STRATEGIC TRANSITIONS FOR YOUTH LABOUR IN EUROPE

D 5.1 - A Comparative Time Series Analysis of Overeducation in Europe

Is there a common policy approach?

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Executive Summary

This paper uses a time-series approach to examine the extent to which youth and adult overeducation move together within countries and the degree to which there exists long-run relationships in the rates of overeducation between countries. The latter perhaps been driven by similar macroeconomic structural effects or common approaches to educational policy and provision.

We find that while overeducation tends to rise over time in a number of European countries, this is by no means a universal pattern as overeducation was found to be static and even declining in some European countries over time. Despite such disparities, long-run trend relationships were found to exist among many European countries, with relationships evident between and within new, old and peripheral European countries.

We found that overeducation rates tend to converge to a common level over time, with convergence somewhat more rapid within new and peripheral European countries. Youth and adult overeducation rates were found not to move together in an equilibrium relationship within the majority of countries and youth overeducation rates were found to be generally more volatile in nature.

Among other things, total and youth overeducation growth rates were found to be related to both unemployment rates, the presence of temporary workers and the share of graduates in the labour force. While there was a relatively high degree of cross-country consistency in the direction of particular variables on the growth of total overeducation, the direction of impacts for youth overeducation were more inconsistent across countries.

The study indicates that there are strong similarities in both the general evolution and the factors determining both total overeducation across many European countries. However, while labour market variables were found to be important in determining youth overeducation, observed impacts varied substantially across countries suggesting that a bespoke policy response is likely to be necessary in most instances. The results suggest that greater attention should be given to the capacity of the labour market to absorb any given increase in educational supply, taking specific account of both the level and composition of current and future labour demand.

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Abbreviations

ADF	Augmented Dicky Fuller test
AT	Austria
ALMP	Active Labour Market Policy/Policies
BE	Belgium
BG	Bulgaria
CH	Switzerland
CY	Cyprus
CZ	Czech Republic
GDP	Gross Domestic Product
DE	Germany
DK	Denmark
EE	Estonia
EPL	Employment Protection Legislation
ES	Spain
ESF	European Social Fund
EU	European Union
EU-LFS	European Union- Labour Force Survey
EU-SILC	European Union Survey on Income and Living Conditions
FI	Finland
FR	France
GR	Greece
HU	Hungary
IE	Ireland
IS	Iceland
ISCED	International Standard Classification of Education
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NEET	Not in Employment, Education or Training
NL	Netherlands
NO	Norway
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares
PIAAC	Programme for the International Assessment of Adult Competencies
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden

SI	Slovenia
SK	Slovakia
SOC	Standard Occupational Classification
STW	School to Work
UK	United Kingdom
VET	Vocational Education and Training

1. Introduction

Currently almost all of the research on labour market mismatch, measured either in terms of overeducation or overskilling, has relied on country specific cross-sectional or panel data sets. The research, to date, has focused on identifying the individual or firm-level determinants of mismatch and/or the impacts of mismatch on individual outcomes such as income and job satisfaction. While such insights are crucial to understanding mismatch, it is only by studying such phenomena at a more aggregate level that we can come to an understanding of the macroeconomic, demographic and institutional forces that drive it. In this report, we use the European Labour Force Survey to construct quarterly time-series of both youth and adult overeducation between 1997 and 2012 for 29 European countries. The report has a number of objectives including (i) providing a descriptive assessment of trends in overeducation in European countries over time (ii) assessing the extent to which the rate of overeducation among various age cohorts moves together within countries, (iii) measuring the degree of interdependence and convergence in the evolution of overeducation between countries over time, and (iv) attempting to identify some of the underlying drivers of overeducation, differentiated by age cohort, using time-series techniques. From a policy perspective, the extent to which overeducation could be suitable to a common policy approach, either at a European or a national level, will largely depend on the similarities in the evolution of overeducation over time both between and within countries. The potential for a common policy approach to overeducation, either at a national or pan-European level, is consequently assessed on the basis of this analysis.

While the general literature on overeducation has expanded rapidly, particularly over the past two decades (see Quintini 2011, McGuinness, 2006 for reviews), there has been little assessment of overeducation from an aggregate country level perspective; nevertheless, some exceptions do exist. Pouliakas (2013), also using data from the EU LFS and analysing the average rate of overeducation between 2001 and 2011, demonstrates that there exist large variations in overeducation rates across European countries. Furthermore, Pouliakas (2013) concludes that while the average level of overeducation among EU 25 member states exhibited a relatively stable time-series between 2001 and 2009, there was substantial credentialism present in the labour market with the growth in overeducation over time being largely subdued by higher occupational entry requirements.[1] Despite the relatively constant trend, the Pouliakas (2013) study does indicate that the average rate of overeducation in Europe increased during the years 2008 and 2009 implying that levels of overeducation may vary with the business cycle. In support of this view, Mavromaras et al (2010) argue that there are grounds to expect the rate of mismatch to vary with macro-economic conditions, on the basis that fluctuations in the economy will change the composition in the demand for labour and, consequently, how workers are utilized within firms. Ex ante, we might reasonably expect rates of overeducation to rise during times of recession and fall during periods of economic growth; however, it is also reasonable to suspect that business cycle impacts will be more heavily felt among newly qualified younger workers and that variations in the overall rate of overeducation are likely to be

[1] Pouliakas (2013) measured overeducation subjectively by comparing individual levels of education with the modal level of education in their chosen occupation. The study demonstrates that overeducation in the EU 25 would have increased much more rapidly between 2001 and 2009 had occupational entry requirements remained at their 2001 levels.

less affected by variations in aggregate output. These hypotheses will be further explored later in the study.

With respect to the potential drivers of overeducation at the macroeconomic level, there is limited research primarily due to the paucity of cross-country datasets. A number of possible effects could potentially explain the existence and persistence of overeducation at a national level. Overeducation could arise due to the supply of educated labour outstripping demand, primarily as a result of the tendency of governments in developed economies to continually seek to raise the proportion of individuals with third-level qualifications. Alternatively, it maybe that the quantity of educated labour does not exceed supply but that there exists imbalances in composition, i.e. individuals are being educated in areas where there is little demand, leading to people from certain fields of study being particularly prone to overeducation[2]. Finally, labour demand and supply might be perfectly synced yet overeducation might still arise due to frictions arising from asymmetric information, institutional factors that prevent labour market clearance or variations in individual preferences related to either job mobility or work-life balance.

Applying a multi-level model to a cross-country graduate cohort database, Verhaest & Van der Velden (2012) derive a number of variables from the individual level data to explain cross-country differences in the incidence of overeducation. Explanatory variables in the Verhaest & Van der Velden (2012) study include measures for the composition of higher education supply in terms of both vocational versus academic orientation and field of study, proxies for educational quality[3], measures of the output and unemployment gaps[4], indicators of employment protection legislation within each country and the level of educational over-supply. Graduate over-supply is taken as the difference in the standardised values of the share of graduates in the over 25 population and gross expenditure on R&D. Verhaest & Van der Velden (2012) find that cross-country differences in overeducation were related to their measures which, they argue, capture variations in quality and orientation (general versus specific) of the educational system, business cycle effects and the relative oversupply of highly skilled labour. Davia et al (2010) attempt a similar exercise using EU-SILC data. Similar to Verhaest & Van der Velden (2012), Davia et al (2010) find evidence to support the notion that overeducation is higher in regions where the level of educated labour supply exceeds demand[5] and where university enrolment levels are higher. Davia et al. (2010) also report that the overeducation rate is positively related to the labour market share of migrants and is lower for females in regions with strong employment protection. Thus, while some concerns may be raised regarding the quality of some of the indicator variables derived in studies relying on cross-sectional international data, both Verhaest & Van der Velden (2012) and Davia et al. (2010) demonstrate the potential importance of aggregate level variables in explaining overeducation, with both studies pointing towards educational over-supply as an important driving force.

[2] There is ample evidence in the literature of a higher prevalence of overeducation among graduates from fields such as the Arts and Social Sciences.

[3] Derived from factor analyses carried out on subjective variables.

[4] Deviations from the observed rate from the natural rate

[5] Measured by the ratio between the share of workers with ISCED-5 educational attainment and the share of workers in professional-directive occupations i.e. SOC groups I and II which consist of Legislators, senior officials and managers

The relative importance of various macro-level factors in explaining international variations in overeducation are explored in the study. This is structured as follows, Section 2 describes the data and methodology, Section 3 provides a descriptive discussion of cross-country trends in overeducation, Section 4 assesses the extent of completed and on-going convergence in overeducation rates across countries, Section 5 assesses the strength of the relationship between youth and adult overeducation within countries, Section 6 measures the impact of various macro-level variables in explaining within-country variations in overeducation, and Section 7 presents the study's conclusions and policy recommendations.

2. Data and Methods

The data used in this study is the quarterly anonymised country level files of the European Union Labour Force Study (EULFS) for the period up to Q3 2012. As there exists no subjective question within the EULFS related to the level of schooling necessary to get, or undertake, a person's current job, overeducation is measured objectively[6]. For each country, in each quarter, overeducation is defined as the proportion of employees in employment whose ISCED level of schooling lies one level or more above the occupational mode. Overeducation is calculated within two-digit occupational codes and using five ISCED categories of <2, 3, 4, 5B and 5A+6. Thus, if the modal level of schooling in a particular two-digit occupation was measured at ISCED 3, then all individuals educated to ISCED levels 4 and above would be deemed to be overeducated under this approach. We calculated the overall rate of overeducation in each country for each quarter and we also extract rates for individuals aged 16-24, 25-60 and also for males and females. Given that we are dealing with a large number of countries, for the purposes of our analysis we group these into the meaningful categories of old European, new European and peripheral European states[7].

In terms of the empirical approach, we are interested in determining the extent to which youth and adult overeducation move together within countries and the degree to which there exist long-run relationships in the rates of overeducation between countries. We classify these long-run equilibrium relationships as "completed convergence" on the grounds that, if detected, they indicate that certain series are sufficiently integrated to the extent that overeducation is likely driven by a set of common macroeconomic and / or institutional factors. We might expect a link between youth and general overeducation within countries on the grounds that they are likely to be driven by a common set of macroeconomic variables related to, for instance, the nature of labour market demand, labour supply or wage setting institutions. However, given that the overall overeducation rate is closely related to a stock measure that will react only slowly to major changes in determining factors, while youth overeducation is more of a flow measure which may react with somewhat more volatility to changes in labour market conditions, raises uncertainties related to the extent to which both series will be highly synced even if they do share common determinants. Regarding inter-country completed convergence, there are grounds to believe that this could prevail within a European Union context, whereby the free movement of workers tend to eradicate cross-country differences in key labour market variables such as unemployment and, possibly, overeducation. Conversely, completed convergence may be limited for accession member states or between countries where language or other non-economic barriers reduce equalising labour flows.

[6] There are essentially three standard methods of measuring overeducation. The subjective measure is based on individual responses comparing their attained education levels with their perceived job entry requirements; the occupational dictionary approach compares individual level education with the required level of schooling detailed for specific occupations in the documentation accompanying occupational classification systems. Finally, the objective approach compares individual levels of schooling with either the mean or mode level of schooling of their respective occupation. Existing studies indicate that while the correlation between the various definitional approaches tends not to be particularly high, they generate very similar results with respect to both the impacts of overeducation (see Quintini 2011, McGuinness, 2006 for reviews).

