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The Effect of Higher Education on Gender Wage-Gap

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In this paper we investigate the effect of an academic degree on gender wage gap in Greece and the United Kingdom. Using Labour Force Survey (LFS) micro-data, first, we compare the returns to higher education for males and females, second, we decompose the gender wage gap between graduates and individuals with secondary education, and finally we analyse the effect of higher education on the (un)explained part of the wage gap. For that purpose, an extension of the Oaxaca-Blinder decomposition technique is used. We find that the unexplained part, which is often related to discrimination is lower for graduates in both countries.

Keywords: Discrimination, graduates, gender

JEL: J20, J21

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1. Introduction

Higher education has traditionally been associated with high wages. Human capital theorists (Becker, 1964) argue that since wages are meant to reward workers' current and future revenues, graduates should be paid more than those with lower levels of education as their skills and capabilities are assumed to be superior. Therefore, graduates may expect certain "extra" financial return to pay for their investment in education. Spence (1973) developed an alternative theory to explain the salary bonus paid to academic degree holders. Spence (ibid) that graduates may posses some natural skills required to get the educational credential, thus, regardless the potential human capital gains obtained in the university, the degree will act as a signal of such innate superior ability.

However, the signalling value of an academic degree may be affected by the expansion of higher education, as it increases the heterogeneity of skills among graduates. In other words, some non-naturally skilled individuals may also enter the higher education system, distorting the educational signal. This may explain, for example, that the difference on earnings between graduates and non graduates has been reduced significantly over the last two decades (Sloane and O'Leary, 2006). Further, the growing trend on higher education enrolment may also lay behind of the increasing popularity of postgraduate courses, where access is stricter and thus heterogeneity is lower.

This paper aims to investigate the impact of an academic degree on the gender wage gap and discrimination. We understand discrimination as an adverse selection problem where the hidden information is the commitment of females to their

professional career. We expect that, if an academic degree is an effective signal of workers' commitment, then the gender wage gap should be reduced by lessening discrimination towards females. However, as we will argue, this assertion may also depend on some institutional factors, such as the nature of the educational system and the labour market. The comparative analysis of two countries, such as Greece and the UK, where both systems differ substantially, provide a promising platform for investigating the above.

There are a few previous works on the impact of education and educational credentials on the gender wage gap composition, which generally assume that education only contributes to the stock of the human capital (Weichselbaumer and Winter-Ebmer, 2005). From this perspective, education is just associated with the explained, non-discriminatory, difference on wages. This approach could be missing the fact that education may also act as a signal to the labour market and, regardless any human capital gain, it might reduce discrimination (unexplained part) acting as a proof of the future commitment of female workers to their careers.

In this paper, in order to address this issue, we compare the gender wage gap structure of two samples: a sample of graduates and a sample of individuals with secondary education (henceforth non-graduates). The analysis is conducted in two very different European labour markets; Greece and United Kingdom. Kirton and Greene (2005) stress the need for analysing gender and other equality issues from a European perspective, as policies aiming to tackle discrimination problems are now commonly undertaken. However, national differences are still evident, being the UK the leading example on the implementation of anti discrimination measures, such as Equal

Opportunities Policies (Hooke and Noon, 2004). The authors believe that comparative analysis could help to the effective design of policies at European level.

We analyse the research question in three steps: (i) we compare the returns to higher education for males and females on the log wage equation, (ii) we estimate the gender wage gap for the two samples, and (iii) we examine the role of higher education degrees on the structure of the gender wage gap.

2. The relation between academic degrees and the gender wage gap.

The discrimination theory argues that female wages could be negatively affected by some stereotypes such as low commitment, caring nature, physical weakness, lesser need for income, etc (Anker, 1997). Influenced by these stereotypes, employers could believe that female workers might prefer to commit to their families rather than to their professional career. In such circumstances, employers may prefer to train and reward their male colleagues, whose future revenues are seen more certain. Hence, the employment conditions of females, including salaries, could be negatively affected by prejudices on women's skills and preferences (Aigner and Cains, 1977).

