The Effect of Higher Education on Youth Unemployment in European Regions During a Period of Economic Instability

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Abstract: This paper examines the impact of higher education on youth unemployment. Following the 2008 financial crisis, youth unemployment returned to the fore as a serious concern among policy makers in Europe. A crucial difference from previous recessions is that this time around supply of higher education opportunities was much higher than in the 1980s, and indeed higher education participation rates grew rapidly in many regions during this period. Drawing on previous work on youth unemployment and the economic impacts of education we identify a variety of channels through which higher education is likely to influence youth unemployment. We examine this issue using a macro-panel of European regions for the period 2002-2012. This decade was characterized by variation in economic activity and higher education rates. Our results suggest that expansion of higher education during this period had a mitigating effect on youth unemployment and not recognizing this external benefit of education risks underestimating the effects of macroeconomic shocks on young people.

JEL Codes: C33; I23; I25; J64
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1 Introduction

We examine whether the scale of a Higher education (HE) sector affects the Youth Unemployment Rate (YUR) observed at a regional level. Drawing on previous evidence on the economic impacts of education, the higher education sector can influence employment of young people through several channels. Prima facie, higher education institutions (HEIs) contribute external benefits by providing young workers with an opportunity to invest in human capital rather than being unemployed, stimulate the local economy and drive productivity spillovers.

We examine the effects of higher education and HEIs on young people[1], drawing on a panel data set of 230 European regions over an 11-year period between 2002 through 2012. This period was characterized by expansion of higher education and economic shocks as highlighted by Hermannsson et al. (2019). Specifically, we examine the structural relationship between youth unemployment and overall economic activity and explore whether this is influenced by changes in the activity of the higher education sector. We examine regional HE enrolment ratios, accounting for both local and incoming students. Our work draws on a one-off dataset of education enrolment at the regional level[2], co-produced by EUROSTAT and UNESCO that is available only for this period. Over the decade from 2002 and 2012 the mean HE enrolment grew by 8.6% (see Table 1), in line with international trends of rising participation rates (Lee & Lee, 2016, Jöns and Hoyler, 2013).

The paper is structured as follows. In the next section we review definitions and prior evidence on the economic impact of higher education and youth unemployment. In the third section we introduce the data and provide a descriptive account. The fourth section outlines our empirical approach, the fifth section reports findings, before brief conclusions are provided in section 6.

2 Economic impact of education and youth unemployment

To inform our study we briefly summarize diverse literatures on the economic impact of education and then relate this evidence to the literature on youth unemployment. In the most prosaic sense, we anticipate that the availability of

[1] By 'young people', we use the age bracket 15-24, following EUROSTAT classification.

[2] The spatial scale is made up of so-called NUTS-2 regions (for details see Section 3). The Nomenclature of Territorial Units for statistics (NUTS) is a nested hierarchical geocoded structure used by the European Union (EU) for providing a breakdown of the economic territories of the union. NUTS have 4 levels, where level '0' is the nation-state. Most policies within the EU are carried out or evaluated at NUTS2 because this level assures jurisdictional contiguity across different countries. For further details, please see: https://ec.europa.eu/eurostat/documents/3859598/10967554/KS-GQ-20-092-EN-N.pdf/9d57ae79-3ee7-3c14-da3e-34726da385cf?t=1591285035000

educational opportunities can alleviate youth unemployment by allowing young people to enroll in additional education, in lieu of becoming unemployed. This is easily understood in the context of a Becker (1964) human capital investment model, where unemployment reduces the opportunity cost of enrolling in education and therefore increases the net benefit.

Another impact channel is where the human capital skills produced by higher education enable graduates to be employed in higher skilled and higher paying jobs since in most countries workers educated with more advanced human capital skills are in shorter supply in most fields. Where this is true, such as in highly technical jobs this normally would not displace lower skilled workers. The higher earnings of these graduates can also stimulate overall economic conditions, raising aggregate demand, and thereby reduce youth unemployment rates. This effect is documented by a large literature[3] on the economic impact of higher education. For an overview see e.g. Drucker & Goldstein (2007), Valero & Van Reenen (2019) and Hermannsson et al., (2019).

From the perspective of local policy makers, an attractive feature of a successful cluster of HEIs is the ability to drive expenditure impacts (Hermannsson et al 2014a; Hermannsson et al 2018) and provide supply-side benefits through the upskilling of the local labour supply (Hermannsson et al 2014b). Moreover, HEIs can shape economic geography by influencing the location of economic activity, for instance attracting R&D activities (Jaffe 1989; Anderson et al, 2009) and highly skilled workers (Beeson & Montgomery 1993; Bound et al, 2004; Abel & Deitz 2012, Ahlin et al, 2018).

A broader perspective is provided by McMahon (2004, 2009) who distinguishes between market and non-market benefits on the one hand and private and public benefits on the other[4]. This is particularly important in our case as we look at the impact on HE on all the local young population. A priori there is the possibility of positive wage spillovers from graduates benefitting those without HE qualifications (Battu *et al* 2003, Moretti, 2004, Heurman 2011). Moreover there is the potential for education to contribute to various types of social benefits such as public health (Feinstein et al, 2006), strengthening of civic institutions and social engagement (Skinner & Doyle, 2021; Teixeira et al, 2021 (both in this issue); Campbell, 2006,), lower crime rates (Machin et al, 2011) and environmental effects (Appiah & McMahon, 2002). For empirical overview of high and low income countries, respectively, see Keller (2021) and Oketch (2021) in this issue. These external

[3] The focus is mainly on higher education, but to a lesser extent on further education (e.g. Hermannsson, Lecca & Swales, 2017).

[4] An updated discussion of the role of externalities is provided by McMahon (2021) in this this issue.

benefits are important for the population directly but have also been shown to feed back to the regional economy (Hermannsson et al, 2017).

Whilst positive overall, education could drive negative distributional impacts. In the absence of growth in labor demand, Hermannsson, Lecca & Swales (2017) demonstrate that population upskilling leads to an increase in the effective labor supply, which exerts a downward pressure on wages. is in Periods of macroeconomic downturns when demand is suppressed represent a particularly relevant concern. To the extent that recessions increase unemployment, affecting the marginal worker. This is analogous to the theoretical notion of a job queue (Thurow 1975, van Ours & Ridder, 1995), where labour markets absorb recruits from the pool of unemployed workers in order of their educational signals.