[7] For old European countries we analyse Austria, Belgium, Denmark, Finland, France, Luxemburg, Netherlands, Norway, Sweden, and UK; for new European Countries we analyse Bulgaria, Czech Republic, Estonia, Hungary, Iceland, Lithuania, Latvia, Poland, Romania, Slovenia, and Slovak Republic; and for the Peripheral countries we analyse Portugal, Ireland, Italy, Greece and Spain.

Given that we are dealing with time-series data, we test for common underlying trends between the overeducation series accounting for the spurious regressions problem. Spurious regressions can occur through the application of OLS to two or more variables that are non-stationary in nature, i.e. the series do not have a constant mean or variance, leading researchers to believing that statistical and causal relationships exist when, in fact, the series have no underlying connection. In order to overcome such issues, we adopt a cointegration estimation approach. We begin by establishing if each respective series is stationary or non-stationary through the application of standard Augmented Dicky Fuller (ADF) test (Dickey & Fuller, 1979). The ADF test is written formally for a time series yt in equation 1, where T is a time trend and g is the number of lags necessary before the error term becomes white noise.

The null hypothesis of the ADF test accepts that the given series non-stationary i.e. β1=0.

$$y_t - y_{t-1} = \beta_0 + \gamma T + \beta_1 y_{t-1} + \sum_{\tau=1}^{g} \beta_2 \left(y_{t-\tau} - y_{t-\tau-1}\right) + \varepsilon_t \qquad (1)$$

If we establish that two overeducation time series are non-stationary, then we adopt the Engle Granger test for a cointegrating relationship. If both series are stationary, we undertake OLS on the basis that spurious regressions are no longer an issue. Finally, if one series is stationary and the other non-stationary we do not undertake any further tests for an underlying relationship.

The Engle Granger test involves a two-step estimation approach. In the first stage equation 2 is estimated

$$X_{it} = \alpha + \beta_1 Y_{it} + u_t \quad (2)$$

$\hat{\beta}$ is a cointegrating vector if $u_t = X_{it} - \alpha - \beta_i Y_{it}$, therefore the second stage of the Engel Granger procedure tests that the regression residuals from equation 2 are stationary i.e.

$$\Delta u_t = \sum_{i=1}^{k} \Delta u_{t-1} + \varphi\, u_{t-1} + n_t \qquad (3)$$

In addition to testing for long-run relationships in overeducation rates both within and between countries, we also examine the extent to which overeducation rates in Europe have been converging or diverging over time by estimating a Barro (Barro, 1997) regression (equation 4). In instances where completed convergence has not been achieved, perhaps as a consequence of some countries remaining outside of monetary union, overeducation rates may converge as workers from saturated graduate labour markets relocate to areas with greater levels of job opportunity and lower levels of overeducation. The consequence of such movements would be to raise overeducation levels in areas of over-supply a consequence of labour inflows, while overeducation rates would tend to fall in highly saturated labour markets as a consequence of out-migration. The application of the Barro model, in this instance, involves regressing the growth rate of overeducation on the initial level of

overeducation. A significant negative coefficient on β1 would indicate convergence in international overeducation rates, while a positive coefficient would point towards divergence. In addition to the Barro regression, we will also check for convergence by plotting the cross-country variance in overeducation rates for specific groups of countries.

$$\frac{\ln Ov(t) - \ln Ov(0)}{t} = \beta_0 + \beta_1 Ov(0) + \varepsilon \quad (4)$$

Finally, we will attempt to identify some potential determinants of total and youth overeducation for each country by estimating equation 5, where ΔOVt represents the quarterly change in the rate of overeducation, while X is vector of potential explanatory variables derived from the EU LFS. The lags are expressed in quarters. We regress our variables on the change in the rate of overeducation on the grounds that are overeducation series are generally I(1) or I(0), thus by taking first differences we ensure that our series are stationary thereby overcoming any risk of spurious regression[8]. The derived variables are designed to capture characteristics of both labour demand and supply and institutions within each particular economy. However, data constraints mean that it was not possible to model factors such as information asymmetries, variations in the composition of labour supply, preferences etc. which may also, as discussed above, play a role in determining overeducation. The level and composition of labour demand is controlled for through the inclusion of variables such as education and age specific unemployment rates, the share of employment in professional occupations[9] and in sectors such as the public services and sales/hotels. The structure of labour market supply is controlled for through measures of the labour force and employment broken down by age education and also by age and education specific participation rates. The shares of migrants, part-time and temporary workers in employment are also used as further measures of labour supply. Institutional influences are proxied by the inclusion of trade-union density[10] and EPL[11]. Finally, changes in the macroeconomic environment are captured by quarterly GDP per capita[12]. Given that our time-series is relatively short and the number of potential explanatory variables quite large, we restrict our model to one lag. We also adopt a parsimonious approach to model estimation, whereby we begin with a full model and then systematically remove the variable with the lowest t-statistic until the point is reached where only statistically significant variables remain. Given that the model is limited to quarterly lags, it will tend to pick up only short-run influences on the overeducation growth rate.

$$\Delta Ov_t = \alpha + \beta_1 Ov_{t-1} + \beta_2 X_{t-1} + \varepsilon_t \quad (5)$$

[8] The order of integration of a series relates to the number of times that it must be differenced before it can become stationary. If a station is defined as I(1), then it is non-stationary but can be made stationary by differencing the series once. An I(2) series requires that the data must be differenced twice and so on.

[9] SOC groups 2 and 3 are deemed to be professional.

[10] Data on trade-union density and EPL was not available at quarterly level, consequently, we use repeated annual values from data published by the OECD.

[11] No EPL data was available for Bulgaria, Cyprus, Lithuania, Latvia, Romania, Estonia, Iceland, Luxembourg, and Slovenia. Trade Union Density data could not be included for Bulgaria, Cyprus, Lithuania, Latvia, Romania, and Slovenia due to data constraints.

[12] There was no available GDP per capita data on Eurostat for Greece, Iceland, Poland, Romania and UK. Aggregate GDP values were included for these countries.

3. Descriptive Statistics

The average levels of overeducation, based on quarterly data, for the period 2001 to 2012 are reported in the first column of Table 1. Our sample is restricted to employees in employment who work full-time and so will largely exclude the student population but will include paid apprenticeships and traineeships. The estimated rate of overeducation varies from below 8 per cent in the Czech and Slovak Republic to over 30 per cent in Ireland, Cyprus and Spain. Generally speaking, we observe the estimated incidence of overeducation to be lowest in new European countries, highest in peripheral states with old European countries lying somewhere in the middle. There are, however, some exceptions to this general pattern, for instance, overeducation rates were relatively high in Lithuania and Estonia, while overeducation in Portugal was well below the level observed in other peripheral countries. The second column of Table 1 provides a comparison with a number of point estimates for 2014 generated by Flisi et al (2014), who applied a comparable approach to OECD Programme for the International Assessment of Adult Competencies (PIAAC) data. Generally speaking our overeducation estimates match closely with those from the PIAAC based study, with the exception of the estimate for Denmark where a relatively large discrepancy exists.

We plot the country rates for total overeducation and for the 15-24[13] and 25-64 for age groups for each country in Figure 1. The length of the time-series varies depending on data availability. There exists a high degree of cross-country variation, both in terms the level of overeducation, the general direction of the trend over time and the relationship between youth and adult overeducation within countries. While the general cross-country pattern of overeducation corresponds to that reported by Pouliakas (2013), the rates vary substantially for some countries. It is likely that the observed difference in the rates are partially a result of data revisions, but also due to our decision to separate out ISCED levels 5A and 5B, which are merged in the Pouliakas (2013) study. Here we take the view that ISCED categories 5A and 5B represent distinctly different levels of schooling that permit entry into very different occupations. ISCED 5A represents typical graduate level occupations with an average duration of three to four years, and provide entry to a profession with a high skills requirement (medicine, dentistry, architecture etc.) (ISCED 1997) [14]. ISCED 5B qualifications are typically shorter than those in 5A and focus on occupationally specific skills designed to equip completers with the know-how for entry into a particular occupation or trade or class of occupation or trade (ISCED 1997). We conclude that an individual with an ISCED 5A level of schooling in an ISCED 5B dominated occupation are likely to view themselves as overeducated and, as such, it is justifiable to separate out both categories. For example, in the UK a Bachelor Degree qualification would be considered level 5A while a Higher National Diploma awarded by Edexcel or equivalent would be considered level 5B. Given that there is a clear progression route between both levels of qualification, it is reasonable to make a distinction between them in this context. For example, taking an average between 2001 and 2011, Poliakas (2013) reports the lowest level of overeducation was

[13] The 15 to 24 age group was chosen on the basis that it allowed us to observe overeducation among young people across all levels of educational attainment.

[14] http://www.uis.unesco.org/Education/Pages/international-standard-classification-of-education.aspx

found in Finland at 5 per cent; however, here we find Finish overeducation to be 15 per cent for the same period. The difference in the rates are partially a result of data revisions, but primarily due to our decision to separate out ISCED levels 5A and 5B, which are merged in the Poliakas (2013) study. When we merge ISCED categories 5A and 5B, the overeducation rate average for 2001 to 2011 fell to 8 per cent which is much more similar to the rate reported by Poliakas (2013). Similarly for Spain, Poliakas (2013) reports an average overeducation rate of 21 percent, while our estimate is closer to 30 percent but when we separate out ISCED levels 5A and 5B, the average overeducation rate is 23 per cent. Comparing our estimates with those of Poliakas (2013) suggests that, for most countries, the distinction makes relatively little difference; nevertheless; in countries with higher concentrations of third-level vocational schooling, such as Finland, our methodological approach results in a significant increase in the estimated rate of overeducation.

For just under half of the countries, overeducation appears to be trending upward over time; however, while the rate of increase appears quite slight, a much steeper slope is observed in the peripheral regions of Spain, Greece, Portugal and Italy and also in Poland. Furthermore, overeducation appears not to have risen in any observable way in 12 countries including Austria, Belgium, Germany, Denmark, Ireland, Iceland and Luxemburg while it has fallen over time in Cyprus, Croatia, Lithuania and Latvia. With respect to youth overeducation, the pattern appears much more volatile relative to adult overeducation. Youth overeducation lies below the average in the vast majority of countries; however, it has been consistently above the average in peripheral countries and in Belgium, Cyprus, France, Ireland, Italy, Portugal, Poland, Greece and Spain. It may be the case that the consistently high levels of youth overeducation in some peripheral countries is also contributing to the observed trend increase in total overeducation over time, as a consequence of higher proportions of consecutive generations of young people failing to achieve an appropriate labour market match. The main characteristics of country level overeducation series are summarised in Table 1a.