The influence of stereotypes on salaries contradicts the human capital theory of productivity-based wage determination. According to this theory, in absence of discrimination, salaries should be essentially explained by present and potential productivity or, in case it is non-observable, by factors related with it, such as knowledge, skills or experience. The returns to higher education should, therefore, be identical for males and females. However, gender discrimination challenges this

assertion as higher education could help females signalling their commitment to their careers.

Education as a signal in contracting under asymmetric information is modelled by Spence (1973, 1974) and Arrow (1973). They understand that highly educated workers are likely to be more productive, not only because they are better trained, but also because they posses some natural skills required to get the educational degree. If these individual characteristics are to persist when working, educated employees should also be easier to train and, ultimately, firms will obtain higher revenue from them. Thus, employers could distinguish high productive workers just observing the signal given by the acquisition of different education levels.

The gender discrimination issue can be explained following the classical adverse selection rationale, which applies for contracts where the employer hires employees who hold private information on her/his skills and preferences (Bolton and Dewatripont, 2005). The hidden information may also include females' preferences on dedication to their professional careers. In absence of any signal, the employer could judge the impact of possible low commitment on productivity by observing females' choice between career and family (or other matters). In that case, the employer might impose the same wage penalization to all female workers, regardless of whether they are actually committed to their career or not. As this information remains private, employers only can rely on observable signals, such as academic degrees in order to differentiate the wage levels they offer to workers.

Undoubtedly, higher education requires certain level of investment, dedication and effort. By observing this employers could imply that females who possess higher education are less likely abandon their jobs when married, or may decide to have a smaller number children in order to favour their careers. This should be the case if the cost of graduation for women with low interest on their career exceeds the future revenue of their (short) professional activity. In that case, only "career driven" females will find attractive to spend resources getting the degree. As valuable and "risk-free" human capital source, graduate females may be offered better employment conditions, including better wages. The gender wage gap should then be smaller for graduates than for non-graduates, as employers will only penalise non-graduate females, whose commitment to careers is not signalled by a degree. If the above holds, it is arguable that academic degrees may have an impact on the gender wage composition, and in particular it should reduce the unexplained (discriminatory) part.

3. The role of the national higher education system and labour market.

The value of an academic degree as a signal may depend on the quality of the university system, alongside with some features of the labour market. In this section we describe the cases of the UK and Greece.

3.1 The education system: the reliability of the signal.

The reliability of an academic degree as a signal is in direct relation with the quality of the awarding university or institution. If the quality of the institution is low, the cost and effort to get the degree is parallel low. Some females with weak commitment to their career may then decide to study these "low cost" degrees.. Heterogeneity among female graduates will then arise and employers may not trust academic

degrees as a signal of commitment. The signaling value of "average" academic degrees could therefore fade away and employers might use other information such as the awarding university or field of study to make such signal more precise.

Regarding heterogeneity on higher education in the two countries of our study, it can be argued that in the UK the quality of universities is less homogeneous than in the case of Greece. In particular, in the UK, there are over 100 universities, whose quality and perceived prestige varies considerably. In Greece, the quality of universities is much more homogeneous as due to the Greek Constitution, universities are all public while other privately owned institutions are not officially recognized as universities. Similarly, graduates from foreign universities have to go through a long process, whose outcome is uncertain, in order for their degrees to be recognized as equal to those acquired within the system in Greece. The above is done to in order to maintain the high standards of higher education and secure the employment prospects of graduates who had to go through a very difficult process in order to get accepted to higher education institutes, from the influx of graduates from private institutions or from foreign institutions whose quality is uncertain. Thus employers may perceive a degree as a sign of ability as those who have been accepted into a public university in Greece are generally those who scored the highest points in the national exams.

Due to the above, an "average" university degree in Greece is likely to signal more precisely graduates´ prospective performance than in the UK, where quality heterogeneity may distort the signal for the internal labor market. It is important to note that for our analysis a degree is treated as homogenious in each country, as the

awarding institutions is not known in the dataset utilized. Thus the quality effect (Black and Smith, 2004) cannot be captured.