Proportional to the size of the student body in college towns is the presence of a student population, many of whom have part-time jobs, which might displace local youths from the labour market. Especially, given that those at risk of YUR are typically from weaker socioeconomic backgrounds, whilst HE students are disproportionately middle- and upper-middle class (Blanden & Machin, 2004; Vryonides & Lamprianou, 2013). The labor supply of students is an important channel for the impact of HEIs on their host communities. However, as Munro et al (2009) point out this has mainly been studied in terms of student welfare. Drawing on data from the UK Annual Population Survey, they point out that students constitute from 0.9% to 7.1% of those employed across UK regions. Moreover, students are concentrated in specific sectors (retail, hotels and restaurant, health and social care) and typically occupy entry-level part-time jobs. They argue that students are likely to displace other young unskilled workers due to their concentration in entry-level jobs and moreover, that they are favored by employers due to their flexibility and relatively high skill levels.

Previous work on youth unemployment has raised the spectre of waves of migration negatively affecting YUR. Blanchflower & Shadford (2009) examine immigration from the 8 EU accession countries[5] and show that from 2004 onwards these had some impact on the employment of the least skilled young people. Therefore, it is prudent to be mindful of potential negative distributional effects of higher education on youth unemployment, even if the overall effect is positive.

2.1 Youth unemployment

The International Labour Organisation (ILO) defines the Youth Unemployment Rate (YUR) as the unemployment rate of those age 15-24 years (ILO, 2017). It is also

[5] These are the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia.

included as one of the measures of the United Nations Sustainable Development Goals[6]. The EUROSTAT data we use in our analyses follows this definition[7] and calculates the YUR as the percentage of the unemployed in the age group 15 to 24 years old compared to the total labor force (both employed and unemployed) in that age group. An omission of YUR is that it ignores economically inactive youths. Moreover, the labor force is a less relevant benchmark population for youths, as many are full time students and therefore outside the labor market.

From a policy perspective youth unemployment is problematic as it is associated with permanently reduced likelihood of being in employment (Heckman & Borjas, 1980; Mroz and Savage, 2006) caused by scarring effects which affect an individual's human capital and motivation (Bjarnason and Sigurdadottir, 2003; Bell & Blanchflower 2011a). The unemployment state, in turn, is associated with subsequent negative life outcomes, such as lower earnings, welfare dependency, reduced health, stated wellbeing and life expectancy (Heidenreich 2015; de Beer 2012; Ferrie et al. 2002; Bell & Blanchflower 2011b).

The issue of youth unemployment rose to prominence in the USA in the 1970s and was seen at the time as a temporary phenomenon attributed to an increase in youth labor supply driven by the unusually large cohorts of the 'baby boomer' generation. However, the problem persisted (for an overview of the historical background see Bell & Blanchflower 2011b; Blanchflower & Freeman, 2007) and at the onset of the 2008 financial crisis many European countries registered high rates of youth unemployment. Boeri & Jimeno (2016) show how from the early 2000's onwards there was increasing divergence of unemployment rates, and particularly youth unemployment rates across European countries. They argue this is due to a combination of economic shocks and institutional features. This is in line with comparative work that stresses the importance of differences in education and labor market institutions in explaining varying levels in the prevalence of youth unemployment (Breen, 2005; Bruno *et al.* 2014; Möller, 2017) and more generally in living conditions of young people and the opportunities available to them (see Furlong et al. 1996). This literature points to more efficient use of vocational training and programs targeted at disadvantaged youth in German-speaking countries. Countries such as Sweden, UK and France seem to be less efficient in maintaining low share of youth unemployment. However, Skans (2005) finds that on average youth unemployment spells are short in these countries and coincide with participation in education and training programs. Finally, Southern European countries such as Greece, Spain, Portugal and Italy have been hit hardest by the Great Recession and have displayed the highest increase in youth unemployment in

[6] https://unstats.un.org/sdgs/indicators/indicators-list/

[7] For details see: https://ec.europa.eu/EUROSTAT/statistics-explained/index.php/Youth_unemployment#Definition_of_unemployment_and_youth_unemployment_indicators

Europe. This has been attributed to lack of aggregate demand under tight fiscal conditions and a common currency, on top of underlying weaknesses, such as segmentation of the labour market and poor vocational training (Boeri & Jimeno, 2016; Pastore 2018).

Scandurra *et al.* (2020) demonstrate based on EU regional data that indicators for youth outcomes are strongly persistent over time and influenced by developments at the national level. Institutional models of school to work transitions mark a stable difference in youth life chances which is coupled with a growing divergence of territorial opportunity in the last decades (Scandurra et al. 2020). This is consistent with the comparative institutional perspective but also the fact that youth unemployment is much more sensitive to economic down turns than aggregate unemployment. For example, Bell & Blanchflower (2011b, p. 247) estimate that in OECD countries a percentage change in adult unemployment rates is associated with 1.79% change in the youth unemployment rate. At an individual level the incidence of youth unemployment is not randomly distributed but disproportionately affects young people with low skills (early school leavers), from lower social class and ethnic minorities (Gesthuizen et al. 2011). Whilst it is prima facie likely that education policies affect this structural relationship, direct estimates of this effect are lacking. A lacuna we aim to fill.

3 Data and methods

Data are obtained from EUROSTAT, which collects educational, social and economic indicators at a regional level from EU member states, as well as several affiliated countries. EUROSTAT identifies regions at three different nested and hierarchical spatial scales. These are referred to as NUTS 1, 2 , 3 and 4, respectively, moving from larger to smaller territorial units. We primarily use data at the NUTS2 level, which is the standard areal unit for application of regional policies in the EU and is therefore convenient for data availability. When data at the NUTS2 level were not available, same-year data were gathered at the NUTS1 level to maintain consistency. This approach is commonly used in hierarchical data systems (e.g. NUTS, U.S. Census), see e.g. Rodriguez-Pose & Crescenzi (2008) and Copus et al (2011). Specifically, Germany, Portugal, Slovenia and the UK do not provide data at NUTS2 level. For these countries, we use NUTS1 level data, which corresponds to larger territorial units (e.g. Landers for Germany). Although this is certainly a limitation, spatial-jurisdictional bias is limited thanks to the fact that in Germany and the UK several NUTS1 are actual political entities charged with aspects of higher education ('nations' in UK, and federal states in Germany, see e.g. de Boer et al., 2007 and Dobbins and Knill, 2017).