Table 1a: Key Characteristics of Country Level Overeducation Series

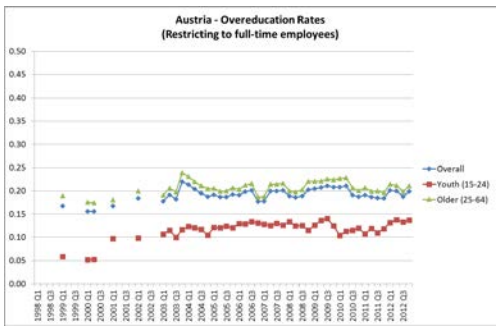
	Youth > Adult	Youth < Adult	+ve trend	-ve trend	no trend
Austria		X			X
Belgium	X				X
Bulgaria		X			X
Cyprus	X			X	
Czech		X	X		
Germany		X			X
Denmark		X			X
Estonia		X			X
Spain	X		X		
Finland		X	X		
France	X				X
Greece	X				X
Croatia		X		X	
Hungary		X	X		
Ireland	X				X
Iceland		X			X
Italy	X		X		
Lithuania		X		X	

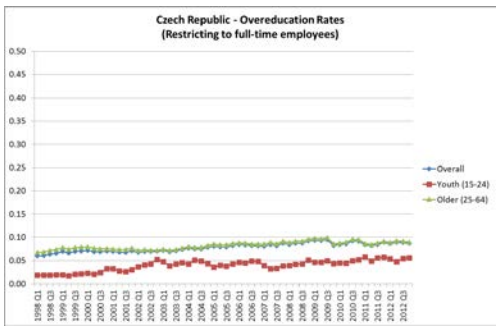
Luxemburg		X			X
Latvia		X		X	
Netherlands		X			X
Norway		X	X		
Poland	X		X		
Portugal	X		X		
Romania		X	X		
Sweden		X	X		
Slovenia		X	X		
Slovak		X	X		
UK		X			X

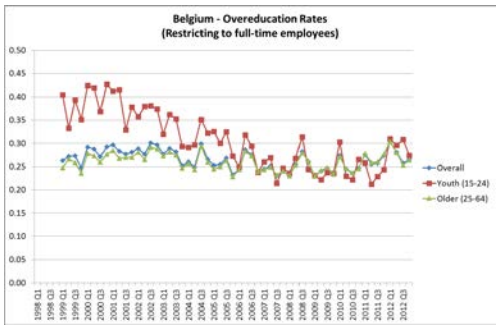
Table 1: Comparison of ESRI and PIAAC Based estimates

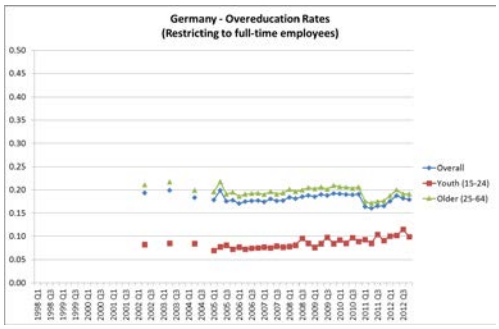
	ESRI Estimate (2001-2011 average)	**Estimates based on PIAAC from EC (2014)**
Austria	0.19	0.23
Belgium	0.26	0.24
Bulgaria	0.11	
Cyprus	0.31	0.31
Czech Republic	0.08	0.12
Germany	0.18	0.22
Denmark	0.18	0.31
Estonia	0.24	0.26
Spain	0.30	0.34
Finland	0.14	0.17
France	0.17	0.17
Greece	0.28	
Hungary	0.13	
Ireland	0.33	0.33
Italy	0.24	0.24
Lithuania	0.25	
Luxembourg	0.17	
Latvia	0.19	
Netherlands	0.22	0.22
Poland	0.11	0.11
Portugal	0.18	
Romania	0.10	
Sweden	0.14	0.19
Slovenia	0.09	
Slovak Republic	0.08	0.10
UK	0.21	0.20

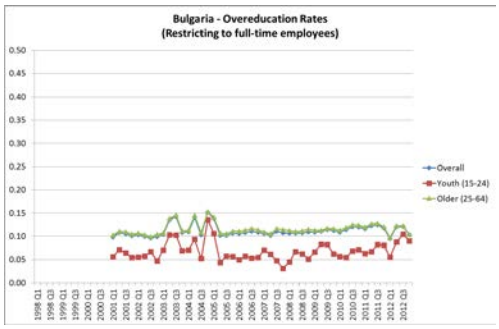
Figure 1 Overeducation Rates (restricting to full-time employees)