3.2 The labour market: the availability of substitutes.

The signalling effect of an academic degree may be also be influenced by other alternative signals. When a worker is hired for the first time, the level of uncertainty regarding her/his future revenues is high. At that moment, and in absence of any type of signal, any random individual will be an uncertain choice for any job. However, the "on the job" performance of workers could progressively reduce the uncertainty regarding their skills. The employer will observe, with different level of accuracy, some outcomes from employee's work and, progressively, will create expectations regarding his/her future revenues. This performance, if not perfectly, will be largely observed by the firm that employs the worker. On the other hand, external employers will just receive certain signals about the worker's potential productivity. These signals could take the form of a job referral, a curriculum vitae or career progress, among others. Consequently, in labour markets where careers are developed in several companies, the signalling value of degrees may be lower, as other signals are available. This might be the case of the UK where the average tenure is lower than in Greece (Table 1).

4. The estimation of the gender wage gap.

4.1 The data and the sample

The analysis draws on micro data from Labour Force Surveys of Greece and the UK, for the second (spring) quarter of 2004[i]. The Greek Labour Force Survey is conducted by the National Statistical Service of Greece (ESYE). The questionnaire used is

comprised of approximately 100 questions. The sample of the survey is 30,000 households and includes 80,000 observations approximately. The UK LFS is conducted by the Office for National Statistics and collects information of 80,000 households approximately (120,000 observations). The questions and definitions used in the LFS questionnaire in both countries are internationally agreed on and based on the European Labour Force Survey (European Communities, 2003).

For the purposes of the analysis of this paper we use only the observations that classify an individual as employed in full time employment. Additionally, we compare those with University education to those with secondary education as most of the studies in the literature compare graduates with the next lower level of qualification or no qualifications (Walker and Zlu, 2001). These restrictions in the original dataset along with a number of missing values restricted the sample available for the purposes of the econometric work.

Regarding the degree variable, it takes the form of a dummy variable that distinguish between graduates and non-graduates. In general, a degree is understood to be awarder by a higher education institution (university), as the result of successfully completing a program of study. However, each education system has its own model of degree awarding.

UK graduates have such consideration if they, at least, have successfully completed the Bachelor degree with honours (BA, for arts subjects, BEng for engineering Bsc for science), that normally takes three years full time study, four in the case of

Scotland. Higher degrees such as Masters degrees take one additional year of study while a PhD requires three years of full time involvement.

Regarding Greece, we count an individual as a "higher degree holder" if he or she possesses a degree from a University (AEI), or a Technological Institute (TEI)[ii] or equivalent from institutions abroad, which are officially recognized as equal by the Greek authorities.

In both cases, we count an individual as non-graduate if he/she has completed secondary education.

A descriptive overview of the UK and Greek samples is presented in Table1.
In general, the stock of higher education is higher in the UK (54.1%) than in Greece (41.8%). In both cases, the relative number of graduates is higher for females than males (+14.4% in Greece and +12.5% in the UK). The descriptive statistics show that the Greek market has a higher reliance on temporary contracts, higher shares of public sector employment (46.5% in Greece and 31.2% in the UK for males and 48.3% in Greece and 43.8% in the UK regarding females), and higher job tenure as workers spend a longer period in the same company in Greece (10.3 years) than in the UK (8.7 years). Regarding the socio-demographic variables, Greece is characterised by a higher proportion of married workers (70.8% against 59.8%).

[Table 1 about here]

4.2 The method of estimation.

In the first step, we specify an adapted Mincerian equation for the logarithm of the hourly wage rate where the educational attainment is measured with the dummy variable *degree.*

$$Log\ W = f(D,X) + e \qquad [1]$$

Where W is the monthly wage rate, D is the dummy classifying graduates and non graduates and X is the set of socio-demographic such as age and marital status, employment conditions such as temporary and public contract, and human capital variables such as tenure, the squared tenure and the number of hours worked. Age squared could not be entered into the specification since only age-bands were included in the available datasets. Finally, e denotes the random error. We also control for regional differences including 14 and 12 administrative regions for Greece and the UK, respectively.