Our proxy for the size of the regional higher education sector is an indicator produced by EUROSTAT that shows the number of students enrolled in HEIs in each region, expressed as a share of the local young population that is of a common

university participation age[8]. We refer to this as the Tertiary Enrolment Ratio (TER), which we designate for the i-th region as TER_i. This ratio is made up of a numerator encompassing the number of students enrolled in higher education programs residing in region i (S_i) divided by the regional population in region i aged 20-24, in order to control for the size of the local young population. S_i is a broad definition of higher education, encompassing levels 5 and 6 of UNESCO's International Standard Classification of Education (ISCED), i.e. undergraduate and sub-degree qualifications.

$$TER_i = \frac{S_i}{P_i^{20-24}} \tag{1}$$

A benefit of the TER (E_i) is that it can be obtained for most EU countries, regardless of the age of high school graduation. It is an aggregate indicator that can be thought of as a composite of three underlying factors: i) the regional participation rate; ii) the retention of students locally; iii) and the attractiveness of the region to mobile students. The age group 20-24 represents one of the three groups defining "young people" within EUROSTAT (see EUROSTAT, 2015, p. 21). For a full account of how the indicator was constructed see UNESCO (2012).

Table 1: Summary statistics.

Year	Youth Unemployment Rate (YUR)	Employment 20-64	Tertiary Enrolment Ratio (TER)	Deviation of TER from national average ($TER_i - TER_N$)	Population log	GDP per capita, % of EU average
2002	18.7	68.78	49.53	3.10	5.08	96.98
2003	19.27	69.02	50.35	4.24	5.08	98.03
2004	20.02	69.07	50.53	6.00	5.08	98.16
2005	20.25	69.95	51.61	5.74	5.09	98.01
2006	19.08	70.79	51.47	5.35	5.09	98.12
2007	17.14	71.81	53.54	5.80	5.07	98.02
2008	17.17	72.34	53.96	5.77	5.07	97.44
2009	21.1	71.36	54.42	5.25	5.07	97.17
2010	22.16	71.01	55.43	6.07	5.08	97.34
2011	23.19	71.01	58.47	5.69	5.07	97.24
2012	25.12	70.96	58.07	5.75	5.07	97.56
Total	20.27	70.59	53.49	5.38	5.08	97.65

Note: Countries included are: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, (the) Netherlands, Poland, Portugal, Romania, Sweden, Slovak Republic, Slovenia, Spain, United Kingdom.

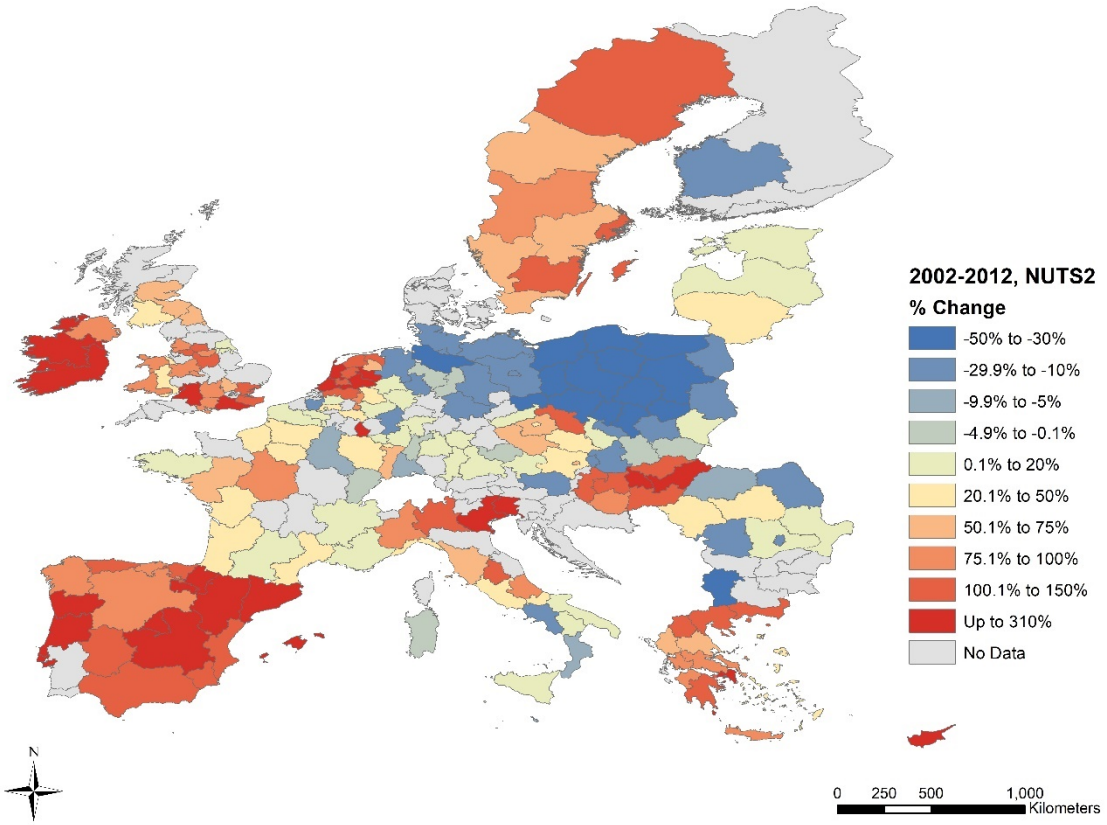
[8] For the methodology utilized to build the underlying variables on enrolment, we refer to the "UOE data collection on education systems – Volume 2" by UNESCO/OECD/EUROSTAT. Full documentation available through https://ec.europa.eu/EUROSTAT/statistics-explained/index.php/UNESCO_OECD_EUROSTAT_(UOE)_joint_data_collection_%E2%80%93_methodology

A drawback of this dataset is that it doesn't capture post-graduate students and doesn't reveal the composition of HE students in each region, whether by origin, nature of institution or program subject. This can include qualifications from universities and other HEIs, as well as advanced qualifications from technical colleges. The exact delimitation between these types of institutions varies across European countries and even regions (e.g. England and Scotland) and therefore levels are unlikely to be directly comparable across countries. We derive a supplementary variable (TERND) to capture the deviation of the TER from the national average. The relative position within the national education system offers another view of the scale of the regional higher education system. For instance, we can infer that, other things being equal, the share of incoming students will tend to be higher in regions with a high TER and, conversely, that those with low TER experience out-migration of students. Further control variables used in the dataset are obtained from EUROSTAT. Summary statistics of key variables are provided in Table 1 above.

