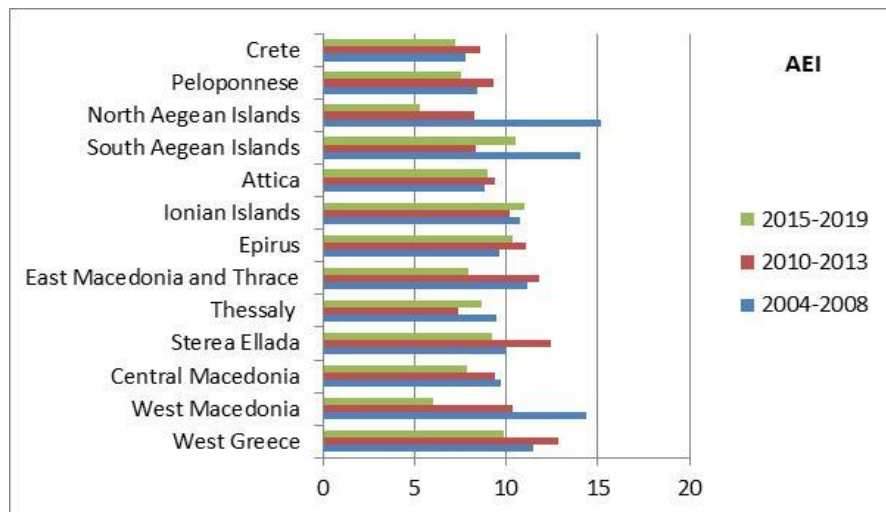
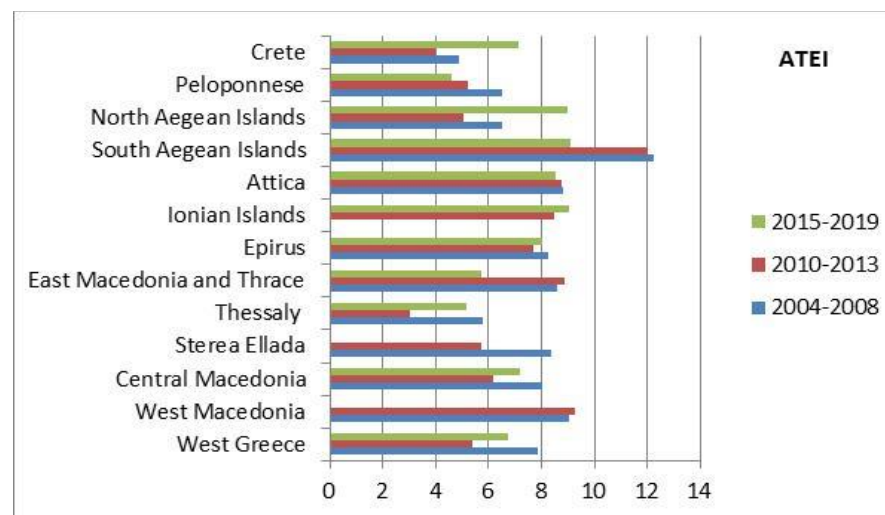
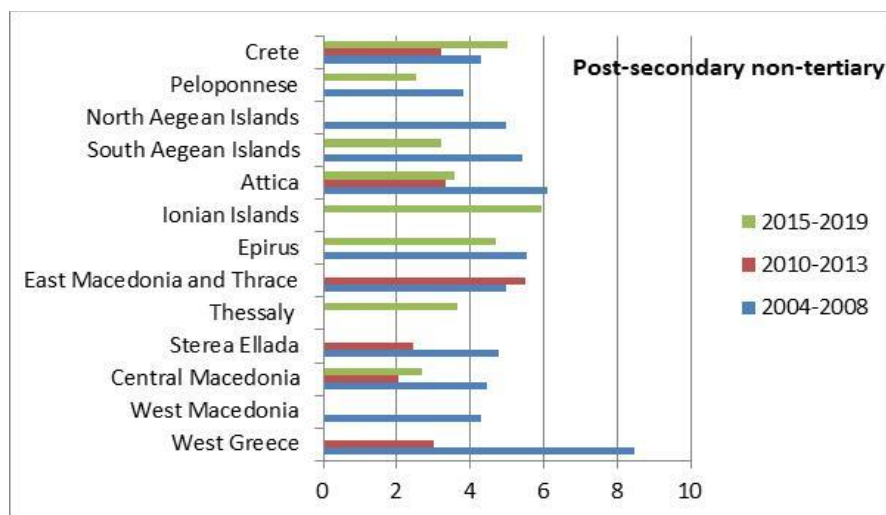
education. This is something that must be communicated to students and parents alike and considered by them when choosing the level of education to acquire. Second, post-secondary education and especially all levels and types of tertiary education improve employment prospects compared to upper secondary education in most regions. However, policy makers should focus on regions in which there is no employment premium or it is too small, because such a finding implies that regional labour markets have different values attached to the same quality of education offered. A more detailed examination of the field of education, especially when higher education is concerned, may provide some explanation for this.