In the second step, we estimate the components of the gender wage gap for graduates and non-graduates separately. The aim is to observe if the unexplained and allegedly discriminatory wage gap is reduced on the sample of graduates. With that purpose, we use various alternatives of the well known Oaxaca (1973) and Blinder (1973) decomposition technique. The basic model can be written as follows:

$$G = w_m - w_f = (x_m - x_f)\beta_f + (\beta_m - \beta_f)\, x_f + (x_m - x_f)(\beta_m - \beta_f) = E + C + I \qquad [2]$$

Where w_m and w_f are the observed mean log hourly rate for males and females respectively, x denotes the vector of explanatory variables and β are the estimated coefficients. This technique allows the decomposition of the total wage gap difference *(G)* into a part due to endowments *(E),* another due to differences in coefficients *(C)* and a last component explained by the interaction between endowments and coefficients *(I)*. Commonly, the endowments part *(E)* is seen as the "explained" and non discriminatory part while the coefficients component *(C)* accounts for the "unexplained" and discriminatory part. The question where the existing methodological approaches diverge is how to allocate the interaction term *(I).* The most common solution is to introduce a diagonal matrix of weights *(W)* into the decomposition of *(G)* in order to split the interaction (I) into the explained or unexplained part.

$$G=w_m-w_f=(x_m-x_f)(\beta_m(W)-(M-W)\beta_f)\,x_f+(x_m(M-W)-x_f(W))(\beta_m-\beta_f) \quad [3]$$

Where *(M)* is an identity matrix. Oaxaca (1973) proposed to consider the interaction whether totally part of the unexplained *(W=0)* or totally part of the explained *(W=M)*. Other extensions proposed different alternatives for the weighting matrix *(W)*, such the use of the size of the gender groups (Cotton, 1988) or a pooled model by Neumark (1988).

In our analysis, the results do not vary substantially when the the proposed alternatives are used. In Table 3, the listed results are obtained applying the most restrictive consideration of discrimination: the interaction is considered as part of the

explained part *(W=M).* This specification is intended to guarantee that coefficients are not artificially increasing the magnitude of the discrimination.

Finally, we linearly decompose the factors affecting discrimination *(C)* in order to estimate the nature of the contribution of academic degrees. As Nielsen (1998) explains, the contribution of each explanatory variable (x_i) is calculated using the differentiation of $d(C)/d(x_i) = C_j$ subject to $C=\sum C_{j.}$, which means that the sum of the contributions is equal to the total discrimination. The resulting coefficients are listed in Table 4.

5. Results

5.1 The estimation of the wage equation for males and females.

Table 2 shows the results of the log wage equation [1]. The coefficients capture the percent change per unit.

[Insert Table 2 about here]

As expected, an academic degree has a positive and significant relationship with wages. The impact of higher education on wages is stronger in the UK, where the percent increase on wages for graduates is similar for females 27 % and males 26 %. In Greece, the raise on graduates' wages in more moderate: 19 % for males and 21 % for females. This lower return to higher education for the case of Greece might be explained by the growing supply of graduates which in fact have expressed downward pressures to their wage compensation (see Author A, forthcoming). However, the difference favours female graduates' wages on 1.6 %, which could be indicating some

type of signalling effect. This preliminary analysis is completed in the following sections.

Regarding the rest of the explanatory variables, some gender and national differences are observed. First, the results indicate that temporary contracting is penalised in Greece, particularly for females (-12 %), while in the UK it does not affect the wage level significantly. Second, wages in public employment are higher in Greece, very significantly for females (26 %), while in the UK the effect is whether negative (-7 % males) or non significant for females.

The rest of variables have a similar relationship in both countries, with small differences on the magnitude of the effect. As expected, tenure increase wages at an approximate rate of 2% per year. Similarly, the number of hours worked are also positively related with wages. Socio-demographic variables such as marital status and age have also a positive impact on wages. Finally, wages in the primary sector are generally lower, with the exception of females in the UK and equal to wages in tertiary sector for the case of the secondary sector.

5.2 Gender wage gap decomposition for graduates and no- graduates

The decomposition of the gender wage gap is shown in Table 3. The dependent variable of the analysis is the gender log differences on the monthly wage for graduates and non-graduates.