3.1 Youth unemployment

Over the past decade, enrolment in higher education and unemployment of young people in the EU have both risen. However, these changes have varied across the EU. For example, many regions in former-communist countries (with the notable exception of Hungary), in Southern Italy, and East Germany experienced a reduction in youth unemployment (Figure 1). In Rural regions of France and most of Germany have also reduced their share of youth unemployment, while countries affected greatly by the 2008 financial crisis such as Spain and Portugal record high increases of youth unemployment. For a detailed descriptive account of YU in Europe during our period of analysis see Eichhorst et al (2013).

Figure 1 Percentage change in the youth unemployment rate (age 15-24) between 2002 and 2012. NUTS2 regions.

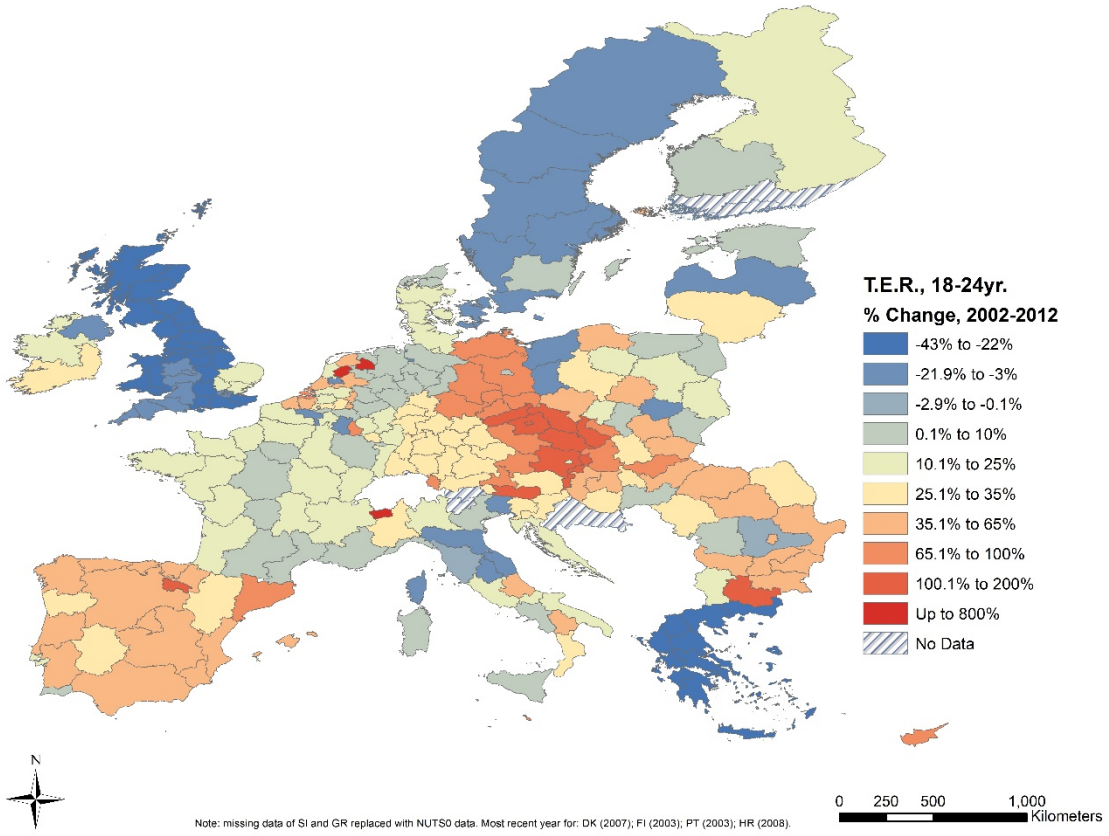


3.2 Tertiary enrolment ratios across regions

The scale of TER change across NUTS2 regions is highlighted in Figure 3 below. Most regions have growing tertiary enrolment ratios, with a few exceptions, most notably the UK. This is likely due to tighter visa regulations, which severely restricted opportunities for overseas students enrolling onto short duration courses outwith the mainstream higher and further education sectors[9]. On the other side of the spectrum, some regions register growth more than 100%. For example, this is the case of Drenthe, Flevoland and Val D'Aosta where the tertiary enrolment was more than 5 times higher than a decade before. It is interesting to note here that these three regions host relatively new HEIs, either created through merging and expanding previously existing institutions (Flevoland in 1986, and Drenthe in 2008), or through the establishment of brand-new universities (e.g. Val d'Aosta in 2000).

[9] This was widely discussed in the press at the time: See for example: https://www.telegraph.co.uk/news/uknews/1502381/Crackdown-fails-to-stop-language-schools-visa-racket.html

Figure 2 Percentage -change in enrolment ratio (E_i) by region between 2002 and 2012.



4 Empirical approach

A typical approach in the youth unemployment literature, is to estimate the relationship between youth unemployment and overall employment (e.g. Breen, 2005). In this setup, the assumption is that overall employment captures the influence of macroeconomic conditions, whereas the relationship between overall employment and youth unemployment is shaped by other regional conditions. We extend this approach to exploit the availability of regional data for the EU.

To understand if and how youth unemployment has been affected by higher education, we fit a panel fixed effect model. The data comprise of 269 regions which are reduced to 263 given the missing data in some of the covariates of the model. The model can be expressed as:

$$ln(YUR_{it}) = \beta_0 + \beta_1 TER_{it} + \beta_2 TERND_{it} + \beta_3 EMP_{it} + \beta_4 \ln(POP_{it}) + \gamma_i + \tau_t \qquad (2)$$

where:

- $ln(YUR_{it})$ is the natural logarithm of youth unemployment rate of region i in time t
- β_0 is the constant
- $\beta_1 TER_{it}$ is the tertiary enrolment rate (TER) of region i in time t
- $\beta_2 TERND_{it}$ is the deviation of TER in region i from respective national average in time t
- $\beta_3 EMP_{it}$ is the regional employment rate of population between 25-64 years at time t.
- $\beta_4 POP_{it}$ is the logarithm size of the region's population at time t.
- γ_i are regional fixed effects.
- τ_t is a set of year dummies, where 2002 is the reference year.

We explore the longitudinal relationship of TER on YUR considering the within region variation over time. By applying fixed effects, we control for enduring (and unobserved or unobservable) characteristics of regions observed on multiple occasions. The fixed effect approach soaks up all the across-group action. What is left over is the within-group action, which eliminates the risk of omitted-variable bias, at least as far as time-invariant characteristics are concerned. In principle, this approach eliminates endogeneity issues, unless there are time-variant omitted variables that are correlated with our dependent variables. Using fixed effects is particularly important to assure us that all stable unmeasured regional differences have been controlled for. Further, all fixed effect models have been estimated including robust clustered errors at country level to deal for correlation of observation among groups.