Third, the higher the level of education the more heterogeneity is found between regions in terms of employment prospects and the impact of education itself on them. This is probably explained by the increasing variety of job offers available to higher education graduates, but it could be a motive for people to move to regions that offer better employment prospects or even for the residents of a region to acquire more education causing regions to diverge further apart.

Fourth, the employment premium for AEI graduates at most decreased during the recession (2010-2013) and increased in the following recovery period (2015-2019) in most regions. However, the impact of education on employment prospects still falls short of its pre-crisis level, although there are a couple of exceptions. For example, in Attica, which represents one fourth of the sample, the employment premium for AEI graduates remained almost unchanged over time.

Fifth, post-graduate studies do not fit this pattern. In most regions the employment premium is larger during the recovery period, while in two regions the employment premium was bigger during the recession. This suggests that post-graduate studies pay in terms of improved employment chances especially during recessionary times, at least during the period analysed. However, it would be interesting to explore this issue further to decide whether this is the unwelcome outcome of substituting less for more educated individuals simply because wages have dropped during the recession and labour demand still falls short of labour supply of skilled individuals.

Graph 3 Average marginal effects by level of education, region and period



Note: Only statistically significant (up to the 10% level of significance) average marginal effects are reported in the graph. Non-statistically significant average marginal effects are set to zero (practically no bars are displayed).

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Appendix

Table A1 Employment rates by level of education and region in 2019

| | Compulsory | Upper sec | Post-sec | ATEI | AEI | Post-grad | SD |
|---------------------------|------------|-----------|----------|------|------|-----------|------|
| Crete | 74.1 | 72.8 | 75.7 | 81.9 | 81.5 | 91.7 | 7.0 |
| Peloponnese | 68.9 | 70.8 | 75.5 | 82.7 | 82.3 | 77.4 | 5.7 |
| North Aegean Islands | 62.5 | 72.8 | 67.7 | 82.6 | 86.7 | 80.7 | 9.4 |
| South Aegean Islands | 66.3 | 73.0 | 73.6 | 78.2 | 81.6 | 70.3 | 5.5 |
| Attica | 54.1 | 68.2 | 69.5 | 82.5 | 79.6 | 87.7 | 12.2 |
| Ionian Islands | 63.2 | 71.6 | 68.6 | 75.3 | 84.7 | 90.4 | 10.2 |
| Epirus | 60.9 | 67.2 | 71.6 | 77.8 | 80.2 | 81.1 | 8.0 |
| East Macedonia and Thrace | 58.7 | 72.8 | 70.8 | 79.3 | 79.4 | 89.7 | 10.4 |
| Thessaly | 59.1 | 66.9 | 67.7 | 73.8 | 80.3 | 83.4 | 9.1 |
| Sterea Ellada | 58.4 | 71.4 | 63.4 | 75.5 | 81.3 | 83.0 | 9.8 |
| Central Macedonia | 54.3 | 64.8 | 66.8 | 79.8 | 75.3 | 85.8 | 11.4 |
| West Macedonia | 59.0 | 66.6 | 61.7 | 62.9 | 71.4 | 82.0 | 8.4 |
| West Greece | 53.4 | 61.7 | 65.7 | 68.2 | 77.9 | 91.4 | 13.3 |
| SD | 6.1 | 3.7 | 4.3 | 5.9 | 3.9 | 6.2 | : |

Notes: Compulsory = up to lower secondary (Gymnasium), Upper sec = upper secondary education (Lyceum), Post-sec = post-secondary non-tertiary education, ATEI = Higher Technical Education Institution, AEI = Higher Education Institution/University, Post-grad = post graduate studies, SD = standard deviation.