[Insert Table 3 about here]

As expected, the results show that wages for females, both for graduates and non-graduates, are lower in both countries. Unsurprisingly, none of the four wage gaps are entirely explained by the human capital attainments. This indicates that gender wage discrimination may exist in both countries and in both segments. This evidence is consistent with previous research based on UK data (Bell and Ritchie, 1998; Harkness, 1996; Makepeace et al, 2004; Wright and Ermisch, 1991) and on Greek data (Psacharopoulos, G, 1983; Patrinos and Lambropoulos, 1993; Kanellopoulos and Mavromaras, 2002; Karamessini and Ioakimoglou, 2007).

In Greece wages of both male and female graduates are higher than non-graduates. However, regarding the gender wage gap, some interesting differences are observed. The gender wage gap is, in absolute terms, larger for the non-graduates (0.20 against 0.14 for graduates). The wage gap is higher for non-graduates also in relative terms.

Further, the decomposition analysis reveals some additional differences between both segments. First, results show that the unexplained part, which is often related to discrimination in the labour market, is higher for non-graduates in both countries. In particular, the unexplained part of the wage gap is 74% for non-graduates and 63% for graduates in Greece, and 62% for non-graduates and 59% for graduates in the UK. This result is coherent with our hypothesis of reduced wage discrimination for female graduates against non-graduates.

The comparison of the results between Greece and the UK reveals some important dissimilarities on the gender wage gap structure. First, the absolute wage gap is larger in the UK, which is reasonable as wages are higher than in Greece. However, it is

more interesting that the gender wage gap is also larger in relative terms in the UK, both for graduates and for non-graduates. Nevertheless, the wage gap in the UK is more precisely explained by the human capital and contractual characteristics of workers than it is in Greece. In other words, the explained part is larger in the UK than in Greece. According to our results, female workers in the UK are further from males' wage standards than female workers in Greece. However, as the explained part is larger in the UK, female workers in the UK could more easily reduce the wage gap by enhancing observable factors such as experience or education. On the contrary, in Greece, the impact of such factors is not that strong, as most of the wage gap remains unexplained, particularly for non-graduates.

The comparison of the wage gap structure by educational segment also provides some interesting results. Contrary to Greece, in the UK, the explained gap is similar for both segments: 40 % for graduates and 37 % for non-graduates. This reveals that the composition of the wage gap is very similar both for graduates and non-graduates. This result suggests that academic degrees do not reduce the unaccounted part of the wage gap or, in other words, that female workers may be equally discriminated regardless they are graduates or not. It is important to remark that the cross national divergence lays, mainly, in the non graduates segments. In this segment, possible gender discrimination is very high in Greece (74 %), while in the UK, the possible level of discrimination for non graduates (62 %) does not substantially differ from the level found on the graduates segment (59 %).

In general, the results reveal that possible discrimination against females is larger in Greece, particularly on the non-graduate segment. However, this evidence should be

interpreted with caution. Recently Chevalier (2007) demonstrates that the unexplained gap could be "explained" by attitudinal and choice variables, such as altruism and family oriented preferences. Accordingly, the larger unexplained gap of the non-graduate segment in Greece may be related with the more traditional familiar role of the individuals that do not choose to pursue higher education in Greece, which could influence female preferences towards work and family. Unfortunately, LFS data do not provide this type of information. The evidence presented in this paper should therefore be interpreted as the maximum (not exact) level of possible discrimination for each country and segment. In order to bring some light onto the sources of the country and segment differences, in the next section, we linearly decompose the wage gap in order to estimate the effect of some socio demographic variables such as age, marital status and type of job on both the explained and unexplained wage gaps.

5.3 The linear decomposition of the gender wage gap

Table 4 shows the linear decomposition of the gender wage gap for the full sample (including both graduates and non-graduates). This is intended to assess the effect of academic degrees on the composition of the wage gap.