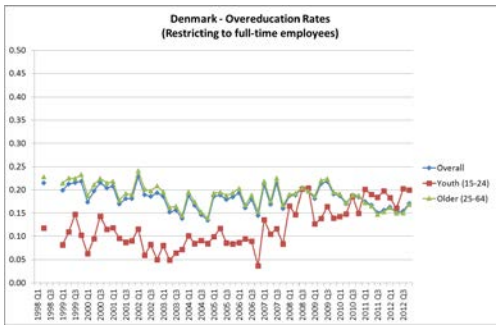


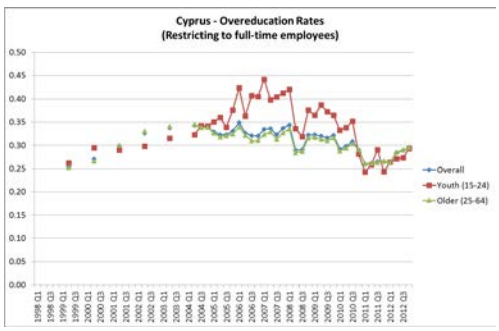


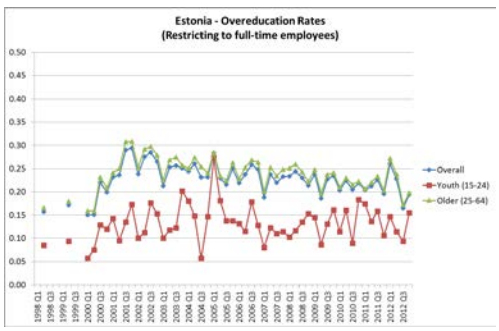


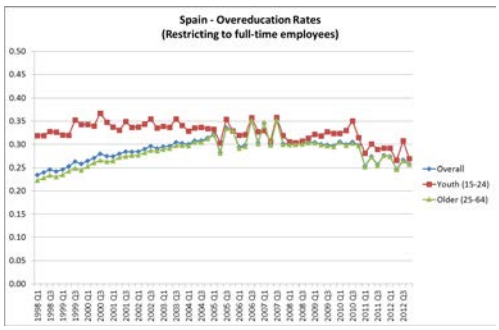


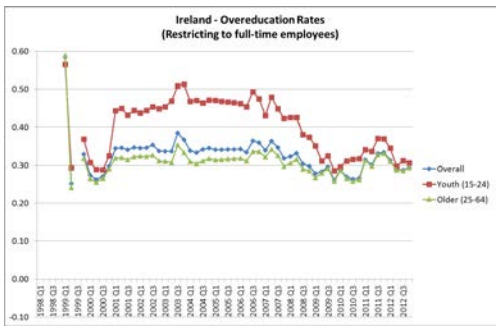


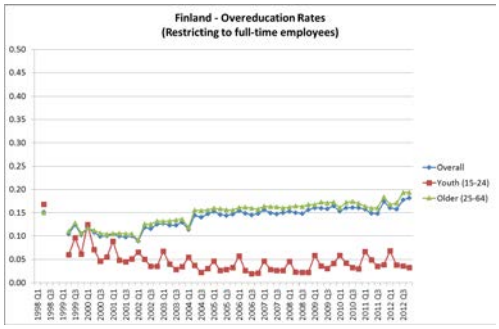


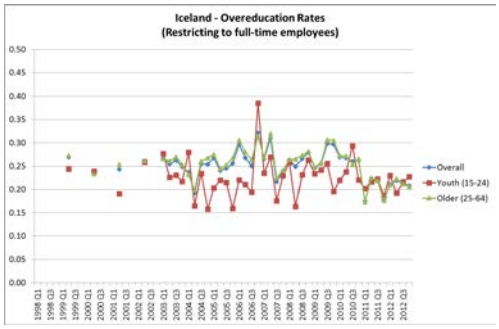


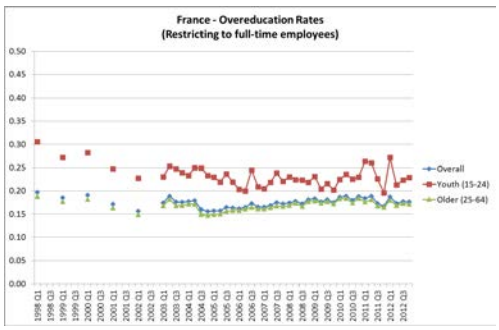


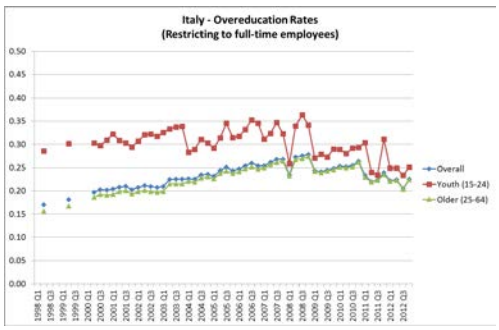

Spain - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

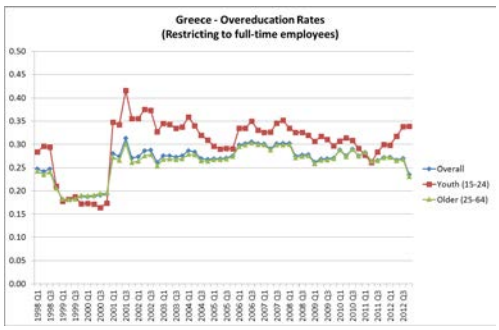

Ireland - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

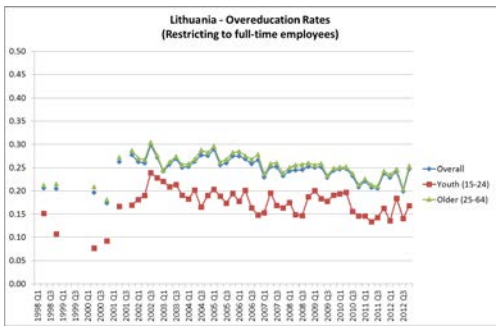

Finland - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

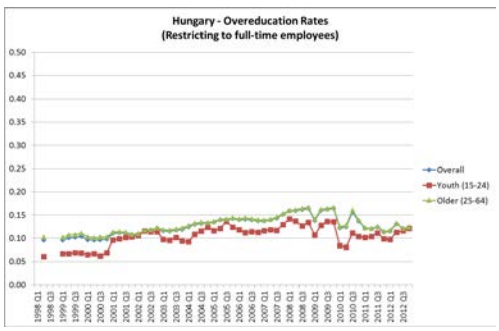

Iceland - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

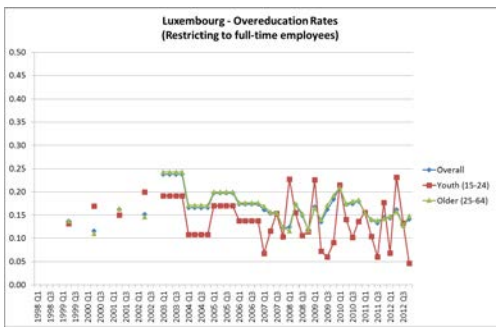

France - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

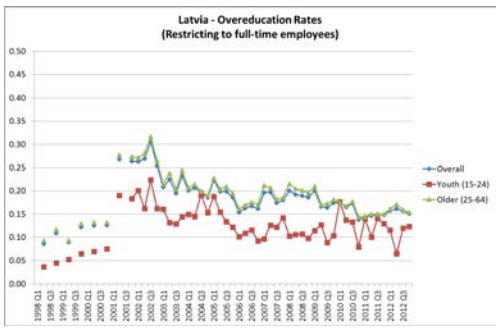

Italy - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

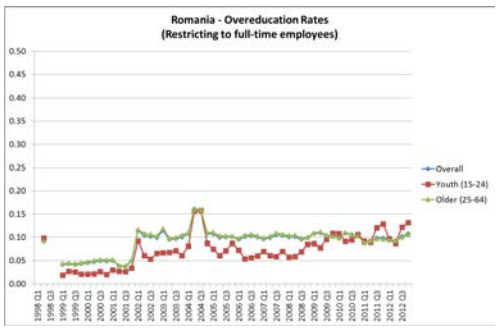

Greece - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

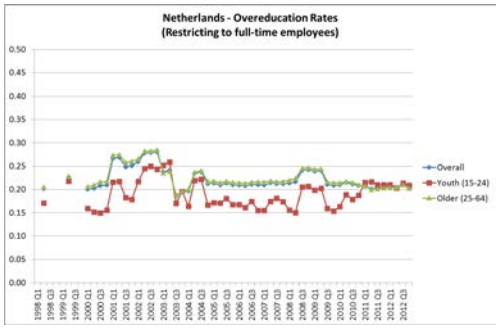

Lithuania - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

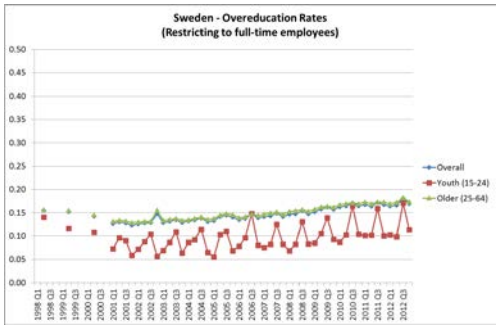

Hungary - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

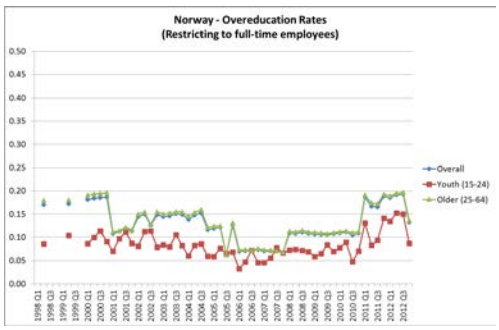

Luxembourg - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

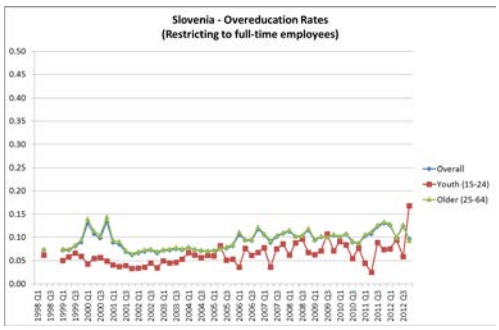

Latvia - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

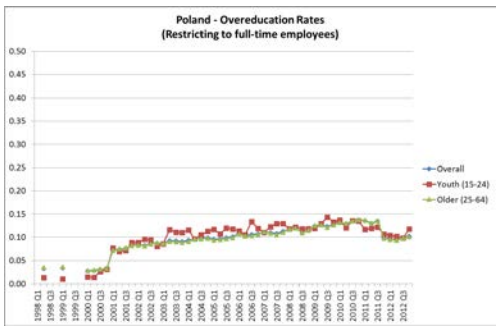

Romania - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

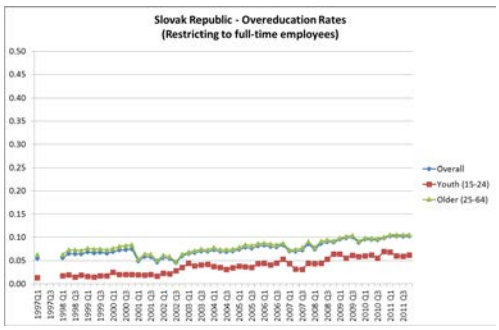

Netherlands - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

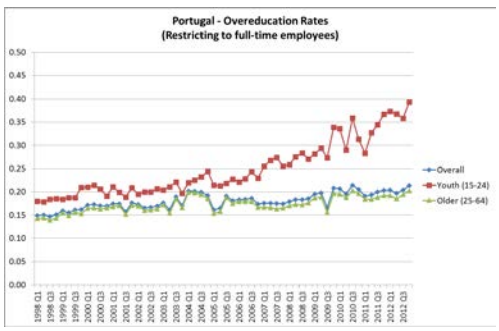

Sweden - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

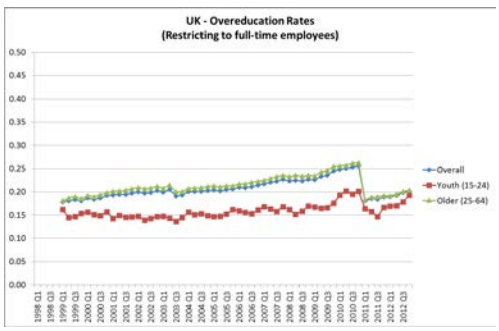

Norway - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)


Slovenia - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)


Poland - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)


Slovak Republic - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)


Portugal - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)


UK - Overeducation Rates
(Restricting to full-time employees)
Overall
Youth (15-24)
Older (25-64)

4. Are overeducation rates converging?

To investigate the existence of a long-run relationship between overeducation rates across countries, we adopt the Engle-Granger approach and perform pairwise analysis of overeducation rates. Cointegration tests should reveal whether overeducation rates move together over a longer time period. A finding of a common trend in the rates across countries may signify that an international policy approach to overeducation is appropriate. Even if there is no finding of cointegration across countries, overeducation may still respond to the same underlying processes, which we explore in a later section.

The starting point of the analysis is to establish which of the series are non-stationary using ADF tests. For each country, the stationarity test is run both with and without a time trend depending on the evolution of the overall overeducation rate over time. We conclude that we cannot reject the null hypothesis of a unit root for any series where the ADF test statistic exceeds the critical value at the 10% level of significance. These countries are then included in the cointegration analysis. We perform pairwise OLS on the other countries where we conclude the overeducation rate is stationary.

Table 2 shows the ADF tests for stationarity across countries and the table reveals that Austria, Bulgaria, Iceland, Lithuania, Luxemburg, Latvia, Portugal, Germany and Ireland, are stationary series. These series are not included in the pairwise cointegration analysis. The Engle-Granger test is carried out on the remaining countries. Table 3 shows the ADF test results from the second step of the Engle-Granger test.[15] Although the patterns are not clear-cut, the table present evidence of cointegrating relationship within and between all three country groupings, however, the pattern of association appears somewhat sporadic. A minority of countries, such as Cyprus, Romania and Poland appear to move independently and are generally not cointegrated with other European countries. The pairwise OLS results, presented in Table 4, reveal similar patterns. These findings of long-run relationships between many European countries may justify a common policy approach for these countries.

[15] Throughout this paper we refer to different groups of European countries: 'old Europe' includes Austria, Belgium, Germany, Denmark, Finland, France, Luxembourg, the Netherlands, Norway, Sweden, UK and Iceland, 'new Europe' consists of Bulgaria, Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Slovenia and Slovakia and the peripheral countries are Ireland, Portugal, Italy, Spain and Greece.

Table 2 Country Level Stationarity tests

Country	ADF test statistic	Trend: y/n
Austria	-4.013***	n
Belgium	-2.221	n
Bulgaria	-3.778***	n
Cyprus	-3.122	y
Czech Republic	-1.169	y
Germany	-2.831*	n
Denmark	-2.385	n
Estonia	-1.255	n
Spain	0.513	y
Finland	-2.476	y
France	-2.478	n
Greece	-2.072	n
Hungary	-2.029	y
Ireland	-2.616*	n
Iceland	-3.817***	n
Italy	0.29	y
Lithuania	-4.289**	y
Luxembourg	-2.985**	n
Latvia	-3.565**	y
The Netherlands	-2.585	n
Norway	-2.027	y
Poland	-2.062	y
Portugal	-5.617***	y
Romania	-2.963	y
Sweden	-1.960	y
Slovenia	-2.877	y
Slovak Republic	-2.374	y
UK	-2.267	y

Table 3: Engle-Granger Test for Cointegration – ADF Tests on Residuals

	CZ	EE	HU	PL	RO	SL	SK	BE	DK	FI	FR	NL	NO	SW	UK	GR	IT	ES
CY	-3.587	-3.497	-3.320	-3.220	-3.315	-3.232	-3.026	-3.538	-3.634	-3.874*	-3.249	-3.368	-3.969*	-3.266	-3.585	-3.189	-3.374	-3.640
CZ		-3.180	-5.122***	-3.454	-3.328	-3.421	-3.428	-4.608**	-4.210**	-3.752*	-2.878	-3.143	-4.111**	-3.404	-3.891*	-3.441	-4.483**	-4.119**
EE			-5.731***	-6.064***	-5.952***	-5.914***	-7.027***	-5.606***	-5.715***	-5.552***	-7.733***	-5.839***	-5.651***	-7.922***	-5.618***	-7.763***	-7.033***	-5.869***
HU				-3.243	-2.853	-2.422	-2.631	-3.556	-2.590	-3.073	-2.451	-2.369	-4.261**	-3.031	-3.685*	-2.957	-4.995***	-4.970***
PL					-2.446	-1.948	-2.794	-3.015	-2.160	-2.291	-1.903	-1.839	-2.280	-1.588	-3.076	-3.041	-3.487	-3.711*
RO						-3.703*	-3.182	-2.632	-3.034	-3.134	-3.493	-2.651	-2.855	-3.375	-2.628	-3.117	-2.980	-3.677*
SL							-4.158**	-3.681	-3.896*	-3.721*	-3.987*	-4.201**	-4.139**	-4.807***	-3.738*	-4.205**	-3.982**	-3.928*
SK								-3.511	-3.587	-3.565	-3.517	-4.051**	-4.081**	-4.391**	-3.767*	-5.212***	-4.666 ***	-4.332**

Table 3: Engle-Granger Test for Cointegration – ADF Tests on Residuals -continued

	CZ	EE	HU	PL	RO	SL	SK	BE	DK	FI	FR	NL	NO	SW	UK	GR	IT	ES
BE									-5.343***	-5.368***	-4.461**	-4.779***	-6.323***	-4.784***	-5.814***	-5.021***	-6.097***	-5.789***
DK										-5.303***	-4.747***	-5.600***	-5.271***	-5.369***	-5.060***	-5.617***	-5.027***	-4.996***
FI											-5.807***	-4.039**	-4.470**	-3.979*	-4.212**	-4.133**	-4.460**	-4.703***
FR												-3.400	-3.571	-3.706*	-3.523	-3.424	-3.404	-3.514
NL													-3.195	-3.111	-3.277	-3.034	-3.443	-3.309
NO														-2.745	-3.301	-3.525	-4.621**	-5.444***
SW															-5.686***	-6.263***	-6.474***	-6.494***
UK																-2.715	-2.995	-3.348
GR																	-4.395**	-3.833*
IT																		-6.283***

Table 4: Pairwise OLS

	Austria	Germany	Iceland	Luxembourg	Ireland	Portugal	Bulgaria	Lithuania	Latvia
Austria		0.458***	0.008	-0.017	-0.094*	0.101	-0.130	0.051	0.046
Germany			0.111**	0.105	-0.151***	0.024	-0.148	0.067	0.145*
Iceland				0.265	0.060	-0.854**	-0.436	0.571**	0.315
Luxembourg					0.352**	-0.678*	0.462	0.647***	0.699***
Ireland						-0.941***	-0.119	0.765***	0.381***
Portugal							0.144	0.062	-0.090
Bulgaria								-0.037	-0.079
Lithuania									0.033
Latvia									

	Austria	Germany	Iceland	Luxembourg	Ireland	Portugal	Bulgaria	Lithuania	Latvia
Austria									
Germany	0.439***								
Iceland	0.073	1.60**							
Luxembourg	-0.159	0.752	0.252						
Ireland	-0.840*	-1.67***	0.055	0.343**					
Portugal	0.142	0.119	-0.095	0.035	-0.085				
Bulgaria	-0.184	-0.128	-0.064	0.071	-0.020	0.167			
Lithuania	0.280	0.261	0.092	-0.020	0.025	0.104	-0.030		
Latvia	0.349	0.670**	-0.018	0.050	-0.291*	-0.322	-0.531**	0.070	

While there is some evidence of completed convergence between European countries, it is still possible that the countries in our study are converging to a common overeducation rate. Here we test for the presence of on-going convergence over the period 2003 Q1 to 2012 Q3. This time period was chosen so as to maximise the number of countries that could be excluded in the model. Given that overeducation generally appears to exhibit a positive trend in many countries, on-going convergence would imply that overeducation is increasing at a faster rate between 2003 and 2012 in countries that had a lower initial overeducation rate in 2003. This is equivalent to a negative and significant β1 coefficient in the Barro regression from equation 4. The coefficients from the Barro models are presented for overall, adult and youth overeducation in Table 5 and indicate that on-going convergence was a feature of the time-period. The results suggest that there is a tendency for countries to converge towards a common overeducation rate over time for all measures of overeducation.