5 Findings

Table 2 below estimates the relationship between employment levels of the working age adult population (age 25-64) and youth unemployment. The dependent variable is expressed in logs so that we can see from the coefficients in models 1 to 3 that every percentage point increase in the employment level is associated with a 6-7% decrease in youth unemployment. We also report the fixed effects for each year, which capture aggregate shocks to youth unemployment associated with each year. These effects are large, particularly in the second half of our period, which is unsurprising given the macroeconomic shock of the 2008 financial crisis. This reveals that other things being equal, we can expect 50% higher youth unemployment in 2012 than in the base year. In model 2 we add the log of the population to control for the size of the regions. This indicates that other things being equal, larger regions will experience higher YUR. An observation consistent with theoretical work on migration and unemployment following Harris-Todaro (1970). In the third model we add the regional GDP per capita relative to the EU average. Whilst a small effect, it reveals that a percentage point increases is

associated with a reduction in youth unemployment of approximately 2.43‰. Recall we are already controlling for economic activity via the employment rate, but relative affluence of a region may be associated with youth unemployment through other channels, as richer regions are likely to have better educational and social infrastructures.

In Table 3, we introduce the Tertiary Enrolment Ratio (TER) to the regressions. Model 4 reveals that each percentage point increase in TER is associated with an approximately 0.03% decrease in the youth unemployment rate log. Comparing models 1 and 4 reveals that allowing for the moderating influence of TER increases the magnitude of the association between adult employment and youth unemployment. Additionally, in model 5 we introduce a term to capture the relative position of TER vis-á-vis the national average (TERND). A priori we anticipated this would reveal a positive sign that would be indicative of diminishing returns to education expansion. On the contrary, the sign for TERND is negative, suggesting not diminishing returns, but if anything increasing returns. Why this is the case is not clear. Recall, we are controlling for overall employment so are looking at the influence of higher education on the structural relationship between aggregate employment and youth unemployment. One possibility, is that mass plays a role in generating the external benefits of HE on youth unemployment. Perhaps large sectors being made up of more diverse institutions can better meet local skills demand. Alternatively, it may be the case that employers of young people and the most employable students/graduates sort into regions with the largest HE sector. We see similar effects as before when population and relative GDP per capita are introduced in models 6 and 7.

Table 2 Drivers of Change in Youth Unemployment Rate, 15-24 years, d.v. in log

VARIABLES	(1)	(2)	(3)
Employment Rate 25-64 years	-0.0688***	-0.0687***	-0.0621***
	(0.00342)	(0.00372)	(0.00408)
Population, log		0.606**	0.577**
		(0.245)	(0.236)
GDP, PPP, % EU av.			-2.43e-05***
			(5.95e-06)
2002	ref.	ref.	ref.
2003	0.0868***	0.0862***	0.0934***
	(0.0144)	(0.0149)	(0.0155)
2004	0.171***	0.171***	0.202***
	(0.0178)	(0.0188)	(0.0201)
2005	0.265***	0.268***	0.314***
	(0.0222)	(0.0237)	(0.0268)
2006	0.262***	0.260***	0.330***
	(0.0223)	(0.0242)	(0.0304)
2007	0.217***	0.211***	0.305***
	(0.0260)	(0.0288)	(0.0372)
2008	0.245***	0.237***	0.328***
	(0.0277)	(0.0308)	(0.0378)
2009	0.408***	0.402***	0.462***
	(0.0273)	(0.0300)	(0.0338)
2010	0.443***	0.434***	0.519***
	(0.0255)	(0.0280)	(0.0358)
2011	0.461***	0.459***	0.560***
	(0.0256)	(0.0285)	(0.0380)
2012	0.510***	0.513***	0.624***
	(0.0260)	(0.0283)	(0.0392)
Constant	7.422***	4.375***	4.557***
	(0.234)	(1.329)	(1.281)
Observations	2,889	2,747	2,736
R-squared	0.493	0.504	0.516
Number of NUTS2_n	279	265	265
R-squared between	0.566	0.256	0.313
R-squared within	0.493	0.504	0.516
R-squared overall	0.542	0.277	0.337

Robust standard errors clustered at country level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3 Tertiary Enrolment Ratio and the Youth Unemployment Rate, 15-24 years, d.v. in log

