A R T I C L E

Territorial Configurations of School-To-Work Outcomes in Europe

Ruggero Cefalo [1], Rosario Scandurra [2,3], and Yuri Kazepov [1]

[1] Department of Sociology, University of Vienna, Austria
[2] Department of Sociology, Autonomous University of Barcelona, Spain
[3] Center for Global Studies, Universidade Aberta, Portugal

Correspondence: Rosario Scandurra (rosario.scandurra@uab.cat)

Abstract

Comparative research on school-to-work transitions mainly focused on country differences, examining the variation in institutional design and its impact on shaping youth labour market outcomes. The field has been dominated by a sort of methodological nationalism assuming nation states as homogeneous objects of comparison, while the territorial variations in youth transitions among sub-national territories have been less explored, notwithstanding their potential impact on life chances. In this article, we look at the outcomes of transitions in EU regions, comparing regional configurations of school-to-work transitions and their change over time. Is it possible to identify differences among groups of regions? To what extent do these patterns change over time? In order to answer these questions, we construct and analyse a longitudinal and systematic set of indicators that combine regional aggregated outcomes of transitions from education to work and regional contextual traits at the Nomenclature of Territorial Units for Statistics level 2 for the period 2007–2019. We perform two cluster analyses to describe regional differences and trends over time. The findings provide novel insights into the characteristics and patterns of an unequal geography of youth opportunities in Europe.

Keywords

education; labour market integration; school-to-work transition; spatial disparities; youth

1. Introduction

Since its comparative turn (Raffe, 2014), research on school-to-work transitions (STWTs) has mainly focused on country differences and has been dominated by a sort of methodological nationalism assuming nation states as homogeneous objects of comparison (Ciccia & Javornik, 2019; Scandurra et al., 2020). Territorial

variations in processes and outcomes of STWTs have been less explored. In contrast, the debate on spatial disparities highlights the relevance of territorial differences for life chances (Iammarino et al., 2018). Moreover, studies carried out at the sub-national level on skills ecosystems look at the way skills arrangements are enacted at the local level, where territorial traits mediate the effects of national institutional settings (Capsada-Munsech & Valiente, 2020; Dalziel, 2015). This body of research claims that contextual socio-economic conditions in subnational territories are still vastly unexplored by systematic comparative and longitudinal studies while they contribute substantially to differentiated outcomes and regional opportunity structures (Hodgson & Spours, 2013). On a similar note, scholars have identified significant regional differences in STWT outcomes within countries that go mostly unnoticed within the literature on STWT, calling for further exploration of variation and patterns of youth labour market integration at the subnational level (Parreira do Amaral et al., 2019; Scandurra et al., 2021a).

As a systematic comparative overview of STWT outcomes in subnational territories is still missing, in this article, we compare configurations of STWT outcomes in EU regions in the last 15 years, looking at educational attainment, employment integration outcomes, contextual characteristics, and their changes over time. Is it possible to identify differences among groups of regions? To what extent do these patterns change over time? The descriptive nature of the article is theoretically driven, i.e., it stems from scholarly research identifying the territorial dimension as an underexplored issue in studies on youth and STWT and considering regions as contexts of opportunities for youth (Cefalo & Scandurra, 2021; Roberts, 2009). More generally, our approach also aligns with contributions in economic geography and spatial disparities that call for the identification of common traits and trends among groups of regions with respect to various aspects of economic and social development (Diemer et al., 2022; Dijkstra, 2022).

We construct a set of indicators that combine regional contextual characteristics and outcomes of transitions from education to work. Our analysis also considers variations over time, especially in the presence of critical junctures that have strongly impacted youth labour market integration, such as the Great Recession. We restrict our view to regional outcomes and socio-economic contextual traits, given the multiple difficulties in systematically accounting for subnational institutional settings (Ciccia & Javornik, 2019). This approach has two fundamental advantages over previous frameworks in the study of STWT. Firstly, by looking at regional outcomes, it overcomes the "methodological nationalism" that often prevails in comparative STWT research. Second, we do not focus on the general effects of drivers on transition outcomes; rather, in complementary terms, we provide a thorough description of groups and patterns that allow us to depict a differentiated geography of opportunities for youth in EU territories. From a perspective of territorial governance, the results support claims for considering mechanisms of territorial sensitivity in the design and implementation of policies affecting youth.