Table A2 Probit estimation results 2004-2008

| Dependent: employed=1 | Coef. | Robust Std. Err. | z | P>z |
|--|--------|---------------------|--------|-------|
| Education | | | | |
| Compulsory | -0.124 | 0.027 | -4.560 | 0.000 |
| Upper secondary (ref. group) | - | - | - | - |
| Post-secondary non-tertiary | 0.401 | 0.036 | 11.260 | 0.000 |
| ATEI (Higher Technical Education Institutions) | 0.601 | 0.057 | 10.480 | 0.000 |
| AEI (University) | 0.601 | 0.034 | 17.720 | 0.000 |
| Post-graduate studies | 0.957 | 0.097 | 9.880 | 0.000 |
| Region | | | | |
| East macedonia and thrace | -0.088 | 0.040 | -2.200 | 0.028 |
| Central macedonia | -0.044 | 0.027 | -1.600 | 0.109 |
| West macedonia | -0.048 | 0.052 | -0.930 | 0.353 |
| Epirus | -0.033 | 0.039 | -0.830 | 0.404 |
| Thessaly | 0.015 | 0.040 | 0.380 | 0.705 |
| Ionian islands | 0.015 | 0.062 | 0.240 | 0.812 |
| West greece | -0.020 | 0.037 | -0.550 | 0.582 |
| Sterea ellada | -0.065 | 0.038 | -1.730 | 0.083 |
| Attica (ref. group) | - | - | - | - |
| Peloponnese | -0.004 | 0.037 | -0.100 | 0.917 |
| North aegean | -0.208 | 0.057 | -3.680 | 0.000 |
| South aegean | -0.189 | 0.047 | -4.000 | 0.000 |
| Crete | 0.013 | 0.037 | 0.350 | 0.729 |
| Education#Region | | | | |
| Compulsory#east macedonia and thrace | 0.112 | 0.054 | 2.090 | 0.037 |
| Compulsory#central macedonia | 0.077 | 0.041 | 1.870 | 0.061 |
| Compulsory#west macedonia | 0.069 | 0.072 | 0.960 | 0.336 |
| Compulsory#epirus | 0.089 | 0.054 | 1.660 | 0.096 |
| Compulsory#thessaly | 0.172 | 0.057 | 3.010 | 0.003 |
| Compulsory#ionian islands | -0.026 | 0.081 | -0.320 | 0.752 |
| Compulsory#west greece | 0.172 | 0.052 | 3.300 | 0.001 |
| Compulsory#sterea ellada | 0.044 | 0.052 | 0.850 | 0.393 |
| Compulsory#peloponnese | 0.156 | 0.054 | 2.910 | 0.004 |
| Compulsory#north aegean | 0.039 | 0.077 | 0.510 | 0.612 |
| Compulsory#southaegean | 0.026 | 0.065 | 0.400 | 0.692 |
| Compulsory#crete | 0.046 | 0.052 | 0.900 | 0.371 |
| PostSec#east macedonia and thrace | -0.077 | 0.093 | -0.840 | 0.403 |
| PostSec#central macedonia | -0.119 | 0.060 | -1.990 | 0.047 |
| PostSec#west macedonia | -0.150 | 0.131 | -1.140 | 0.253 |
| PostSec#epirus | -0.054 | 0.098 | -0.550 | 0.582 |
| PostSec#thessaly | -0.261 | 0.100 | -2.610 | 0.009 |
| PostSec#ionian islands | -0.191 | 0.151 | -1.270 | 0.205 |
| PostSec#west greece | 0.123 | 0.105 | 1.170 | 0.241 |
| PostSec#sterea ellada | -0.095 | 0.107 | -0.890 | 0.376 |
| PostSec#peloponnese | -0.149 | 0.103 | -1.440 | 0.149 |