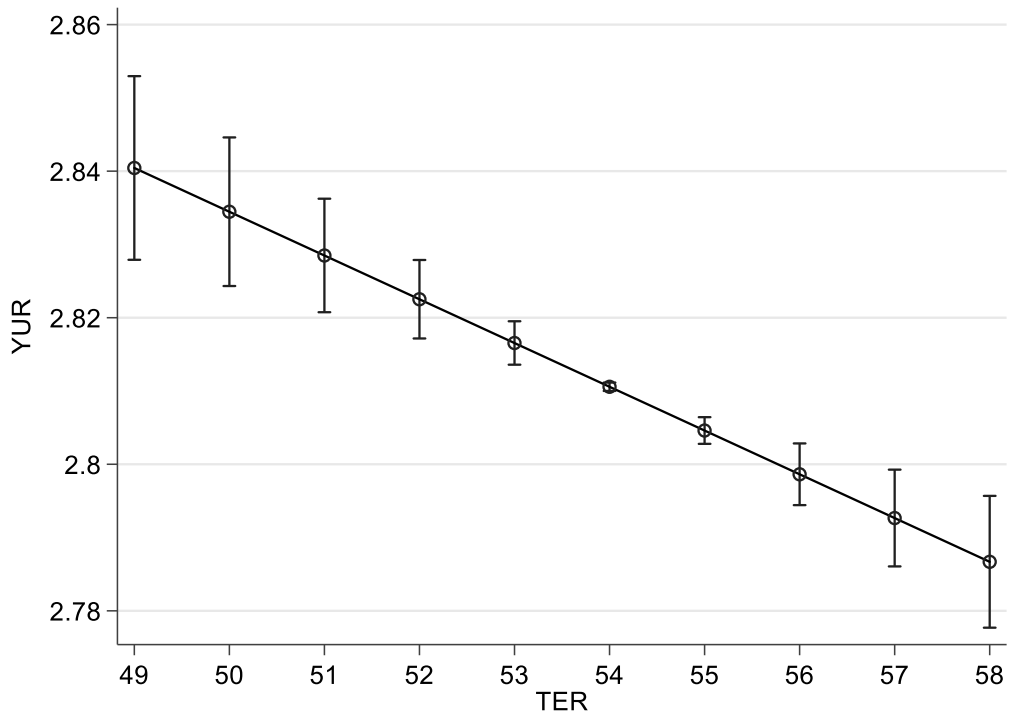
VARIABLES	(4)	(5)	(6)	(7)
Employment Rate 25-64 years	-0.0711***	-0.0718***	-0.0694***	-0.0638***
	(0.00357)	(0.00358)	(0.00373)	(0.00410)
TER	-0.00312***	-0.00707***	-0.00707***	-0.00597***
	(0.000695)	(0.00119)	(0.00123)	(0.00122)
TERND		-0.00606***	-0.00636***	-0.00631***
		(0.00147)	(0.00152)	(0.00155)
Population, log			0.594**	0.573**
			(0.245)	(0.237)
GDP, PPP, % EU av.				-2.06e-05***
				(6.22e-06)
2002	ref.	ref.	ref.	ref.
2003	0.0924***	0.101***	0.0996***	0.103***
	(0.0155)	(0.0154)	(0.0157)	(0.0161)
2004	0.185***	0.198***	0.196***	0.222***
	(0.0191)	(0.0191)	(0.0196)	(0.0215)
2005	0.289***	0.306***	0.302***	0.339***
	(0.0236)	(0.0238)	(0.0249)	(0.0283)
2006	0.290***	0.312***	0.302***	0.357***
	(0.0235)	(0.0242)	(0.0255)	(0.0318)
2007	0.247***	0.271***	0.255***	0.330***
	(0.0267)	(0.0270)	(0.0290)	(0.0384)
2008	0.280***	0.308***	0.286***	0.359***
	(0.0282)	(0.0285)	(0.0304)	(0.0388)
2009	0.447***	0.479***	0.462***	0.507***
	(0.0287)	(0.0291)	(0.0308)	(0.0349)
2010	0.483***	0.524***	0.505***	0.571***
	(0.0268)	(0.0282)	(0.0298)	(0.0377)
2011	0.509***	0.553***	0.538***	0.615***
	(0.0272)	(0.0284)	(0.0305)	(0.0398)
2012	0.567***	0.615***	0.598***	0.684***
	(0.0280)	(0.0292)	(0.0307)	(0.0408)
Constant	7.716***	7.983***	4.834***	4.912***
	(0.243)	(0.257)	(1.335)	(1.288)
Observations	2,737	2,737	2,654	2,643
R-squared	0.503	0.508	0.520	0.527
Number of nuts2_n	276	276	263	263
R-squared between	0.517	0.484	0.236	0.291
R-squared within	0.503	0.508	0.520	0.527
R-squared overall	0.499	0.480	0.267	0.324

Robust standard errors clustered at country level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.1 Relevance of findings

Overall, it is clear that an expansion of higher education is associated with a decrease in youth unemployment for a given macroeconomic state This is consistent with the predications of human capital theory that the opportunity cost of education falls as employment prospects weaken, and hence in an economic downturn is likely to be associated with an endogenous response where young people increasingly enroll in education. This is in addition to a long-term trend towards higher participation rates in higher education globally. Therefore, both supply and demand for education are changing and in the TER indicator we observe the combined impact of these two forces. We argue that, in the absence of increasing participation in higher education, the impact of the 2008 financial crisis on young people would have been even worse. In Figure 3 Predicted youth unemployment in 2012 by Tertiary Enrolment Ratio we illustrate this by graphing predicted youth unemployment in logs in 2012 across a range of TER levels, from the 2002 EU mean to the 2012 mean. This reveals that under the initial TER of 49% we could expect youth unemployment at 2.84 log points versus approximately 2.78 log points with the 2012 average TER of 58%. This equates to a difference in the youth unemployment rate of approximately a percentage point. Whilst this does not leave much of a dent in youth unemployment rate of approximately 17%, it will have considerably improved the living conditions of many young people in absolute terms.

Figure 3 Predicted youth unemployment in 2012 by Tertiary Enrolment Ratio



*TER levels are plotted taking as a reference EU average between 2002 and 2012.

6 Conclusions

We use European regional panel data to examine how the relationship between youth unemployment and macroeconomic conditions is moderated by tertiary enrolment. The regions are heterogeneous in terms of economic prosperity, participation rates and the extent to which they were affected by the 2008 financial crisis. Participation in higher education was on an upward trajectory throughout this period. Moreover, our findings show a pattern where enrolment expands in response to macroeconomic shocks, a feature which is consistent with the predications of human capital theory. We argue that this moderation effect reduced youth unemployment from what it would otherwise have been. This is an important external benefit of the education system, mitigating the economic and social impact of macroeconomic fluctuations. This has direct and immediate benefits for the individuals affected but is also likely to result in second order effects through reducing subsequent scarring from unemployment and its effect on lifetime earnings.

The scale of this effect is substantial. Our findings indicate that youth unemployment in the European Union would on average have been 1 percentage point higher in 2012 had it not been for the approximately ten percentage point increase in higher education enrolment during the preceding decade. In addition, our analysis highlights how the geography of places matter in driving rates of youth unemployment. Regions with larger populations, often hosting urban areas, tend to have higher youth unemployment rates. In terms of policy relevance, our results show how expanding access to higher education, either by supporting youth's mobility, or by creating regional higher education centers, does in effect reduce youth unemployment rates. Thus, HEIs can play an important role at the regional level, offering an opportunity to improve the stock of human capital, which in turn may either emigrate (effectively lowering the youth unemployment rate), or be retained regionally.

We find no evidence of saturation from the expansion of participation at a regional level, but rather that those regions with the largest higher education sectors benefit the most. Therefore, when considering the external benefit of expansion of higher education mitigating youth unemployment, there do not appear to be diminishing returns to participation rates. More higher education simply translates into a larger benefit.

The data reveal aggregate impacts and these are likely to be net of internal displacements. It would be highly desirable to identify distributional impacts of higher education expansion by examining outcomes and participation of sub-populations such as by socioeconomic status and ethnicity, but also distinguishing between local and mobile students and young workers. Likewise, for future work it would be desirable to disaggregate the composition of the higher education sectors

in each region so that effects could be attributed to different types of higher education institution and activities – and therefore aligned more closely with available policy levers.

Whilst future research may shed further light on the exact composition of the underlying effects and whether they benefit different regions and sub-populations heterogeneously, the aggregate picture is clear. We observe a positive net-social benefit of higher education, which reduced the human and economic cost of a prolonged and deep recession in Europe. It is certainly worth investing in further research to understand this external benefit of higher education, but for policy makers this provides yet one more reason why higher education is a worthwhile investment for public benefits, not only private benefits.