The article is structured as follows: Section 2 justifies the need for a territorial approach to STWT, paving the basis; Section 3 focuses on the identification of regions as contexts of opportunities for youth. Section 4 details the methodological strategy applied, in particular, the clustering approach that stems from the aim of identifying groups of regions and their trajectories over time. Section 5 presents the result of our analysis, describing the clusters on levels and trajectories. In the discussion, we combine the classifications proposed and discuss their significance for policy-making.

2. A Territorial Approach to STWT

The transition from school to work is influenced by the way in which individual, institutional, and structural factors relate to one another, producing aggregate STWT patterns that may vary within and across countries and time (de Lange et al., 2014; Müller, 2005; Raffe, 2014; Walther, 2017; Wolbers, 2007). Comparative research on STWT investigates how these patterns differ across countries and are affected by institutions such as the education and welfare systems and structural or contextual conditions related to labour market, economic, and demographic dynamics (Hadjivassiliou et al., 2019; O'Reilly et al., 2015; Scandurra & Alberio, 2021).

Comparative research on STWT has generally emphasised variation across countries while underestimating territorial differences in transition patterns and overlooking variations below the national level (Ciccia & Javornik, 2019; Greer et al., 2015; Raffe, 2014; Simões, 2022). A composite body of literature has recently responded to this criticism and directed attention towards the territorial dimension of STWT and skill formation (Capsada-Munsech & Valiente, 2020; Scandurra et al., 2021a) arguing that regional and local contexts can enable (or hinder) specific opportunity structures for young people (Roberts, 2009), due to the interactions between (a) multi-level governance arrangements, and (b) the persistence of spatial disparities in a variety of domains, ranging from economic development to demographic, employment, and educational outcomes (Cefalo & Scandurra, 2023).

Within multi-level governance arrangements, the devolution of competencies to subnational levels (regions, cities, and localities) and central coordination coexist in complex combinations (Kazepov, 2010). As policies move through this multi-layered process, significant intra-country variation is produced in policy outputs and outcomes. Education and skills agendas are commonly drawn at the national level. However, their enactment usually takes place at the regional and local level, within local socioeconomic contexts, which are likely to differ within and across countries (Dalziel, 2015; Garritzmann et al., 2021). The renewed increasing spread of territorial disparities has, therefore, drawn attention to regional contexts as a source of internal heterogeneity in European states. A combination of globalisation and technological change prompted the reshuffling of the positions of subnational territories in the global space, leading to new spatial disparities reinforcing (or consolidating) already existing ones (Rodríguez-Pose, 2018) and a new geography of jobs (Iammarino et al., 2018). Local contexts mediate the relationship between the national institutional setting and its effects on the supply and demand of skills in each region. Thus, the outcomes of the education systems and youth labour markets can be highly heterogeneous at the local scale, creating distinct subnational trajectories (Daigneault et al., 2021; Keating, 2021). Along this line, scholars claim that education and training provisions are enacted across regions with very different employment opportunities and labour market demands. This creates local skills ecosystems (Capsada-Munsech & Valiente, 2020; Dalziel, 2015; Finegold & Soskice, 1988) that Buchanan et al. (2017) defined as clusters of high, intermediate, or low-level competencies in a particular region. At the heart of the skills ecosystem approach is an attempt to propose a multi-factorial frame of analysis that includes skill demand and usage as well as supply, tailored to their specific context. According to this analytical framework, policy interventions should address the range of contextual factors that shape skill formation and youth opportunities within a particular ecosystem (Hodgson & Spours, 2013).

The complex framework of the ecosystem model is highly useful for analysing local contexts. However, it is limited in comparing a large number of regions across countries (for an exception, although not systematic,

see Capsada-Munsech & Valiente, 2020). Conversely, human geography and spatial economics often use regions as units of analysis to account for subnational variation in comparative terms and highlight how regional characteristics of labour markets or socio-demographic conditions are associated with several regional aggregated outcomes, such as employment growth, social exclusion, and even political discontent (Dijkstra et al., 2020). In their long-term analysis of regional development, Rosés and Wolf (2018) found a growing disconnection between EU regions, with the emergence of islands of prosperity out of sync with their hinterland. The authors observe that the pattern of regional inequality over the last 110 years followed a U-shape, with convergence until the 1980s and divergence as well as geographical reconcentration after that. Subnational territories appear, to some extent, separate from the overall national performance as actors capable of endogenous development, leading to the consideration of regions and localities as production systems rather than as simply locations of production (Keating, 2021).