| | | | | |
|------------------------------------|--------|-------|---------|-------|
| PostSec#north aegean | -0.104 | 0.133 | -0.780 | 0.434 |
| PostSec#southaegean | -0.070 | 0.128 | -0.550 | 0.583 |
| PostSec#crete | -0.093 | 0.082 | -1.140 | 0.253 |
| ATEI#east macedonia and thrace | -0.018 | 0.114 | -0.160 | 0.875 |
| ATEI#central macedonia | -0.074 | 0.080 | -0.920 | 0.359 |
| ATEI#west macedonia | -0.055 | 0.142 | -0.390 | 0.697 |
| ATEI#epirus | -0.066 | 0.103 | -0.640 | 0.523 |
| ATEI#thessaly | -0.229 | 0.106 | -2.160 | 0.031 |
| ATEI#ionian islands | -0.403 | 0.220 | -1.830 | 0.067 |
| ATEI#west greece | -0.118 | 0.112 | -1.050 | 0.292 |
| ATEI#sterea ellada | -0.042 | 0.127 | -0.330 | 0.743 |
| ATEI#peloponnese | -0.153 | 0.132 | -1.160 | 0.246 |
| ATEI#north aegean | -0.207 | 0.177 | -1.170 | 0.244 |
| ATEI#southaegean | 0.194 | 0.213 | 0.910 | 0.362 |
| ATEI#crete | -0.248 | 0.108 | -2.310 | 0.021 |
| AEI#east macedonia and thrace | 0.180 | 0.091 | 1.970 | 0.048 |
| AEI#central macedonia | 0.048 | 0.054 | 0.890 | 0.376 |
| AEI#west macedonia | 0.316 | 0.120 | 2.640 | 0.008 |
| AEI#epirus | 0.034 | 0.079 | 0.430 | 0.670 |
| AEI#thessaly | 0.037 | 0.082 | 0.450 | 0.654 |
| AEI#ionian islands | 0.195 | 0.173 | 1.130 | 0.260 |
| AEI#west greece | 0.135 | 0.084 | 1.600 | 0.109 |
| AEI#sterea ellada | 0.076 | 0.098 | 0.770 | 0.439 |
| AEI#peloponnese | -0.008 | 0.083 | -0.100 | 0.919 |
| AEI#north aegean | 0.402 | 0.144 | 2.800 | 0.005 |
| AEI#southaegean | 0.335 | 0.130 | 2.590 | 0.010 |
| AEI#crete | -0.012 | 0.079 | -0.150 | 0.882 |
| PostGrad#east macedonia and thrace | 0.034 | 0.470 | 0.070 | 0.943 |
| PostGrad#central macedonia | -0.105 | 0.174 | -0.600 | 0.546 |
| PostGrad#west macedonia | 1.481 | 0.466 | 3.180 | 0.001 |
| PostGrad#epirus | -0.520 | 0.398 | -1.310 | 0.192 |
| PostGrad#thessaly | 0.007 | 0.422 | 0.020 | 0.987 |
| PostGrad#ionian islands | 0.211 | 0.374 | 0.570 | 0.572 |
| PostGrad#west greece | -0.423 | 0.229 | -1.840 | 0.065 |
| PostGrad#sterea ellada | -0.866 | 0.817 | -1.060 | 0.289 |
| PostGrad#peloponnese | -0.178 | 0.364 | -0.490 | 0.625 |
| PostGrad#north aegean | 1.953 | 0.381 | 5.120 | 0.000 |
| PostGrad#southaegean | - | - | - | - |
| PostGrad#crete | -0.122 | 0.232 | -0.530 | 0.598 |
| <hr/> Additional variables <hr/> | | | | |
| Female (=1) | -1.231 | 0.017 | -72.350 | 0.000 |
| Immigrant (=1) | -0.143 | 0.021 | -6.880 | 0.000 |
| Years since graduation | 0.128 | 0.003 | 48.760 | 0.000 |
| Years since graduation^2 | -0.003 | 0.000 | -50.080 | 0.000 |
| Married (=1) | -0.428 | 0.017 | -24.810 | 0.000 |
| Head of household (=1) | 0.701 | 0.018 | 39.410 | 0.000 |

| | | | | |
|----------------------------------|------------------------------|-------|---------|-------|
| Residing in big city (=1) | -0.146 | 0.013 | -11.620 | 0.000 |
| Child below 12 in household (=1) | 0.739 | 0.013 | 54.910 | 0.000 |
| Share of employed in household | 0.055 | 0.000 | 148.930 | 0.000 |
| Year dummies | | | | |
| 2004 (ref. group) | - | - | - | - |
| 2005 | 0.005 | 0.010 | 0.520 | 0.600 |
| 2006 | 0.015 | 0.013 | 1.160 | 0.244 |
| 2007 | 0.017 | 0.013 | 1.300 | 0.195 |
| 2008 | 0.010 | 0.013 | 0.730 | 0.468 |
| Quarter dummies | | | | |
| 1 | -0.017 | 0.003 | -5.180 | 0.000 |
| 2 (ref. group) | | | | |
| 3 | 0.004 | 0.003 | 1.240 | 0.214 |
| 4 | -0.007 | 0.004 | -1.640 | 0.100 |
| Constant term | -2.294 | 0.039 | -59.060 | 0.000 |
| Number of obs = 603,999 | Pseudo R2 = 0.5265 | | | |
| Wald chi2(93) = 26,773.18 | Log likelihood = -162,918.88 | | | |
| Prob > chi2 = 0 | | | | |