Table 5: Barro Regression Results: Time Period Q1 2003 – Q1 2012 for 26 countries

Overeducation Shares	**Coefficients**
Total Overeducation	-0.0256** (0.0093)
Adult Overeducation	-0.023** (0.010)
Youth Overeducation	-0.030*** (0.010)

It may be the case that that the degree of on-going convergence varies among groups of countries with common structural, geographical and historical features. It is not possible to estimate Barro regressions separately for the old, new and peripheral European countries as the sample size for each grouping will be too small. In order to overcome this difficulty, we assess the rate of on-going convergence by plotting the variance of overeducation rates across countries, on the grounds that on-going convergence would be consistent with a falling variance over time. Plotting the variance across all countries and across all three measures (total overeducation, youth overeducation and adult overeducation) confirms the results from the Table 5 that on-going convergence did occur over the time period (Figures 2 to 4). However, the aggregate picture appears to hide substantial variation, as it is apparent that on-going convergence was more modest in old Europe relative to new and peripheral European countries (Figures 5 to 7).

Figure 2: Variance in Total Overeducation across Countries from Q1 2003 to Q1 2012 (26 countries included)

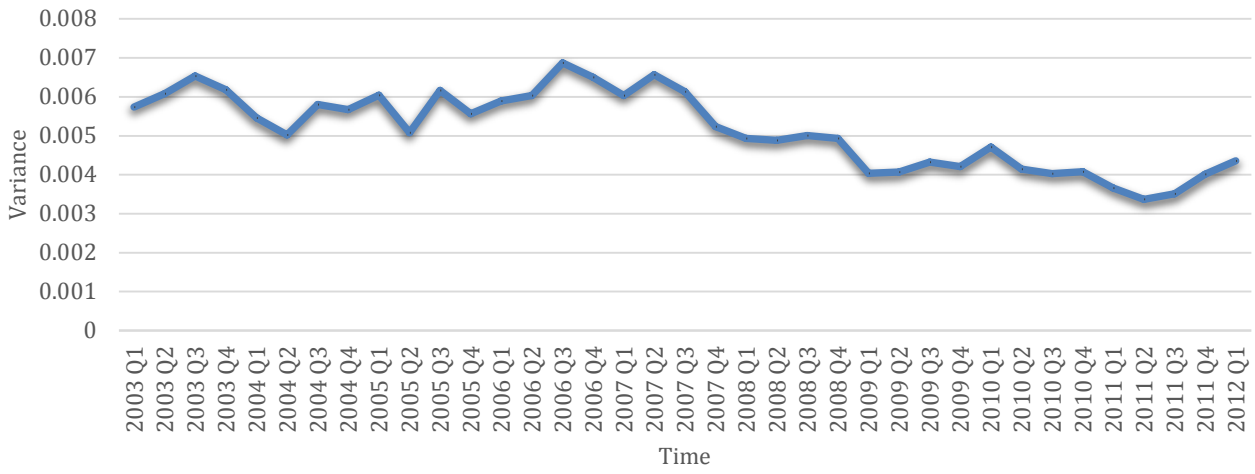


Figure 3: Variance in Adult Overeducation across Countries from Q1 2003 to Q1 2012 (26 countries included)

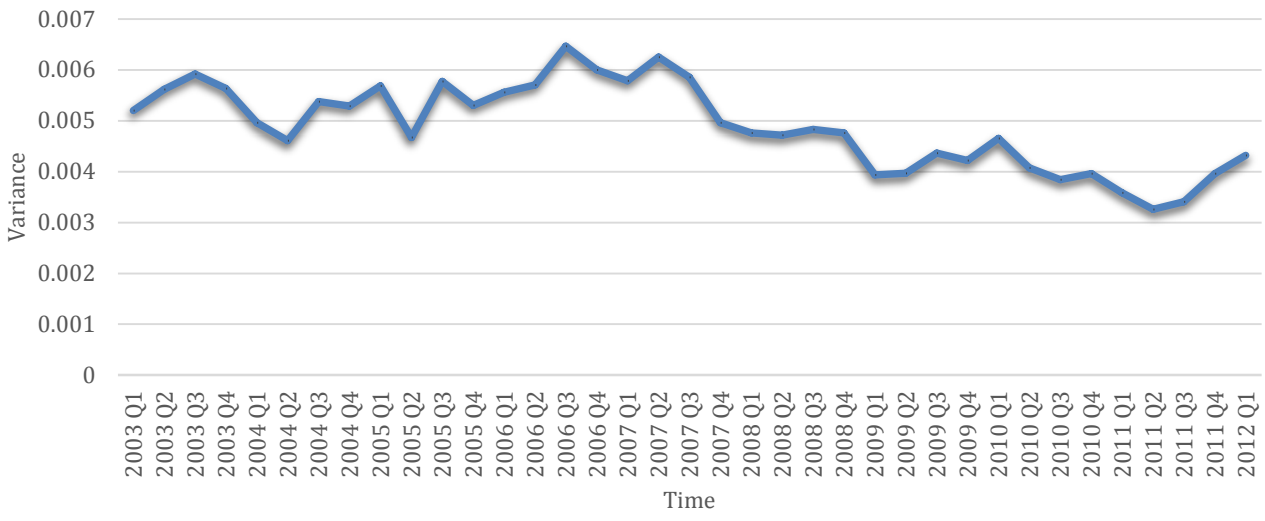


Figure 4: Variance in Youth Overeducation across Countries from Q1 2003 to Q1 2012 (26 countires included)

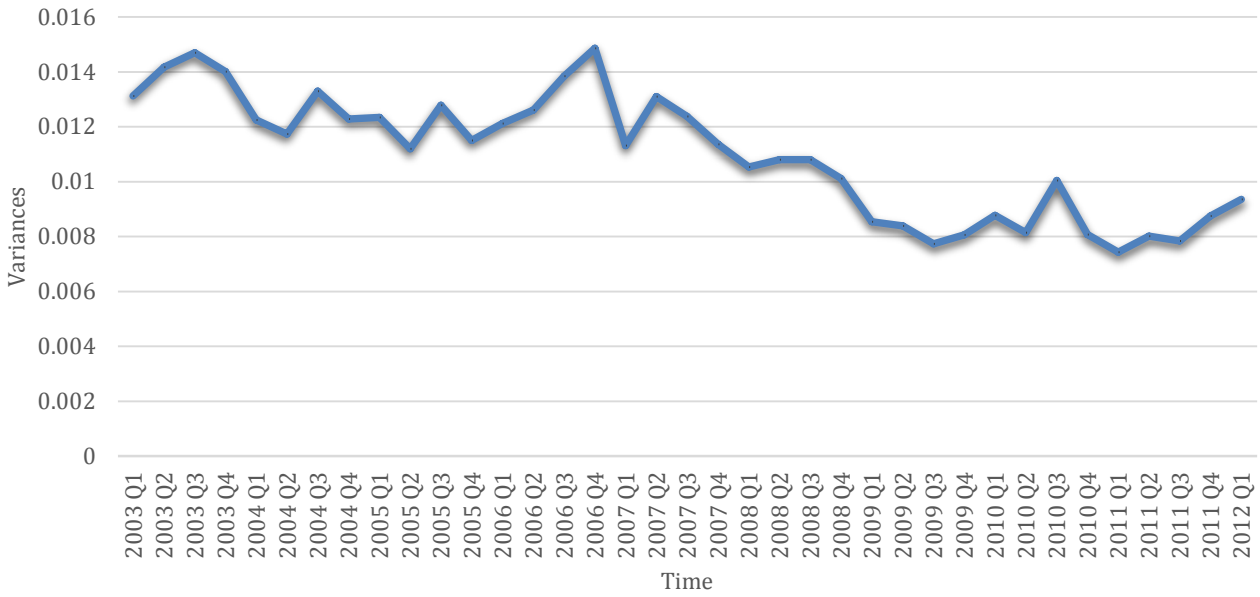


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Figure 5:Variance in Total Overeducation across Old European Countries from Q1 2003 to Q1 2012 (Austria, Belgium, Denmark, Finland, France, Luxemburg, Netherlands, Nrway, Sweden, and UK included)

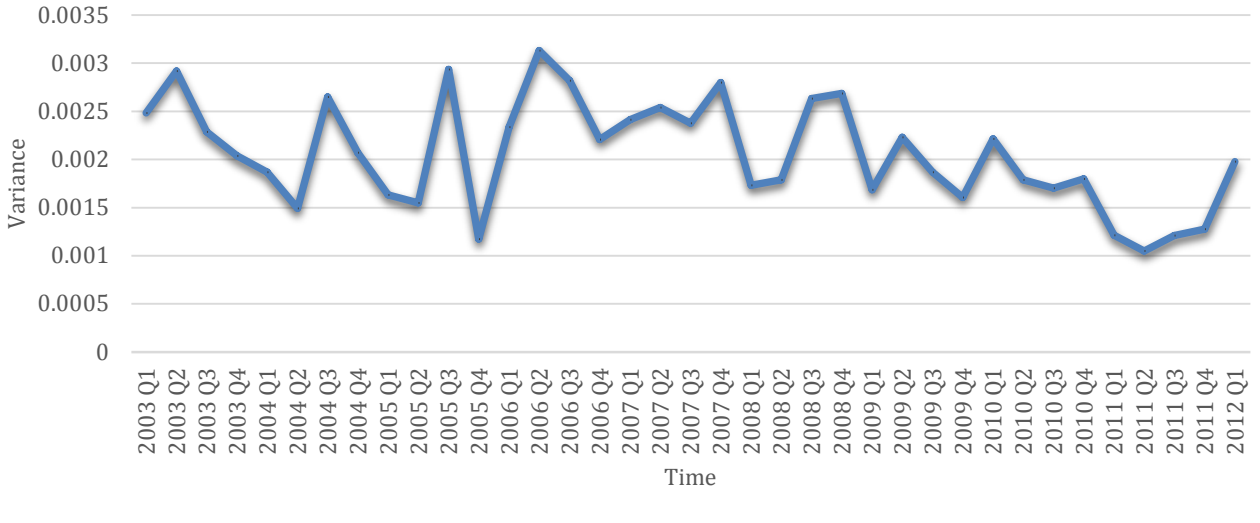


Figure 6: Variance in Total Overeducation across New European Countries from Q1 2003 to Q1 2012 (Bulgaria, Czech Republic, Estonia, Hungary, Iceland, Romania, Slovenia, Slovenia, and Slovak Republic included)