3. Regional Contexts of Opportunities for Youth

Building on the relevance of spatial disparities in producing differentiated social outcomes, a growing body of research analyses various aggregated outcomes at the regional level, as well as the interaction with multiple contextual traits related to the economic structure and socio-demographic characteristics of the territory. The consideration of regions as contexts of opportunities and the focus on subnational territories leads to the identification of differentiated geographies of jobs and opportunities that do not necessarily overlap with national borders (Dijkstra et al., 2020; Iammarino et al., 2018). The systematic comparison of regions as units of analysis has also gained ground in recent STWT analysis, challenging the predominant national focus of comparative STWT research (Raffe, 2014). Scandurra et al. (2021b) show that several labour market indicators, such as youth employment and unemployment, display significant within-country variation, which cannot be explained solely by country-level analysis. Further empirical evidence using regions as units of analysis also shows significant variations in regional youth unemployment, NEET (Not in Employment, Education, and Training), and youth employment rates (Bruno et al., 2014; Cefalo et al., 2020).

When looking at regional drivers of youth employment, this literature connects cross-country investigations on youth labour markets (de Lange et al., 2014; Tomić, 2018) with studies on regional characteristics and spatial disparities as contextual factors potentially affecting STWT outcomes. As a general trend, regional structural heterogeneity seems to play a role in the development of STWT outcomes. Along this line, Scandurra et al. (2021b) find that regional youth labour market integration is affected by the regional demand for work, pointing to possible effects of sectoral specialisation (Sforzi & Amin, 2018). As for demographic trends, the size of the youth population defines the potential labour supply of the region. It is affected by skill- and age-selective migration with large regional variation (Prenzel & Iammarino, 2021). Regions with migration outflows may, for instance, display reduced competition for labour market access (Cefalo & Scandurra, 2021). However, emigration risks exacerbating brain-drain dynamics, possibly leading to labour and skill shortages in the long term.

In terms of empirical strategies, some studies partially depart from the identification and testing of drivers of integration, pointing towards differences among groups of regions and differentiated developments over time as promising directions of research. According to Diemer et al. (2022), regions cluster into groups with similar trajectories and levels of economic development, sectoral composition, innovation, and demography. These factors help explain outcomes of economic change, prosperity, and lack thereof. Interestingly, in the

authors' view, regional development traps demand attention in a forward-looking fashion so that analyses that shed light on trajectories of groups over time can allow policymakers to design effective preventive policies rather than being confined to ex-post remedial policies. Cefalo and Scandurra (2021) look at trajectories of regions grouped according to GDP quintiles; they observe only a slight convergence of patterns of youth labour market integration over time and suggest that once certain regional patterns and trends in youth employment are established, they tend to persist despite external economic factors. The pronounced spatial differences mirror the traits of an unequal and path-dependent geography of opportunities for young people, with diverging life chances and employment accessibility. Dynamic regions are more adaptable to change and better equipped for generating youth employment opportunities. Conversely, the trajectory of several peripheral regions from Southern European regions severely affected by the crisis did not show any significant sign of catch-up with better-off regions over the last 15 years (Scandurra et al., 2020). The persistent lack of employment opportunities might fuel the discontent of young people with weak labour market prospects trapped in lagging regions.

Along the lines presented in this literature review, in this article, we share the consideration of EU regions as contexts of opportunities, and we acknowledge the need for a systematic comparative approach to describe subnational variation in STWT outcomes and contexts over time.

4. Methodology and Data

Empirically, we focus on the systematic comparison of aggregated transition patterns (Raffe, 2008) at the regional level (Scandurra et al., 2021a). We use regions as units to explore the heterogeneity of STWT outcomes by means of cluster analysis. We selected a core number of variables based on the theory-driven model of STWT outcomes that we draw from the reviewed research on STWTs and spatial disparities. For the operationalisation and data elaboration, we relied on comparable regional measures of educational and labour market outcomes in combination with contextual characteristics of local socio-economic systems.

In STWT research, an overarching amount of research established the strong linkages and interaction between education and employment outcomes. The level of education plays a major role in shaping youth access to the labour market (Müller, 2005). Education qualifications provide differential returns in the labour market, so education and skill levels in a territory are crucial factors in determining youth opportunities. Educational qualifications are strongly and positively associated with youth integration into the labour market. Higher-educated young people tend to experience faster transitions; conversely, low-educated adults without an upper-secondary degree bear a particularly high risk of labour market marginalisation, although the extent of their advantages and disadvantages varies considerably across countries (Gesthuizen et al., 2011; O'Reilly et al., 2015). Countries largely differ in the composition of educational qualifications and labour market outcomes by level of education (Müller, 2005), institutional settings, and aggregate structural conditions (as contexts) that affect STWT (Müller & Gangl, 2003; Raffe, 2008). For this reason, in our analysis, we include indicators on youth educational attainment by International Standard Classification of Education (ISCED) level and youth employment rates by ISCED level to explore cross-regional combinations of educational and employment outcomes. As for contextual regional traits, we aim to account for basic structural indicators related to the general state of the economy, regional specialisation, and population trends (Dijkstra, 2022; Prenzel & Iammarino, 2021; Rosés & Wolf, 2018; Scandurra et al., 2021b). Therefore, we resort to the literature on economic geography and spatial disparities, using regional GDP and