Table A3 Probit estimation results 2010-2013

| Dependent: employed=1 | Coef. | Robust Std. Err. | z | P>z |
|--|--------|---------------------|--------|-------|
| Education | | | | |
| Compulsory | -0.157 | 0.032 | -4.850 | 0.000 |
| Upper secondary (ref. group) | - | - | - | - |
| Post-secondary non-tertiary | 0.192 | 0.037 | 5.200 | 0.000 |
| ATEI (Higher Technical Education Institutions) | 0.522 | 0.049 | 10.670 | 0.000 |
| AEI (University) | 0.563 | 0.036 | 15.740 | 0.000 |
| Post-graduate studies | 0.825 | 0.082 | 10.110 | 0.000 |
| Region | | | | |
| East macedonia and thrace | -0.145 | 0.045 | -3.240 | 0.001 |
| Central macedonia | -0.021 | 0.031 | -0.670 | 0.502 |
| West macedonia | 0.012 | 0.053 | 0.220 | 0.826 |
| Epirus | -0.061 | 0.044 | -1.380 | 0.167 |
| Thessaly | 0.083 | 0.041 | 2.010 | 0.044 |
| Ionian islands | -0.171 | 0.064 | -2.680 | 0.007 |
| West greece | -0.010 | 0.042 | -0.230 | 0.815 |
| Sterea ellada | -0.100 | 0.038 | -2.600 | 0.009 |
| Attica (ref. group) | - | - | - | - |
| Peloponnese | -0.004 | 0.040 | -0.090 | 0.926 |
| North aegean | -0.128 | 0.064 | -2.010 | 0.045 |
| South aegean | -0.051 | 0.058 | -0.880 | 0.378 |
| Crete | -0.033 | 0.038 | -0.870 | 0.383 |
| Education#Region | | | | |
| Compulsory#east macedonia and thrace | 0.234 | 0.063 | 3.740 | 0.000 |
| Compulsory#central macedonia | 0.066 | 0.049 | 1.330 | 0.182 |
| Compulsory#west macedonia | 0.059 | 0.083 | 0.720 | 0.474 |
| Compulsory#epirus | 0.211 | 0.064 | 3.300 | 0.001 |
| Compulsory#thessaly | 0.143 | 0.062 | 2.290 | 0.022 |
| Compulsory#ionian islands | 0.167 | 0.089 | 1.890 | 0.059 |
| Compulsory#west greece | 0.184 | 0.061 | 3.000 | 0.003 |
| Compulsory#sterea ellada | 0.097 | 0.057 | 1.700 | 0.090 |
| Compulsory#peloponnese | 0.193 | 0.061 | 3.180 | 0.001 |
| Compulsory#north aegean | -0.031 | 0.092 | -0.340 | 0.736 |
| Compulsory#southaegean | -0.102 | 0.083 | -1.220 | 0.221 |
| Compulsory#crete | 0.131 | 0.057 | 2.300 | 0.021 |
| PostSec#east macedonia and thrace | 0.127 | 0.100 | 1.270 | 0.206 |
| PostSec#central macedonia | -0.078 | 0.066 | -1.190 | 0.234 |
| PostSec#west macedonia | -0.134 | 0.115 | -1.160 | 0.246 |
| PostSec#epirus | -0.106 | 0.103 | -1.020 | 0.307 |
| PostSec#thessaly | -0.219 | 0.099 | -2.210 | 0.027 |
| PostSec#ionian islands | -0.016 | 0.179 | -0.090 | 0.928 |
| PostSec#west greece | -0.030 | 0.105 | -0.280 | 0.776 |
| PostSec#sterea ellada | -0.058 | 0.094 | -0.620 | 0.538 |
| PostSec#peloponnese | -0.080 | 0.121 | -0.660 | 0.511 |