[Insert Table 4 about here]

Starting with Greece, the effect of an academic degree on wages appears to be very beneficial for female graduates. First, it reduces the wage gap on its explained part (-0.02), which, following the human capital theory means that the reward to the skills of graduate females narrows the gender difference on salaries. This result indicates that the skills difference between graduate and "non-graduate" females is larger for

males, where the graduates´ wage bonus is comparatively more moderate. Assuming that the skills acquired in the university are equal for all graduates (males or females), the result suggests that females with secondary education are relatively less skilled than their male counterparts in Greece. Second, academic degrees also reduce (-0.02) the unexplained part of the wage gap. This is in line with the previously presented evidence on the levels of possible discrimination for graduates and non-graduates and reinforces the hypothesis of reduced discrimination of graduate females.

Regarding the rest of the explanatory variables most of these (age, hours and tenure) contribute positively to the explained wage gap. This means that female human capital attainments are inferior to the same elements for males. For example, the positive coefficient (0.04) of tenure means that since experience increases wages, the lower levels of experience of females are increasing the explained part of the wage gap.

The impact of the explanatory variables on the unexplained part appears to be of more interest. In particular, the coefficients may disentangle the sources of discrimination, measured by magnitude of the unexplained gap, towards some particular groups of females. For example, it is remarkable that in Greece both age (0.18) and experience (0.04) increase the unexplained gap, which may be interpreted as a sign of age-related discrimination towards females. However, this is rather counterintuitive, and indeed does not hold for the UK. As we argued above, discrimination may be understood as an insurance of the employer against the absences due to child bearing, which are a female specific labour cost. If that is the case, age and experience, negatively related with the likelihood of child bearing, should reduce wage discrimination and the

unexplained part of the wage gap. Finally, it is likely that the negative coefficient of the public sector variable for the unexplained gap in Greece (-0.03) captures the effect of the tighter control and wage rigidities on the public sector, which both could help to tackle gender wage discrimination more effectively.

The results for the UK are in many aspects diverse to the outcomes for Greece. First, the effect of an academic degree is found to be non-significant in reducing both the explained and unexplained gender wage gap. The result is in apparent contradiction with the lower level of unexplained gap observed for graduates (-3 % in Table 2). What this result is proving is that such reduction is not statistically significant. In the case of Greece, the difference on the unexplained wage gap between graduates and non graduates is as large as -10 %, which, when decomposing the wage gap, confirms higher education as a factor reducing possible discrimination.

Nevertheless, the non-significant contribution of an academic degree to the wage gap composition in the UK is not a proof against the human capital theory. Indeed, female higher education skills contribute to increase wages, as it is shown in Table 2, but the return to higher education is statistically equal to the return obtained by males. Hence, as wages increase at the same rate, the explained gap of the difference remains unaltered. On the contrary, the non significant effect of higher education on reducing the unexplained gap does challenge the theory of academic degrees as signalling mechanisms. It indicates that the maximum level of discrimination is unaltered by academic degrees. As we discussed above, the theoretical signalling value of academic degrees may depend on some country specific variables. In particular, it could be faded away by heterogeneity on the quality of the higher education system

and the availability of other labour market signals. Unfortunately, this question can not be scientifically answered with the dataset available in this analysis. However, it is possible to draw a reasonable picture attending to the results obtained for some other labour market signals.

The low effect of academic degrees on reducing the unexplained part may be explained by impact of the remaining explanatory variables. The unexplained gender wage gap in the UK is significantly reduced by age (-0.072), tenure (-0.052), hours worked (-0.042) and public sector (-0.056). As we discussed for Greece, the effect of age, lower risk of pregnancy, and public employment, tighter control on hiring procedures, are somehow expected results. The observed negative effect of tenure and hours workers appears to be more interesting as these may substitute academic degrees as signals of female career commitment. In sum, the UK results suggest that the labour market is able to provide some allegedly more accurate signals of females´ commitment than academic degrees.

6. Conclusions

This paper studied the effect of an academic degree on the composition of the gender wage gap by comparing the cases of Greece and the UK. The analysis follows the human capital perspective by observing the explained part of the wage gap, as well as the theory of discrimination perspective by studying the unexplained part of the wage gap. In this paper, discrimination is understood as a problem of adverse selection where the hidden information affects to female's commitment to their career. Hence, this paper argues that an academic degree should reduce the unexplained part of the wage gap by signalling effect of higher education.