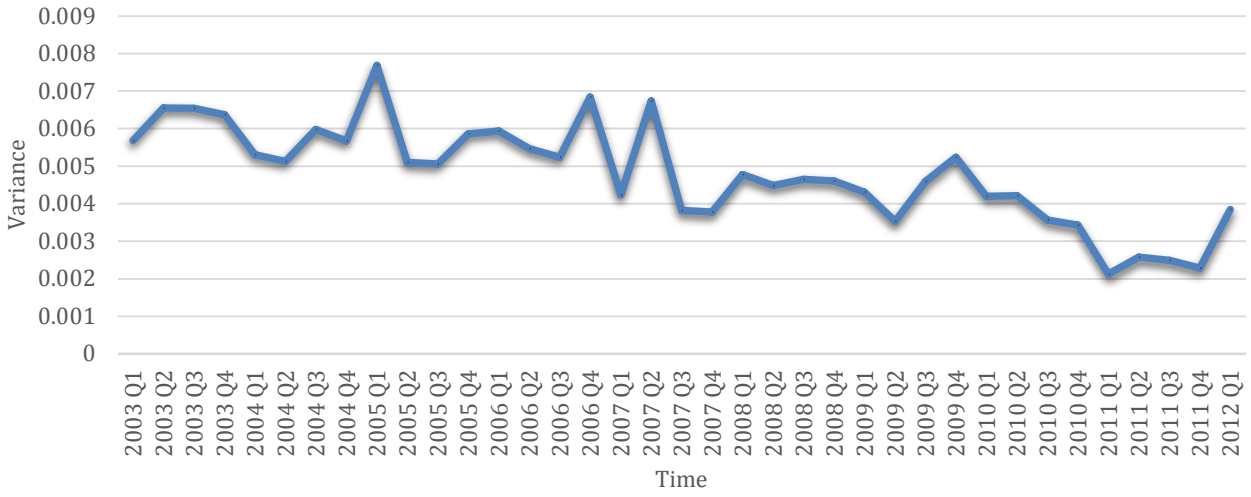
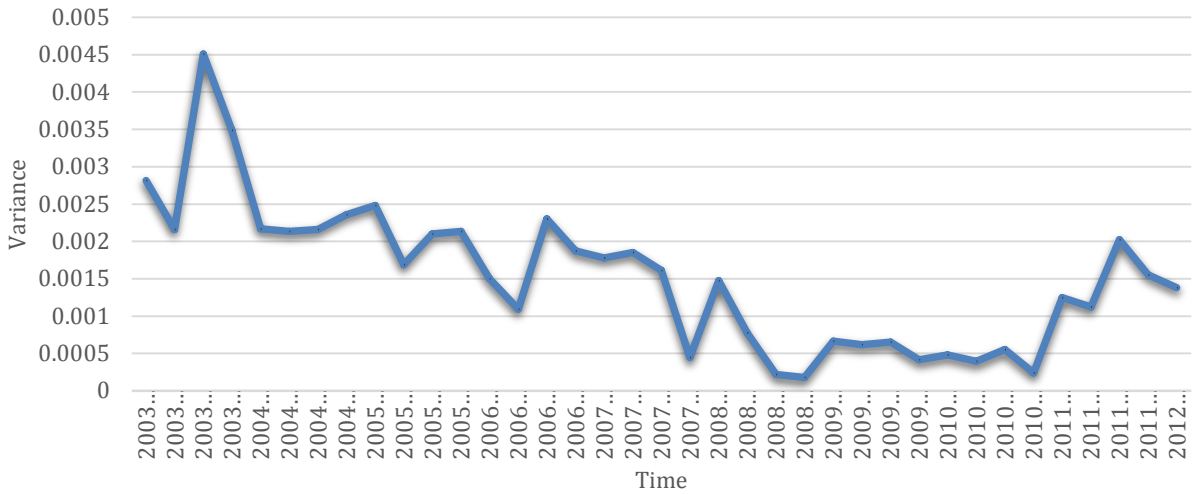


Figure 7: Variance in Total Overeducation across Peripheral Countries from Q1 2003 to Q1 2012 (Portugal, Ireland, Italy, Greece and Spain Included)



5. The relationship between youth and adult overeducation within countries?

We explore the link between adult and youth overeducation on the grounds that if both series move together, then a common policy approach would be suitable at a national level. There is a rational basis for the belief that both time-series may have an underlying connection, on the grounds that a high rate of adult overeducation may imply that the labour market for professional positions is over-supplied that could, in turn, lead to a higher rate of youth overeducation as a consequence of increased competition. Alternatively, in the absence of substantial levels of over-supply, both series may be driven by a common set of determinants that would also imply in an underlying relationship.

As discussed in the methodology section, we adopt a cointegration approach in order to establish if an underlying relationship exists between youth and overeducation within a specific country over time. Both the ADF and the Engle-Granger tests were estimated either with or without a time trend depending on whether one was determined to exist based on a visual inspection. The results from our analysis are reported in Table 6. From our sample of 28 countries, both adult and youth overeducation were non-stationary in the vast majority of instances, which implied that the Engle-Granger framework was the most appropriate for testing for an underlying relationship (in the form of a cointegrating vector). In three cases, Bulgaria, Iceland and Lithuania both youth and adult overeducation were found to be stationary and OLS was adopted to test for a relationship. No second stage tests were carried out for Iceland, Austria, Greece, Ireland, Latvia, Portugal and Sweden where adult overeducation was found to be stationary while the youth overeducation series was not; similarly, the Slovak Republic was ruled out on the basis that youth overeducation was stationary while the respective adult series was non-stationary. In five countries, Belgium, Denmark, Finland, Norway and Estonia, we found youth and adult overeducation to be cointegrated while relationships were also detected in Bulgaria, Iceland and Lithuania under OLS. The results suggest that there exists somewhat an underlying relationship between rates of adult and youth overeducation in a minority of countries. The results leave open the possibility that both series may have very distinct determinants in some countries, either in the overall significance or marginal impact of potential explanatory effects, which also implies that separate policy responses may be necessary to negate the negative influences of overeducation within both cohorts. To shed further light in this, we will now explore the extent to which the determinants of youth and adult overeducation vary within countries.

Table 6: Within Country Relationships between Youth and Adult Overeducation

Country		ADF test statistic	Trend: y/n		Engle-Granger Test Statistic	Trend: y/n		OLS	Trend: y/n
Austria	Youth	-2.841	n						
	Older	-3.904***	n						
Belgium	Youth	1.343	y		-5.577***	n			
	Older	-2.633	n						
Bulgaria	Youth	-4.544***	n					0.456***	n
	Older	-4.144***	n						
Cyprus	Youth	-2.833	y		-3.747*	y			
	Older	-3.302	y						
Czech Republic	Youth	-2.655	y		-3.878*	y			
	Older	-2.860	y						
Germany	Youth	-1.476	y		-2.862	n			
	Older	-2.780	n						
Denmark	Youth	-2.111	y		-4.656***	n			
	Older	-1.978	n						
Estonia	Youth	-2.369	n		-3.751**	n			
	Older	-2.269	n						
Spain	Youth	-1.279	y		-3.414	y			
	Older	0.613	y						
Finland	Youth	-1.828	y		-4.472**	y			
	Older	-2.448	y						
France	Youth	-2.286	n						
	Older	-2.653	n		-2.203	n			
Greece	Youth	-2.087	n						
	Older	-2.967**	n						
Hungary	Youth	-2.835	y		-1.847	y			
	Older	-2.128	y						
Ireland	Youth	-1.568	n						
	Older	-3.411**	n						

Table 6 (cont'd)

Country		ADF test statistic	Trend: y/n		Engle-Granger Test Statistic	Trend: y/n		OLS	Trend : y/n
Iceland	Youth	-7.013***	n					0.313**	n
	Older	-3.392**	n						
Italy	Youth	-1.404	y		-3.606	y			
	Older	1.480	y						
Lithuania	Youth	-4.822***	y					0.243**	y
	Older	-3.995**	y						
Luxembourg	Youth	-1.551	n		-3.148	n			
	Older	-2.899	n						
Latvia	Youth	-0.892	y						
	Older	-3.672**	y						
The Netherlands	Youth	-2.520	n		-1.591	n			
	Older	-2.802	n						
Norway	Youth	-1.537	n		-4.564**	y			
	Older	-2.065	y						
Poland	Youth	-3.312	y		-3.704*	y			
	Older	-2.033	y						
Portugal	Youth	0.046	y						
	Older	-5.262***	y						
Romania	Youth	-2.424	y		-2.395	y			
	Older	-3.011	y						
Sweden	Youth	-1.651	y						
	Older	-5.178***	y						
Slovenia	Youth	-2.827	y		-3.764*	y			
	Older	-2.881	y						
Slovak Republic	Youth	-3.899**	y						
	Older	-2.212	y						
UK	Youth	-2.521	y		-2.029	y			
	Older	-2.174	y						

6. What determines overeducation growth?

In order to address what determines the growth of overeducation, we estimated models separately for the overall level of overeducation and the incidence of youth overeducation within each country. We again group our results according to old, new and peripheral European countries. As stated, we adopt a parsimonious approach and include variables that proxy the level and composition of labour demand such as education and age specific unemployment rates, the share of employment in professional occupations and in sectors such as the public services and sales\hotels. The structure of labour market supply is controlled for through measures of the labour force and employment broken down by age / education and also by age and education specific participation rates. The shares of migrants, part-time and temporary workers in employment are used as further measures of labour supply. Institutional factors are accounted for by the inclusion of trade-union density and EPL measures, while general economic conditions are proxied by GDP variables. We are mindful of the potential influences of credentialism in our data; for instance, if overeducation is relatively low in a non-graduate occupation, we might expect an increase in the supply of graduates to that occupation to raise the growth in overeducation[16]. However, if the level of education in the occupation is already high, then a further increase in the supply of graduates could actually reduce the incidence of overeducation, without any shift in the underlying nature of the job, as a consequence of an increase in the occupational mode[17]. To account for the influences of credentialism, we also include the educational mean of non-professional occupations in our models, on the grounds that the presence of credentialism will be evident should we find overeducation falling as the mean level of education in these occupations rises i.e. that the coefficient are negative. Given that it would be difficult to make sense of the individual regressions, we have summarised the statistically significant impacts in tables 7 through to 12 (in the appendix)[18].

The results indicate that a number of key variables have a consistent impact on the overeducation growth rate such as education specific unemployment rates, the participation rates, the employment shares of migrants, temporary workers and graduates; however, there is substantial variation in both the direction and marginal effect of such influences across countries. Nevertheless, the following general findings do emerge:

- Overeducation growth generally increases with a rise in the employment share of graduates.
- Overeducation growth will generally rise for any given increase in the employment share of temporary workers.
- Overeducation growth generally falls (rises) for a given increase in the share of migrants

[16] We investigated changes in educational requirements over time. Appendix Table A1 lists occupations where the modal education requirement changes between the beginning of the sample and 2010Q4 for a selection of countries. The table reveals that there have been limited changes in the modal educational requirements over time and, where changes have occurred, there is no real consistent pattern across countries.

[17] Similarly subjective measurement approaches are prone to the same influence whereby beyond a certain point in the educational profile of an occupation an employer may also decide to raise entry requirements without any underlying change in the job type.

[18] Details of the full models are provided in a separate appendix.

within old Europe and Peripheral (new European) countries.

- Overeducation growth is generally positively related to the economy-wide unemployment rate.
- Overeducation growth will generally fall for any given rise in the unemployment rate of low-skilled workers (ISCED levels 1, 2 and 3).
- Overeducation growth will generally fall for any given rise in the percentage of workers actively seeking alternative employment.