References

Abel, J. R., & Deitz, R. (2011). Do colleges and universities increase their region's human capital? Journal of Economic Geography, 12(3), 667-691.

Ahlin, L., Andersson, M., & Thulin, P. (2018). Human capital sorting: The “when” and “who” of the sorting of educated workers to urban regions. Journal of Regional Science, Vol. 58(3), 581-610.

Andersson, M., Gråsjö, U., & Karlsson, C. (2009). The Role of Higher Education and University R&D for Industrial R&D Location. In Varga, A. (ed) Universities, Knowledge Transfer and Regional Development: Geography, Entrepreneurship and Policy. pp. 85-108.

Appiah, E.N. & McMahon, W. (2002). The Social Outcomes of Education and Feedbacks on Growth in Africa. Journal of Development Studies. Vol. 38, No. 4, pp. 27-68.

Battu, H., Belfield, C.R. & Sloane, P.J. (2003). Human Capital Spillovers within the Workplace. Evidence for Great Britain. Oxford Bulletin of Economics and Statistics. Vol. 65, No. 5, pp. 575-594.

Becker, G. S. (1964) Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education (New York: National Bureau for Economic Research).

Beeson, P. & Montgomery, E. (1993). The Effects of Colleges and Universities on Local Labor Markets. Review of Economics and Statistics, Vol. 75, pp. 753-61.

Bell, D. N., & Blanchflower, D. G. (2011a). Youth unemployment in Europe and the United States. Nordic Economic Policy Review, Vol. 1, pp. 11-37.

Bell, D. N., & Blanchflower, D. G. (2011b). Young people and the Great Recession. Oxford Review of Economic Policy, 27(2), 241-267.

Bjarnason, T., and Sigurdadottir, T.J. (2003). Psychological distress during unemployment and beyond: social support and material deprivation among youth in six northern European countries. Social Science & Medicine, Vol. 56, No. 5, pp. 973-985.

Blanden, J., & Machin, S. (2004). Educational inequality and the expansion of UK higher education. Scottish Journal of Political Economy, 51(2), 230-249.

Blanchflower, D. & Freeman, R.B. (2007). Introduction. In Blanchflower & Freeman (eds.) Youth Employment and Joblessness in Advanced Countries. Chicago: The University of Chicago Press.

Blanchflower, D. G., & Shadforth, C. (2009). Fear, unemployment and migration. The Economic Journal, 119(535), F136-F182.

Binder, A. J., & Bound, J. (2019). The Declining Labor Market Prospects of Less-Educated Men. Journal of Economic Perspectives, Vol,. 33, No. 2, pp. 163-90.

Boeri, T. & Jimeno, J.F. (2016). Learning from the Great Divergence in Unemployment in Europe during the Crisis, Labour Economics 41, 32–46.

Bound, J., Groen, J., Kézdi, G. & Turner, S. (2004). Trade in University Training: Cross-State Variation in the Production and Stock of College-Educated Labour. Journal of Econometrics. Vol. 121, pp. 143-173.

Breen, R. (2005). Explaining cross-national variation in youth unemployment: Market and institutional factors. European sociological review, 21(2), 125-134.

Bruno, G. S.F., E. Marelli, and M. Signorelli. 2014. The Rise of NEET and Youth Unemployment in EU Regions after the Crisis. Comparative Economic Studies 56 (4): 592–615. doi:10.1057/ces.2014.27.

Burstein, A., Hanson, G., Tian, L., & Vogel, J. (2017). Tradability and the Labor-Market Impact of Immigration: Theory and Evidence from the US (No. w23330). National Bureau of Economic Research. Retrieved from the World Wide Web: https://www.nber.org/papers/w23330.pdf

Campbell, D.E. (2006). What is education's impact on civic and social engagement? In Desjardins, R. & Schuller, T. (eds.) Measuring the Effects of Education on Health and Civic Engagement: Proceedings of the Copenhagen Symposium. Paris: OECD. Retrieved from the World Wide Web: http://www.oecd.org/document/61/0,3746,en_2649_35845581_37425853_1_1_1_1,00.html

Card, D. (2009). Immigration and inequality. American Economic Review, Vol. 99, No. 2, pp. 1-21.

Cortes, P. (2008). The effect of low-skilled immigration on US prices: evidence from CPI data. Journal of political Economy, 116(3), 381-422.

Copus, A. 2011. Macro Scale patterns of differentiation (spatial generalisations). In Copus, A. and Hörnström, L. (eds.). The New Rural Europe: Towards rural cohesion policy. NORDREGIO Report 2011:1.

de Beer, P. (2012). Earnings and income inequality in the EU during the crisis. International Labour Review, 151(4), 313–331. https://doi.org/10.1111/j.1564-913X.2012.00151.x

de Boer H., Enders J., Schimank U. (2007) On the Way towards New Public Management? The Governance of University Systems in England, the Netherlands, Austria, and Germany. In: Jansen D. (eds) New Forms of Governance in Research Organizations. Springer, Dordrecht

Dobbins, M., and Knill, C. (2017). Higher education governance in France, Germany, and Italy: Change and variation in the impact of transnational soft governance. Policy and Society, 36(1): 67-88.

Drucker, J., Goldstein, H. (2007). Assessing the regional economic development impacts of universities: A review of current approaches. International regional science review, 30(1), 20-46.

Eichhorst, W., Hinte, H., & Rinne, U. (2013). *Youth unemployment in Europe: what to do about it?* IZA policy paper, no. 65. Retrieved from the World Wide Web: http://ftp.iza.org/pp65.pdf

Eurostat (2015). Being young in Europe. The European Union: Brussels, Belgium. ISBN: 978-92-79-43243-9.

Feinstein, L., Sabates, R., Anderson, T.M., Sorhaindo, A. & Hammond, C. (2006). What are the effects of education on health? In Desjardins, R. & Schuller, T. (eds.) Measuring the Effects of Education on Health and Civic Engagement: Proceedings of the Copenhagen Symposium. Paris: OECD. Retrieved from the World Wide Web: http://www.oecd.org/document/61/0,3746,en_2649_35845581_37425853_1_1_1_1,00.html

Ferrie, J. E., Shipley, M. J., Stansfeld, S. A., & Marmot, M. G. (2002). Effects of chronic job insecurity and change in job security on self reported health, minor psychiatric morbidity, physiological measures, and health related behaviours in British civil servants: The Whitehall II study. Journal of Epidemiology and Community Health, 56(6), 450–454. https://doi.org/10.1136/jech.56.6.450

Furlong, A., Biggart, A. and F. Cartmel. (1996). Neighbourhoods, opportunity structures and occupational aspirations. Sociology, 30 (3): 551-565. doi: 10.1177/0038038596030003008.