Our results show that the effect of an academic degree on discrimination is to a great extent contingent to the characteristics of the education systems and the labour market structures. For example, a possible explanation for differences in the wage gap between the two countries may lie in the differences in the female labour force participation. Yaish and Kraus (2003) show that women's economic positions depends in some institutional factors and the level of restructuration of the labour market. In that sense, since female participation is lower in Greece than the UK, it might be assumed that in Greece only the most determined females participate, and thus the wage gap is lower in Greece.

Our initial findings show that in the UK the expected return to an academic degree is the same for males and females. On the contrary, the results for Greece are opposite; returns to education are higher for females, which is consistent with evidence from various other studies. Subsequently, an Oaxaca and Blinder approach suggests that the absolute and relative gender wage gap is higher in the UK than in Greece. Nevertheless, the unexplained part of such wage gap is larger in Greece, particularly for non-graduates. In both cases, the unexplained part, was found to be lower for graduates. Finally, it was found that in the UK, an academic degree is not significantly related with discrimination while in Greece this relation is significant and negative. Our hypothesis of reduced discrimination among graduates is found to apply only for Greece.

The results obtained for the UK are consistent with the expected effect of the rapid expansion of higher education. As Mcguinness and Bennett (2007) argue, this

phenomenon has increased the graduate heterogeneity where educational credentials such as degrees may no longer constitute sufficient control for potential skills and productivity. However, the access to university has also been expanding in Greece. Our results show that an academic degree reduces discrimination in this labour market. This may indicate that universal access to higher education may debilitate, but not eliminate, the effect of an academic degree on wages. In particular, in labour markets where alternative signals are scarce, an academic degree may orientate employers when offering contracts. It is reasonable to think that in the UK, where job turnover is higher than Greece, the labour market is able to produce more accurate and trustful signals of female commitment to their career than an academic degree. The same signals may be, in some extent, missing in the more rigid labour market of Greece, and therefore, graduate females make use of their educational credentials to signal their commitment to their career and reduce the gender penalty on their wages. However, the findings of this study may also be explained by the differences on the heterogeneity of the higher education institutions. In the UK there is a wide range of universities of different quality whereas in Greece the quality of higher education institutions is more homogeneous. Thus, since the quality of the university cannot be controlled for, a university degree in Greece provides a stronger signal than in the UK.

The use of LFS data is an advantage in the sense of the extension of the analysis to a wider population and the cross country comparability of the results. However, the set of available variables is limited and attitudinal and choice variables are missing. This is a clear limitation of the analysis as the precise estimation of the discrimination is hindered by the effect of the omitted variable bias. Nevertheless, the main goal of our

analysis was to compare the effect of an academic degree on the maximum level of possible discrimination in order to draw a comparative picture of female graduates' prospects.

Further research could extend the analysis and include elements associated to academic degrees, such as the field of study, the quality of the awarding university, and student's performance. Such approach will permit to measure more precisely the actual level of discrimination. In addition, postgraduate credential such as PhD and masters, where access is stricter, could be analysed. This will permit the control of the differences on the heterogeneity of students between under and post graduate students. Thus, it will make possible to compare the signalling value of academic credentials by comparing courses with different levels of heterogeneity among students.

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Table 1 Descriptive statistics of the sample: Mean and (Standard deviation)

	Greece			UK		
	All	*Male*	*Female*	*All*	*Male*	*Female*
Monthly Wage	1,005 [4.2]	1,028 [3.8]	975 [4.8]	1,373 [12.6]	1,469 [17]	1220 [10]
Degree	46.8%	42.5%	56.9%	54.1%	49.2%	61.7%
Age	41.8 [11.7]	41.7 [11.2]	41.9 [12.4]	40.1 [15.5]	40.2 [19]	40.0 [18]
Married	70.8%	68.6%	73.8%	59.8%	60.1%	58.8%
Temporary	9.7%	9.4%	10.2%	4.5%	3.9%	5.1%
Public sector	47.2%	46.5%	48.3%	37.6%	31.2%	43.8%
Tenure	10.3 [.11]	10.4 [.10]	10.2 [.11]	8.7 [.11]	8.8 [.14]	8.60 [.13]
Hours worked	38.7 [.09]	39.4 [.09]	37.8 [.10]	36.8 [.12]	39.0 [.11]	36.11 [.14]
Observations	14,370	8,254	6,166	7,657	3,730	3,927

Source: 2004(2nd Quarter)LFS micro data, processed by the authors.