There are a number of other variables that are consistently important with respect to overeducation growth; however, the direction of the impact varies across countries. Examples of these statistically consistent, but directionally inconsistent, influences include changes in the general labour market participation rate, the youth unemployment rate, and measures of GDP. Despite some variability in the model outputs, the general findings would tend to support the view that overeducation is being driven by a combination of factors related to the growing supply of educated workers, changes in the share of migrants and temporary workers, changes in the composition of labour demand and variations in the general level of labour demand. There is little evidence that the growth in overeducation has been stemmed by any substantial increases in professional level employment or that it is heavily influenced by the broad sectoral composition of jobs. The impact of institutional variables is generally uncertain.

The results from the aggregate models would indicate that the growth in overeducation is heavily influenced by imbalances in the general levels of demand and supply for educated labour. More detailed information on the structure of labour supply by field of study is necessary to get a more effective handle on the potential role of field specific compositional imbalances in determining overeducation, which may account for the inconsistent sign of the coefficient on graduate unemployment rates. The results also indicate that overeducation growth is being partially determined in the majority of old European countries by increased flows of educated workers to non-profession occupations. Nevertheless, there is some evidence of credentialism with overeducation growth falling as a consequence of rises in the educational profile of SOC groups 4 to 6 in Belgium and Denmark and 7 to 9 in the Germany, Norway and Sweden.

Within new European countries, while factors such as the graduate share of employment, the share of migrants/temporary workers, the unemployment rates etc. also systematically influence overeducation growth rate in these countries, there are some additional factors than appear to be important only for this group of countries. Migration generally has a negative influence on overeducation growth. Furthermore, the youth unemployment rate and / or the share of 15-24 years olds in the labour force were also statistically significant for explaining overeducation growth in the majority of new European countries, however, the general direction of the impacts were inconsistent.

Turning to peripheral countries, relative to both new and old European countries we observe a distinct lack of consistency either in terms of statistical significance or the general direction of influences. Within peripheral countries, factors such as the labour force share of migrants and temporary workers and the employment share of graduates also appear important but they appear to influence the growth in overeducation in different directions across countries. As was the case with many new and

old European countries, the youth graduate employment share was important within peripheral states with the sign of the coefficient varying substantially.

It is clear that while the structural factors that influence the development of overeducation in Europe are highly consistent in nature, there is considerable heterogeneity with respect to the general structure of the relationships with some important differences emerging between peripheral and new European countries relative to the tradition core. It is likely that these differences relate to important variations in the underlying structure of these economies and labour markets, that are not only reflected in the estimated relationships but also in the general evolution of overeducation over time (as was evident from the descriptive representations).

6.1 What are the determinants of Youth overeducation growth?

The results from the youth overeducation growth models are remarkably similar, in many respects to those of the general case. Regarding the old European block, youth overeducation growth is linked in many countries to both the labour force share of graduates and, the overall unemployment rate and the graduate share of employment. Youth overeducation growth also related to the share of young graduates in employment and the share of 15-24 year olds in the labour force. However, in contrast to the general overeducation models, while certain variables influence overeducation growth in many countries, there is little consistency with respect to the general direction of impacts, with positive and negative coefficients appearing with equal frequency in many instances. The one exception in this respect relates to low-skilled unemployment rates which are generally negatively related to youth overeducation growth. The inverse relationship with demand for low skilled labour may be indicative of the fact that youth overeducation grows less rapidly in labour markets that are underpinned by the influences of skilled bias technological change, whereby the demand for labour is skewed towards graduates and away from low skilled-labour. In four of the five peripheral countries, overeducation growth was also positively related to the share of temporary workers in the labour force.

The general finding that there is a strong commonality between the factors of youth and total overeducation within countries, raises the question as to why the adult and youth series do not appear to move together at a national level in the majority of countries. Obviously the variation in both the sign and magnitude of marginal effects will account for a good deal of the divergence and it is also likely that there are a number of variables omitted from our models that will impact adult and youth overeducation in different ways. Nevertheless, despite the absence of cointegrating relationships in many instances, the results suggest that imbalances between the level of labour demand and supply are a key determinant of overeducation growth both at the aggregate level and within the youth labour market.

7. Summary

While the general literature on overeducation has expanded rapidly, particularly over the past two decades (see Quintini 2011, McGuinness, 2006 for reviews), there has been little assessment of overeducation from an aggregate country level. To date, overeducation research has focused on identifying the individual or firm-level determinants of mismatch and/or the impacts of mismatch on individual outcomes such as income and job satisfaction. While such insights are crucial to understanding mismatch, it is only by studying such phenomena at a more aggregate level that we can come to an understanding of the macroeconomic, demographic and institutional forces that drive it.

This paper uses a time-series approach to examine the extent to which youth and adult overeducation move together within countries and the degree to which there exist long-run relationships in the rates of overeducation between countries. The latter perhaps been driven by similar macroeconomic structural effects or common approaches to educational policy and provision. We find that while overeducation tends to rise over time in a number of European countries, this is by no means a universal pattern as overeducation was found to be static and even decline in some European countries. Indeed, it is a positive finding that overeducation has not risen in the majority of countries in our study. Despite such disparities, long-run trend relationships were found to exist among within and between countries. We found that while overeducation rates had a tendency to converge to a common level over time, with evidence of more rapid convergence within new and peripheral countries European countries. Youth and adult overeducation rates were found not to move together, in the majority of cases, in an equilibrium relationship within countries and youth overeducation rates were found to be generally more volatile in nature. Among other things, total and youth overeducation growth rates were found to be related to unemployment rates, the presence of temporary workers and the share of graduates in the labour force. While there was a relatively high degree of cross-country consistency in the direction of particular variables in on the growth of total overeducation, the nature of impacts for youth overeducation were more inconsistent across countries. The results are suggestive of a scenario whereby overeducation within European countries is highly systemic of imbalances in the demand and supply of workers, however, the nature of impacts vary substantially for the youth and general labour markets both within and between countries. We found little evidence of any systematic and related to trade-union density and employment protection legislation.

The study demonstrates that overeducation cannot be treated as a statistical artefact that can be explained away due to factors such as the unobserved ability levels of mismatched workers, frictional effects or strategic choices made by workers seeking career mobility. The study confirms the view of many micro-studies that imbalances between the demand and supply for educated labour are important influences in explaining the existence and development of overeducation. The study indicates that there are strong similarities in both the general evolution and the factors determining both total overeducation across many European countries. However, while labour market variables were found to be important in determining youth overeducation, observed impacts varied substantially across countries suggesting that a bespoke policy response is likely to be necessary in most instances. The results suggest that greater attention should be given to the capacity of the labour market to absorb any given increase in educational supply, taking specific account of both the level and composition of current and future labour demand.

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Appendix

Table A1: Changes in Modal Education in Occupations Over Time

Austria	Legislators and senior officials; Teaching Professionals; Machine operators and assemblers; Sales and services elementary occupations
Germany	Legislators and senior officials
The Netherlands	Corporate managers; Extraction and building trades workers; Other craft and related trades workers; Stationary plant and related operators
Portugal	Legislators and senior officials; Physical and engineering science associate professionals; Life science and health associate professionals; Teaching associate professionals; Other associate professionals; Customer services clerks
Spain	Teaching associate professionals; Other associate professionals; Customer services clerks
Poland	Agricultural, fishery and related labourers
Latvia	Life science and health associate professionals; Teaching associate professionals; Other associate professionals; Skilled agricultural and fishery workers; Agricultural, fishery and related labourers

Table 7: Determinants of Overeducation Growth

Table 7: Determinants of Overeducation	Austria	Belgium	Germany	Denmark	Finland	France	Luxembourg	Netherlands	Norway	Sweden	UK
Overeducation (lagged)	-0.57***	-0.77***		-0.98***	-0.99***	-0.86***	-0.36**	-0.49***	-0.99***	-1.46***	-0.55***
% Migrants in LF			14.41***						7.56***	1.40***	
% Temporary Workers in LF			15.63***							0.31***	
Unemployment Rate ISCED 1&2				-0.53***	-0.33***	0.90**		-2.80**	-0.91*		
Unemployment rate ISCED 3			-17.40***				-1.91**			-0.36*	1.03***
Unemployment Rate ISCED 4&5B			4.05**	-0.53**							
Unemployment Rate ISCED 5A&6			17.67***					-2.74**	5.29***	-0.50***	
Unemployment rate 15-24			3.64***			-1.21***			0.47*		0.53**
Unemployment rate 25-65			-2.34***		0.96***	-0.59*					
Total Unemployment Rate			14.80***		0.82***	-1.66**	1.89*	6.10**		0.64***	
% Wanting to work more hours			0.54**		0.23***						-0.17*
% Looking for another job			-18.20***						-2.09***		
% 15-24 in Employment											
% Part-time											
% Employed in Public Admin		-1.29**	-9.06***								4.88***
% Employed in Sales & hotels			-2.75**		1.10**			-1.30*	-2.62**	-0.91**	

Table 7: Determinants of Overeducation Growth - continued

Table 7: Determinants of Overeducation Growth	**Austria**	**Belgium**	**Germany**	**Denmark**	**Finland**	**France**	**Luxembourg**	**Netherlands**	**Norway**	**Sweden**	**UK**
Share of 15-24 in labour force			**-2.34*** **			**-0.35** **					
Youth Graduate Employment Share			**-5.87*** **		**-0.32** **		**0.16***		**-1.09*** **	**0.30*** **	
% Labour force with third-level		**-0.66** **	**-34.72*** **				**-4.34*** **		**-12.81** **		
ISCED 5/6 Employment Share			**30.95*** **	**0.77*** **	**-0.92*** **	**-0.50*** **	**4.34*** **	**-0.53** **	**12.43** **	**1.26*** **	
share of 15-24 in employment											
SOC 2 and 3 Employment Share			**11.69*** **							**-0.77** **	
Youth Participation Rate											
Graduate Participation Rate			**2.52** **				**-1.01*** **	**1.12** **			
Youth Graduate Participation Rate			**0.34*** **							**0.05** **	
Overall Participation Rate		**-0.84** **			**-0.35** **	**1.96** **				**-0.43** **	
Mean Schooling Soc 4 -6		**-0.17** **	**1.92*** **	**-0.34*** **					**0.75*** **		
Mean Schooling Soc 7 -9			**-0.84*** **		**0.22** **				**-0.49*** **	**-0.54*** **	**0.23***
Trade Union Density			**-0.30*** **	**0.00*** **	**-0.00***						
EPL Indicator			**-0.14** **			**-0.25** **					
GDP per capita		**+ive***	**+ive*** **				**-ive***		**+ive*** **		

Table 8: Determinants of Overeducation Growth

Table 8:	**Bulgaria**	**Cyprus**	**Czech**	**Estonia**	**Hungary**	**Lithuania**	**Latvia**	**Poland**	**Romania**	**Slovenia**	**Slovak Rep**
Overeducation (lagged)	-0.78***	-0.76***	-1.08***	-0.77***	-0.95***	-1.15***	-0.96***	-0.55***	-0.69***	-0.79***	-1.13***
% Migrants in LF		-0.53*	-0.75***				-0.14**	-18.28***		1.52**	
% Temporary Workers in LF	0.93***		0.31***	1.46**			-1.44***				-0.42***
Unemployment Rate ISCED 1&2	-1.02***		0.27***						-8.68***	-4.00***	
Unemployment rate ISCED 3	-4.77***	1.65***	1.83***			-1.09***	-0.86**		-18.95***	-13.08***	
Unemployment Rate ISCED 4&5B	-0.38*	-0.54*	0.32***						-1.81***		
Unemployment Rate ISCED 5A&6	-1.44**			-1.48***			-0.76***	0.78**	-4.87***	1.06***	
Unemployment rate 15-24		2.38**	1.32***	-1.10*	-5.65**	-0.54**	-2.87***	2.50***			
Unemployment rate 25-65							1.22***	-4.46***			
Total Unemployment Rate	7.13***		-3.12***	1.62***	-0.94***	1.45**	1.79***	-0.77***	33.48***	16.06***	
% Wanting to work more hours	-0.08*	-1.23***			0.11***		0.12**		-0.11**	-0.06**	
% Looking for another job	-0.96**		-1.09***				-2.37***	0.85***	4.74**		
% 15-24 in Employment											
% Part-time											
% Employed in Public Admin	2.78***		-0.71**						3.36***	1.38**	
% Employed in Sales & Hotels	0.98**	0.97***		0.96**	0.94*			0.87*			