Gesthuizen, M., Solga, H., & Künster, R. (2011). Context matters: Economic marginalization of low-educated workers in cross-national perspective. European Sociological Review, 27(2), 264–280. https://doi.org/10.1093/esr/jcq006

Harris, J.R. & Todaro, M.P. (1970). Migration, Unemployment and Development: A Two-Sector Analysis. American Economic Review, Vol. 60, No. (1), pp. 126–142.

Heckman, J. J., & Borjas, G. J. (1980). Does unemployment cause future unemployment? Definitions, questions and answers from a continuous time model of heterogeneity and state dependence. Economica, 47(187), 247-283.

Heidenreich, M. (2015). The end of the honeymoon: The increasing differentiation of (long-term) unemployment risks in Europe. Journal of European Social Policy, 25(4), 393–413. https://doi.org/10.1177/0958928715594544

Hermannsson, K., Lisenkova, K., McGregor, P. G., & Swales, J. K. (2014a). 'Policy scepticism'and the impact of Scottish higher education institutions (HEIs) on their host region: accounting for regional budget constraints under devolution. Regional Studies, 48(2), 400-417.

Hermannsson, K., Lisenkova, K., Lecca, P., Swales, J. K., & McGregor, P. G. (2014b). The regional economic impact of more graduates in the labour market: a 'micro-to-macro'analysis for Scotland. Environment and Planning A, 46(2), 471-487.

Hermannsson, K., Lisenkova, K., Lecca, P., McGregor, P. G., & Swales, J. K. (2017). The external benefits of higher education. Regional Studies, 51(7), 1077-1088

Hermannsson, K., Lecca, P., & Swales, J. K. (2017). How much does a single graduation cohort from further education colleges contribute to an open regional economy?. Spatial Economic Analysis, 12(4), 429-451.

Hermannsson, K., McGregor, P. G., & Swales, J. K. (2018). Students' consumption expenditures in economic impact studies: assumptions revisited in an input–output approach for Scotland. Regional Studies, Regional Science, 5(1), 57-77.

Hermannsson, K., Scandurra, R. & Graziano, M. (2019). Will the unequal regional distribution of higher education persist? The case of Europe in a period of rising participation. Regional Studies, Regional Science, 6,1, 539-556.

Heurman, D. (2011). Human Capital Externalities in Western Germany. Spatial Economic Analysis, Vol. 6, No. 2, pp. 139-166.

International Labour Organization (ILO). (2017). Global employment trends for youth. Geneva, Switzerland: ILO.

Keller, K.R.I. (2021). The External Social and Economic Benefits of Higher Education: Empirical Evidence from Worldwide Data. Journal of Education Finance, this issue.

Jaffe, A. B. (1989). Real effects of academic research. The American economic review, 957-970.

Jöns, H. Hoyler, M. 2013. Global geographies of higher education: The perspective of world university rankings. Geoforum, 46, 45-59.

Lee, J. W., Lee, H. 2016. Human capital in the long run. Journal of Development Economics, 122, 147-169.

Machin, S., Marie, O. & Vujic, S. (2011). The Crime Reducing Effect of Education. The Economic Journal. Vol. 121, pp. 463-484.

McMahon, W.W. (2004). The Social and External Benefits of Education. In Geraint, J. & Johnes. J. (eds.) International Handbook on the Economics of Education.Cheltenham: Edward Elgar.

McMahon, W. W. (2009). Higher learning, greater good: The private and social benefits of higher education. Baltimore: JHU Press.

McMahon, W.W. (2021). The External Social Benefits of Higher Education: Theory, Evidence and Policy Implications. Journal of Education Finance, this issue.

Moretti, E. (2004). Workers' Education, Spillovers and Productivity: Evidence from Plant-Level Production Functions. American Economic Review Vol. 94, No. 3, pp. 656-690.

Mroz, T.A., and Savage, T.H. (2006). The Long-Term Effects of Youth Unemployment. The Journal of Human Resources, 61, No. 1, pp. 259-293.

Munro, M., Turok, I. and Livingston, M. (2009). Students in cities: A preliminary analysis of their patterns and effects. Environment and Planning A, Vol. 48, No. 8, pp. 1805-1825.

Möller, J. (2017). Youth Unemployment in Europe from a Regional Perspective. In CESifo Forum (Vol. 18, No. 2, pp. 11-18). München: ifo Institut–Leibniz-Institut für Wirtschaftsforschung an der Universität München.

Oketch, M. (2021). The Social Benefits of Widening Participation in Higher Education in Sub-Saharan Africa. Journal of Education Finance, this issue.

Pastore, F, (2018): Why so slow? The school-to-work transition in Italy, Studies in Higher Education, DOI: 10.1080/03075079.2018.1437722

Rodríguez-Pose, A., & Crescenzi, R. (2008). Research and development, spillovers, innovation systems, and the genesis of regional growth in Europe. Regional studies, 42(1), 51-67.

Scandurra, R., Cefalo, R., Kazepov, Y. (2020). School to work outcomes during the Great Recession, is the regional scale relevant for young people's life chances? Journal of Youth Studies. DOI: 10.1080/13676261.2020.1742299

Skans, O N, (2005) Age effects in Swedish local labor markets, Economics Letters, Vol. 86 (3), pp. 419-426.

Skinner, B.T. & Doyle, W.R. (2021). Do Civic Returns to Higher Education Differ Across Subpopulations? Analysis Using Propensity Forests. Journal of Education Finance, this issue.

Teixeira, P., Sa, C., Cerejeira, J. & Portela, M. (2021). Mass Higher Education and Its Civic Impacts in Portugal and Spain. Journal of Education Finance, this issue.

Thurow L C, 1975 Generating Inequality (Basic Books, New York)

van Ours J C, Ridder G, 1995, Job matching and job competition: are lower educated workers at the back of job queues? European Economic Review Vol. 39, pp. 1717–1731.

UNESCO (2012). UOE data collection on education systems Volume 2. UNESCO/OECD/Eurostat: Montreal, Paris, Luxembourg.

Valero, A. & Van Reenen, J. (2019). The economic impact of universities: Evidence from across the globe. Economics of Education Review, Vol. 68. pp. 53–67.

Vryonides, M., & Lamprianou, I. (2013). Education and social stratification across Europe. International Journal of Sociology and Social Policy, 33(1/2), 77-97.