| | | | | |
|------------------------------------|--------|-------|---------|-------|
| PostSec#north aegean | 0.008 | 0.143 | 0.050 | 0.958 |
| PostSec#southaegean | -0.283 | 0.129 | -2.190 | 0.028 |
| PostSec#crete | -0.003 | 0.085 | -0.040 | 0.971 |
| ATEI#east macedonia and thrace | 0.003 | 0.113 | 0.030 | 0.977 |
| ATEI#central macedonia | -0.171 | 0.077 | -2.220 | 0.026 |
| ATEI#west macedonia | -0.025 | 0.133 | -0.190 | 0.851 |
| ATEI#epirus | -0.071 | 0.108 | -0.650 | 0.513 |
| ATEI#thessaly | -0.352 | 0.103 | -3.420 | 0.001 |
| ATEI#ionian islands | 0.014 | 0.189 | 0.070 | 0.943 |
| ATEI#west greece | -0.226 | 0.104 | -2.160 | 0.031 |
| ATEI#sterea ellada | -0.201 | 0.112 | -1.800 | 0.072 |
| ATEI#peloponnese | -0.213 | 0.116 | -1.830 | 0.067 |
| ATEI#north aegean | -0.230 | 0.166 | -1.380 | 0.167 |
| ATEI#southaegean | 0.219 | 0.179 | 1.230 | 0.221 |
| ATEI#crete | -0.284 | 0.096 | -2.960 | 0.003 |
| AEI#east macedonia and thrace | 0.150 | 0.094 | 1.600 | 0.110 |
| AEI#central macedonia | -0.023 | 0.058 | -0.390 | 0.699 |
| AEI#west macedonia | -0.004 | 0.122 | -0.030 | 0.974 |
| AEI#epirus | 0.107 | 0.090 | 1.180 | 0.236 |
| AEI#thessaly | -0.130 | 0.081 | -1.610 | 0.107 |
| AEI#ionian islands | 0.093 | 0.164 | 0.560 | 0.572 |
| AEI#west greece | 0.178 | 0.087 | 2.040 | 0.042 |
| AEI#sterea ellada | 0.169 | 0.091 | 1.860 | 0.062 |
| AEI#peloponnese | 0.013 | 0.090 | 0.150 | 0.882 |
| AEI#north aegean | -0.072 | 0.136 | -0.530 | 0.594 |
| AEI#southaegean | -0.068 | 0.139 | -0.490 | 0.624 |
| AEI#crete | -0.033 | 0.082 | -0.400 | 0.691 |
| PostGrad#east macedonia and thrace | 0.582 | 0.320 | 1.820 | 0.069 |
| PostGrad#central macedonia | -0.333 | 0.143 | -2.320 | 0.020 |
| PostGrad#west macedonia | 0.610 | 0.376 | 1.620 | 0.105 |
| PostGrad#epirus | -0.479 | 0.430 | -1.120 | 0.265 |
| PostGrad#thessaly | -0.203 | 0.270 | -0.750 | 0.452 |
| PostGrad#ionian islands | -0.468 | 0.499 | -0.940 | 0.349 |
| PostGrad#west greece | 0.143 | 0.256 | 0.560 | 0.576 |
| PostGrad#sterea ellada | 0.645 | 0.293 | 2.200 | 0.028 |
| PostGrad#peloponnese | -0.823 | 0.504 | -1.630 | 0.103 |
| PostGrad#north aegean | -0.671 | 0.692 | -0.970 | 0.332 |
| PostGrad#southaegean | 0.551 | 0.279 | 1.980 | 0.048 |
| PostGrad#crete | -0.101 | 0.296 | -0.340 | 0.734 |
| <hr/> Additional variables <hr/> | | | | |
| Female (=1) | -0.853 | 0.017 | -50.940 | 0.000 |
| Immigrant (=1) | -0.140 | 0.021 | -6.720 | 0.000 |
| Years since graduation | 0.125 | 0.003 | 43.560 | 0.000 |
| Years since graduation^2 | -0.003 | 0.000 | -40.700 | 0.000 |
| Married (=1) | -0.282 | 0.018 | -15.880 | 0.000 |
| Head of household (=1) | 0.470 | 0.017 | 27.110 | 0.000 |

| | | | | |
|-------------------------------------|-----------------------------|-------|---------|-------|
| Residing in big city (=1) | -0.120 | 0.014 | -8.690 | 0.000 |
| Children below 12 in household (=1) | 0.663 | 0.015 | 44.190 | 0.000 |
| Share of employed in household | 0.055 | 0.000 | 148.800 | 0.000 |
| Year dummies | | | | |
| 2010 (ref. group) | - | - | - | - |
| 2011 | -0.027 | 0.010 | -2.670 | 0.007 |
| 2012 | -0.065 | 0.013 | -4.870 | 0.000 |
| 2013 | -0.082 | 0.014 | -6.070 | 0.000 |
| Quarter dummies | | | | |
| 1 | -0.006 | 0.004 | -1.570 | 0.117 |
| 2 (ref. group) | - | - | - | - |
| 3 | 0.001 | 0.004 | 0.180 | 0.855 |
| 4 | -0.012 | 0.005 | -2.420 | 0.016 |
| Constant term | -2.663 | 0.042 | -63.940 | 0.000 |
| Number of obs = 417,193 | Pseudo R2 = 0.5151 | | | |
| Wald chi2(93) = 27,094.85 | Log likelihood = -127,726.9 | | | |
| Prob > chi2 = 0 | | | | |