Table 8: Determinants of Overeducation Growth - continued

Table 8:	Bulgaria	Cyprus	Czech	Estonia	Hungary	Lithuania	Latvia	Poland	Romania	Slovenia	Slovak Rep
Share of 15-24 in labour force		0.79***			-0.48***			-0.67***	0.45***		-0.31***
Youth Graduate Employment Share					-0.54**	0.30*	-0.39***				
% Labour force with third-level				3.96**				-1.74***		-26.24***	
ISCED 5/6 Employment Share	1.71***			-4.45***	2.14***		-0.21*			25.36***	0.46***
SOC 2 and 3 Employment Share			0.14***				-0.96***	1.49***		0.66***	-0.26**
Youth Participation Rate											
Graduate Participation Rate		1.24*	-0.38***		-2.08***						
Youth Graduate Participation Rate		-0.26**			0.15*		0.15***				
Overall Participation Rate		-1.94***	0.46***	-1.18***	1.57***	-0.55*		1.92***	-0.57***		1.06***
Mean Schooling Soc 4 -6					-0.76***			0.42***			
Mean Schooling Soc 7 -9										0.34***	
Trade Union Density				-0.01***				0.00**			
EPL Indicator			0.04***								
GDP per capita	-ive***	+ive*	-ive***		-ive***						

Table 9: Determinants of Overeducation Growth

Table	Portugal	Ireland	Italy	Greece	Spain
Overeducation (lagged)	-1.08***	-0.42***	-0.83***	-0.57***	-1.36***
% Migrants in LF	-2.06***		0.94*	-2.12***	
% Temporary Workers in LF	0.38**				1.44***
Unemployment Rate ISCED 1&2					
Unemployment rate ISCED 3	-0.36**				-1.51***
Unemployment Rate ISCED 4&5B				0.38*	-0.71*
Unemployment Rate ISCED 5A&6				-0.95***	2.00***
Unemployment rate 15-24					
Unemployment rate 25-65					
Total Unemployment Rate					
% Wanting to work more hours					
% Looking for another job			-0.73***		-0.32*
% 15-24 in Employment					
% Part-time					
% Employed in Public Admin	1.77**		-3.55**		
% Employed in Sales & hotels					-1.66**
Share of 15-24 in labour force			1.11**		
Youth Graduate Employment Share	0.27*		0.91*	-1.00***	-0.99***
% Labour force with third-level			5.93*		-10.27***
ISCED 5/6 Employment Share	1.92***	0.68*	-6.90**		10.40***
SOC 2 and 3 Employment Share	-1.47***		0.71**		
Youth Participation Rate					
Graduate Participation Rate					
Youth Graduate Participation Rate	-0.12***				0.29**
Overall Participation Rate			-1.53**		
Mean Schooling Soc 4 -6				0.27**	
Mean Schooling Soc 7 -9					-1.20***
Trade Union Density					
EPL Indicator					0.51***
GDP per capita		+ive**			

Table 10: Determinants of Youth Overeducation Growth

	Austria	Belgium	Germany	Denmark	Finland	France	Luxembourg	Netherlands	Norway	Sweden	UK
Overeducation (lagged)	-0.71***	-0.74***	-2.08***	-1.06***	-1.37***	-0.97***	-1.45***	-1.00***	-0.98***	-1.12***	-0.61***
% Migrants in LF	1.69***	2.05**					5.99***	-5.32**	5.81***		
% Temporary Workers in LF			-3.32***		0.50***		-1.56*	-3.54***		1.26***	
Unemployment Rate ISCED 1&2			-1.26***			4.52***			2.16***		
Unemployment Rate ISCED 3				1.90**			-4.40***		4.86*	-2.23**	
Unemployment Rate ISCED 4&5B			-2.78***	-0.72**							
Unemployment Rate ISCED 5A&6	-2.23***		-5.53***		0.95*		2.21*		-5.92**	-4.34***	
Unemployment Rate 15-24			-1.17***			-2.91***	-5.68***				
Unemployment Rate 25-65			0.59***						2.51***	-1.25**	
Total Unemployment Rate	2.29**		5.80***		-1.33**	-7.11***				5.59***	
% Wanting to work more hours	0.26**				0.49***		1.07*			-0.30**	
% Looking for another job		-2.41**	3.71***						-1.13**	-0.49*	
% 15-24 in Employment											
% Part-time											
% Employed in Public Admin		-3.27***	3.70***								
% Employed in Sales & Hotels	-0.75**	-1.87**			1.48***		-8.81***				

Table 10: Determinants of Youth Overeducation Growth - continued

	Austria	Belgium	Germany	Denmark	Finland	France	Luxembourg	Netherlands	Norway	Sweden	UK
Share of 15-24 in labour force					-0.38***			0.92***		-1.15***	
Youth Graduate Employment Share	-1.27***		1.95***		0.37**		0.78***	-1.17**	-0.76**		
% Labour force with third-level	14.75***		17.24***	6.04*	-6.77***		-23.43***		32.82**		
ISCED 5/6 Employment Share	-12.86**		-15.30***	-6.49*	6.09***	-2.23***	23.15***	-2.49***	-30.78**	1.60**	
SOC 2 and 3 Employment Share	0.46***		-3.16***	0.88**	0.27***		-2.09***	2.13**	-2.35***		
Youth Participation Rate											
Graduate Participation Rate				1.83***						-2.18***	
Youth Graduate Participation Rate					0.08***						
Overall Participation Rate						4.83***	3.59***			5.25***	
Mean Schooling Soc 4 -6	-0.42***		-0.42***	-0.28**			0.34**	0.40**			
Mean Schooling Soc 7 -9			0.28***			-0.68***	-0.52***		-0.31*	-0.97***	
Trade Union Density	-0.01**		0.05***	-0.01**	0.01***		0.03***				
EPL Indicator		-0.14*	0.09***	0.19**		-0.88***		0.69**			
GDP per capita			-ive***	+ive**	+ive***	+ive***	-ive**		+ive**		

Table 11: Determinants of Youth Overeducation Growth

Table	Bulgaria	Cyprus	Czech	Estonia	Hungary	Lithuania	Latvia	Iceland	Poland	Romania	Slovenia	Slovak Rep
Overeducation (lagged)	-1.07***	-0.80***	-1.12***	-1.31***	-0.66***	-0.82***	-0.88***	-1.31***	-1.47***	-0.39***	-0.99***	-1.55***
% Migrants in LF		-2.24***	-0.71***					-2.71**		-8.44**	-2.62**	-4.06**
% Temporary Workers in LF	0.98***						1.65***	0.51*				-0.29**
Unemployment Rate ISCED 1&2	-0.66**		-0.12***	-2.52***		-0.36***		-6.89***			6.42***	
Unemployment rate ISCED 3	-3.33**			-10.07***				-6.55***		-3.67**	23.50***	-0.23***
Unemployment Rate ISCED 4&5B			0.15**	-3.23***				-4.91***	-0.31***	-0.91*		
Unemployment Rate ISCED 5A&6			0.58***	-3.56***				-3.99**		-4.02***		
Unemployment rate 15-24		4.46***	1.65***				0.99*					
Unemployment rate 25-65	-1.70*							-3.10***	-5.61***	-9.28***		1.15***
Total Unemployment Rate	4.40**			19.77***	-1.66***	0.63*		22.36***		9.07***	-29.41***	
% Wanting to work more hours			-0.18**	0.30**			-0.22**					-0.14***
% Looking for another job				-2.71***	2.92**			2.47***	1.30***	12.57***		
% 15-24 in Employment												
% Part-time												
% Employed in Public Admin	3.53***		-1.21***	-1.66*		2.80*		7.26***				
% Employed in Sales & Hotels							-3.82***		1.89***	-1.77**		

Table 11: Determinants of Youth Overeducation Growth - continued

Table	Bulgaria	Cyprus	Czech	Estonia	Hungary	Lithuania	Latvia	Iceland	Poland	Romania	Slovenia	Slovak Rep
Share of 15-24 in labour force		0.81**					-0.79***	-1.20***	-0.48*	0.73**		-0.50***
Youth Graduate Employment Share				0.42**				-1.98**	0.58***	-2.12***		0.40***
% Labour force with third-level	1.94**				-5.13*			2.31***		29.37***	41.52***	-0.54***
ISCED 5/6 Employment Share			0.27***		7.42**		0.77**			-29.71***	-41.48***	
SOC 2 and 3 Employment Share					-2.63***		1.35***					0.37***
Youth Participation Rate												
Graduate Participation Rate				1.26***			-1.83***			1.42***		
Youth Graduate Participation Rate											0.09*	-0.07***
Overall Participation Rate							1.60**	4.04***	1.42***	-2.30***		2.08***
Mean Schooling Soc 4 -6												
Mean Schooling Soc 7 -9				0.50**	0.68**		-0.52***	0.21*	-0.83***	-0.57**		
Trade Union Density					-0.01**				0.01***			0.00***
EPL Indicator			0.05***									
GDP per capita	-ive**			-ive**			+ive*		-ive**			

Table 12: Determinants of Youth Overeducation Growth

Table	Portugal	Ireland	Italy	Greece	Spain
Overeducation (lagged)	-1.08***		-1.37***		-1.17***
% Migrants in LF					-2.10***
% Temporary Workers in LF	1.28***	0.67**	2.48***		0.94***
Unemployment Rate ISCED 1&2	2.72**	-3.97***	-25.17***		
Unemployment rate ISCED 3		-6.80***	-29.01***		-1.10***
Unemployment Rate ISCED 4&5B		-4.15***		-1.81***	
Unemployment Rate ISCED 5A&6			-10.90***	-3.58***	
Unemployment rate 15-24			12.91***		
Unemployment rate 25-65					
Total Unemployment Rate	-2.10*	12.48***	65.84***	5.56***	
% Wanting to work more hours					
% Looking for another job		-5.90***	-2.11***		
% 15-24 in Employment					
% Part-time					
% Employed in Public Admin					2.65**
% Employed in Sales & Hotels				3.47**	-1.47**
Share of 15-24 in labour force	0.64***		2.75***		
Youth Graduate Employment Share	-0.56**		2.27***		-1.09***
% Labour force with third-level	1.47**	-26.74***			-9.01***
ISCED 5/6 Employment Share		25.86***		-7.43***	8.12***
SOC 2 and 3 Employment Share				4.74**	
Youth Participation Rate					
Graduate Participation Rate					
Youth Graduate Participation Rate			-0.86***		0.47***
Overall Participation Rate	-4.15***				1.34**
Mean Schooling Soc 4 -6				0.76***	
Mean Schooling Soc 7 -9		0.28*			-0.79***
Trade Union Density					
EPL Indicator					0.38**
GDP per capita		+ive*		+ive**	

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