Table 2 Log wage estimates males and females.

	Greece		*United Kingdom*	
	Males	*Females*	*Males*	*Females*
Constant term	6.149***	6.310***	6.751***	6.166***
	[0.030]	[0.031]	[0.063]	[0.076]
Degree	0.194***	0.210***	0.266***	0.274***
	[0.008]	[0.009]	[0.016]	[0.018]
Age	0.005***	-0.000	0.009	0.003***
	[.0005]	[0.000]	[0.019]	[.0009]
Married	0.093***	0.0593***	0.176***	0.035*
	[0.009]	[0.009]	[0.018]	[0.018]
Temporary	-0.080***	-0.127***	0.031	-0.062
	[0.013]	[0.012]	[0.047]	[0.041]
Public sector	0.170***	0.268***	-0.076***	0.004
	[0.009]	[0.009]	[0.019]	[0.019]
Tenure	0.021***	0.019***	0.016***	0.024***
	[0.001]	[0.001]	[0.002]	[0.003]
Squared Tenure	-0.0004***	-0.0002***	-0.0002***	0.005***
	[.00005]	[.00005]	[.00008]	[0.001]
Hours worked	0.005***	0.025***	0.009***	0.015***
	[.0005]	[0.005]	[0.001]	[0.001]
Primary	-0.250***	-0.188***	-0.334***	0.003
	[0.034]	[0.002]	[0.090]	[0.004]
Secondary	0.009	0.022*	0.018	-0.006
	[0.008]	[0.011]	[0.018]	[0.010]
Tertiary	§	§	§	§
Observations	8254	6114	3730	3927
R squared	0.438	0.457	0.233	0.265

*Notes: *** Significant at the 0.01 level, ** Significant at the 0.05 level, *Significant at the 0.01 level, [Standard deviation in brackets]*
[14 regions for Greece and 12 regions for the UK have been included]

Table 3 Oaxaca-Blinder gender wage differentials (monthly wage).

Sample	*Graduates*	*Secondary Education*
Greece		
Log wage male earnings	7.077	6.794
Log wage female earnings	6.931	6.588
Wage gap	0.146	0.206
Explained	0.054 [36 %]	0.053 [25 %]
Unexplained	0.092 [63 %]	0.153 [74 %]
United Kingdom		
Log wage male earnings	7.392	7.136
Log wage female earnings	7.138	6.836
Wage gap	0.254	0.300
Explained	0.104 [40 %]	0.112 [37 %]
Unexplained	0.151 [59 %]	0.188 [62 %]

Table 4 Linear decomposition of the gender wage gap (full sample)

	Greece		United Kingdom	
	Explained	Unexplained	Explained	Unexplained
Constant term	n.s	-0.126	n.s	0.191
Academic degree	-0.026	-0.029	n.s	n.s
Age	n.s	0.182	n.s	-0.072
Married	n.s	0.026	0.016	0.084
Temporary	n.s	n.s	n.s	n.s
Public sector	n.s	-0.039	0.028	-0.056
Tenure	0.041	0.046	0.017	-0.052
Squared Tenure	-0.023	-0.043	n.s	0.020
Hours worked	0.012	0.126	0.034	-0.042
Primary	0.013	n.s	n.s	n.s
Secondary	0.012	n.s	n.s	n.s
Tertiary	§	§	§	§

[14 regions for Greece and 12 regions for the UK have been include, n.s. stands for non significant coefficients. Listed coefficients are significant at .05.

[i] This wave was the latest available at the time of the research. The LFS micro-data is not a freely available dataset and there are various procedures and restrictions in accessing the data that did not allow the use of more recent data.

[ii] Tertiary education in Greece is divided into; AEI, which is a university that has a full length of studies (4+ years), and TEI, which has a shorter circle (2-3 years).