Table A4 Estimation results 2015-2019

| Dependent: employed=1 | Coef. | Robust Std. Err. | z | P>z |
|--|--------|------------------|--------|-------|
| Education | | | | |
| Compulsory | -0.094 | 0.039 | -2.390 | 0.017 |
| Upper secondary (ref. group) | - | - | - | - |
| Post-secondary non-tertiary | 0.213 | 0.039 | 5.410 | 0.000 |
| ATEI (Higher Technical Education Institutions) | 0.527 | 0.048 | 10.940 | 0.000 |
| AEI (University) | 0.555 | 0.037 | 14.930 | 0.000 |
| Post-graduate studies | 0.907 | 0.067 | 13.540 | 0.000 |
| Region | | | | |
| East macedonia and thrace | 0.025 | 0.041 | 0.610 | 0.539 |
| Central macedonia | 0.060 | 0.031 | 1.910 | 0.056 |
| West macedonia | 0.131 | 0.052 | 2.530 | 0.011 |
| Epirus | -0.070 | 0.049 | -1.420 | 0.156 |
| Thessaly | 0.071 | 0.045 | 1.590 | 0.112 |
| Ionian islands | -0.137 | 0.057 | -2.390 | 0.017 |
| West greece | 0.079 | 0.043 | 1.840 | 0.066 |
| Sterea ellada | 0.013 | 0.043 | 0.300 | 0.761 |
| Attica (ref. group) | - | - | - | - |
| Peloponnese | 0.048 | 0.041 | 1.170 | 0.243 |
| North aegean | -0.014 | 0.058 | -0.240 | 0.811 |
| South aegean | -0.045 | 0.050 | -0.910 | 0.361 |
| Crete | -0.035 | 0.040 | -0.850 | 0.393 |
| Education#Region | | | | |
| Compulsory#east macedonia and thrace | 0.136 | 0.063 | 2.170 | 0.030 |
| Compulsory#central macedonia | 0.018 | 0.056 | 0.330 | 0.742 |
| Compulsory#west macedonia | -0.005 | 0.090 | -0.060 | 0.952 |
| Compulsory#epirus | 0.218 | 0.077 | 2.810 | 0.005 |
| Compulsory#thessaly | 0.047 | 0.075 | 0.630 | 0.531 |
| Compulsory#ionian islands | 0.133 | 0.087 | 1.520 | 0.129 |
| Compulsory#west greece | -0.078 | 0.067 | -1.160 | 0.246 |
| Compulsory#sterea ellada | -0.035 | 0.069 | -0.510 | 0.610 |
| Compulsory#peloponnese | 0.030 | 0.068 | 0.430 | 0.664 |
| Compulsory#north aegean | -0.013 | 0.098 | -0.130 | 0.895 |
| Compulsory#southaegean | 0.108 | 0.079 | 1.360 | 0.173 |
| Compulsory#crete | 0.123 | 0.065 | 1.890 | 0.059 |
| PostSec#east macedonia and thrace | -0.161 | 0.084 | -1.920 | 0.055 |
| PostSec#central macedonia | -0.065 | 0.068 | -0.970 | 0.334 |
| PostSec#west macedonia | -0.233 | 0.112 | -2.080 | 0.037 |
| PostSec#epirus | 0.049 | 0.114 | 0.430 | 0.671 |
| PostSec#thessaly | -0.013 | 0.092 | -0.140 | 0.886 |
| PostSec#ionian islands | 0.155 | 0.119 | 1.300 | 0.195 |
| PostSec#west greece | -0.228 | 0.094 | -2.440 | 0.015 |
| PostSec#sterea ellada | -0.276 | 0.093 | -2.960 | 0.003 |
| PostSec#peloponnese | -0.063 | 0.088 | -0.720 | 0.472 |

| | | | | |
|------------------------------------|--------|-------|---------|-------|
| PostSec#north aegean | -0.007 | 0.138 | -0.050 | 0.959 |
| PostSec#southaegean | -0.017 | 0.100 | -0.170 | 0.865 |
| PostSec#crete | 0.092 | 0.081 | 1.130 | 0.259 |
| ATEI#east macedonia and thrace | -0.179 | 0.094 | -1.900 | 0.057 |
| ATEI#central macedonia | -0.121 | 0.071 | -1.710 | 0.087 |
| ATEI#west macedonia | -0.402 | 0.118 | -3.410 | 0.001 |
| ATEI#epirus | -0.068 | 0.106 | -0.640 | 0.520 |
| ATEI#thessaly | -0.238 | 0.101 | -2.350 | 0.019 |
| ATEI#ionian islands | 0.047 | 0.139 | 0.340 | 0.734 |
| ATEI#west greece | -0.142 | 0.101 | -1.400 | 0.162 |
| ATEI#sterea ellada | -0.412 | 0.111 | -3.710 | 0.000 |
| ATEI#peloponnese | -0.252 | 0.109 | -2.320 | 0.020 |
| ATEI#north aegean | 0.012 | 0.152 | 0.080 | 0.935 |
| ATEI#southaegean | 0.062 | 0.128 | 0.480 | 0.630 |
| ATEI#crete | -0.086 | 0.095 | -0.900 | 0.366 |
| AEI#east macedonia and thrace | -0.068 | 0.076 | -0.890 | 0.375 |
| AEI#central macedonia | -0.110 | 0.058 | -1.890 | 0.059 |
| AEI#west macedonia | -0.231 | 0.111 | -2.070 | 0.038 |
| AEI#epirus | 0.048 | 0.090 | 0.530 | 0.597 |
| AEI#thessaly | -0.057 | 0.082 | -0.700 | 0.486 |
| AEI#ionian islands | 0.158 | 0.133 | 1.190 | 0.235 |
| AEI#west greece | 0.017 | 0.093 | 0.180 | 0.854 |
| AEI#sterea ellada | -0.012 | 0.096 | -0.120 | 0.902 |
| AEI#peloponnese | -0.087 | 0.090 | -0.970 | 0.334 |
| AEI#north aegean | -0.245 | 0.121 | -2.030 | 0.042 |
| AEI#southaegean | 0.131 | 0.116 | 1.130 | 0.257 |
| AEI#crete | -0.104 | 0.081 | -1.290 | 0.198 |
| PostGrad#east macedonia and thrace | 0.246 | 0.189 | 1.300 | 0.195 |
| PostGrad#central macedonia | -0.053 | 0.116 | -0.450 | 0.650 |
| PostGrad#west macedonia | 0.310 | 0.259 | 1.200 | 0.231 |
| PostGrad#epirus | 0.076 | 0.387 | 0.200 | 0.845 |
| PostGrad#thessaly | 0.159 | 0.189 | 0.840 | 0.401 |
| PostGrad#ionian islands | 0.612 | 0.574 | 1.070 | 0.286 |
| PostGrad#west greece | -0.084 | 0.224 | -0.380 | 0.707 |
| PostGrad#sterea ellada | 0.107 | 0.290 | 0.370 | 0.712 |
| PostGrad#peloponnese | -0.207 | 0.258 | -0.800 | 0.423 |
| PostGrad#north aegean | 0.067 | 0.409 | 0.160 | 0.870 |
| PostGrad#southaegean | -0.096 | 0.253 | -0.380 | 0.706 |
| PostGrad#crete | -0.099 | 0.231 | -0.430 | 0.667 |
| <hr/> | | | | |
| Additional variables | | | | |
| Female (=1) | -0.849 | 0.016 | -52.180 | 0.000 |
| Immigrant (=1) | -0.159 | 0.023 | -7.010 | 0.000 |
| Years since graduation | 0.117 | 0.003 | 39.140 | 0.000 |
| Years since graduation^2 | -0.002 | 0.000 | -34.220 | 0.000 |
| Married (=1) | -0.269 | 0.017 | -15.450 | 0.000 |
| Head of household (=1) | 0.391 | 0.016 | 23.900 | 0.000 |

| | | | | |
|----------------------------------|------------------------------|-------|---------|-------|
| Residing in big city (=1) | -0.094 | 0.014 | -6.580 | 0.000 |
| Child below 12 in household (=1) | 0.698 | 0.015 | 46.060 | 0.000 |
| Share of employed in household | 0.056 | 0.000 | 147.850 | 0.000 |
| <hr/> | | | | |
| Year dummies | | | | |
| <hr/> | | | | |
| 2015 (ref. group) | - | - | - | - |
| 2016 | -0.005 | 0.012 | -0.460 | 0.643 |
| 2017 | 0.001 | 0.015 | 0.100 | 0.921 |
| 2018 | 0.006 | 0.015 | 0.420 | 0.678 |
| 2019 | 0.028 | 0.015 | 1.830 | 0.068 |
| <hr/> | | | | |
| Quarter dummies | | | | |
| <hr/> | | | | |
| 1 | -0.026 | 0.004 | -6.640 | 0.000 |
| 2 (ref. group) | - | - | - | - |
| 3 | 0.004 | 0.004 | 1.020 | 0.309 |
| 4 | -0.010 | 0.005 | -2.030 | 0.043 |
| <hr/> | | | | |
| Constant term | -2.847 | 0.044 | -65.280 | 0.000 |
| <hr/> | | | | |
| Number of obs = 429,752 | Pseudo R2 = 0.5253 | | | |
| Wald chi2(93) = 27,334.18 | Log likelihood = -128,666.71 | | | |
| Prob > chi2 = 0 | | | | |
| <hr/> | | | | |

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