population size as general traits of the regional context. We also complement them with an indicator of regional specialisation and knowledge economy. Specifically, we use the share of scientists and engineers in the active population as a proxy of the occupational stock of persons employed in science and technology occupations (see, for instance, Eurostat, 2023).

For classification purposes, we restrict our view to regional outcomes of transitions and socio-economic contextual traits. The scarce availability of comparable information on subnational institutional settings is unfortunately well recognised and hampers the possibility of large-*N* comparative analysis: measures of institutional differentiation at the regional level are not systematic in terms of cases and time range, or they run risks of compensation effects and excessive generalisation (Ciccia & Javornik, 2019). In the conclusive section, we will return to the interaction between the regional contexts of opportunities identified and institutional settings.

A unique dataset was compiled using a macro panel of all European regions between 2007 and 2019. Regional data were retrieved from EUROSTAT, the statistical office of the EU, which aggregates information from different sources at the Nomenclature of Territorial Units for Statistics (NUTS) levels 1 and 2 for a range of educational, social, and economic indicators. Specifically, regional indicators on educational attainment and employment outcomes are calculated from the EU Labour Force Survey; regional contextual traits are derived from the regional accounts developed by the European System of Accounts. The NUTS classification is a hierarchical system for dividing countries into statistically homogeneous subnational territories. We use NUTS 2 as our preferred level of aggregation to describe the geography of youth opportunities, as previous research singled out significant spatial disparities in social, economic, and employment outcomes among EU territories at the regional NUTS 2 level, with significant impacts on life chances (Cefalo & Scandurra, 2021; Scandurra et al., 2021b). In our analysis, we consider variation across space and over time in STWT (Hadjivassiliou et al., 2019), classifying regions according to (a) average levels and (b) rates of change across the period considered. The period of our data (2007–2019) covers a period of post-recession and economic growth in Europe. Our set of variables, for which descriptive statistics are reported in the annexe, includes three dimensions:

- Educational attainment: educational attainment of youth 25–34, distinguishing among qualifications at ISCED 0–2 (low educated with no more than a lower secondary qualification); ISCED 3–4 (medium educated with upper secondary qualification); and ISCED 5–8 (highly educated with tertiary qualification).
- Labour market outcomes: employment rate of youth 20–34 by educational qualifications (ISCED 0–2, ISCED 3–4, ISCED 5–8); NEET rate (share of young people aged 15–29 that are neither in employment nor in education or training) as a measure of labour market exclusion.
- Socio-economic contextual conditions: GDP per capita in purchasing power standard; Scientists and engineers in the active population; population aged 20–64.

In what follows, we process the data according to a three-step sequence. The first segment of the empirical strategy provides brief descriptive statistics about the variation of selected indicators of STWT outcomes. The second segment applies multidimensional clustering of EU regions with regard to STWT outcomes and contextual socioeconomic characteristics. We cluster EU regions according to specific criteria, giving priority to (a) levels of the selected indicators of outcomes and regional contextual traits and (b) their relative change

over time. We perform two cluster analyses, the first on the moving average and the second on the relative rate of change of the above indicators. The third segment of the article discusses common patterns of variation over time and space through cross-tabulation.

For each cluster analysis, the details of the variables used can be found in the Supplementary File, along with the respective variable's univariate statistics. For the first cluster analysis, we derived a simple moving average by computing the mean of data points for each variable over 18 years, considering a three-year interval. We replaced missing values with data from the nearest available year. For the second cluster analysis, we calculated the relative rate of change over the whole period by dividing the difference between the final (2019) and initial (2007) values of each variable by its initial value. In cases where atypical outliers were present (with deviations exceeding 10% from the level of the nearest year), we partially corrected for them by using the average of the two closest years. All indicators in the cluster analysis were mix max normalised ranging between 0 and 1, raw variables are reported in the Supplementary File. NEET rate was changed in sign to match the cardinality of the other proxies.

Clustering methods must be used with the awareness that results are affected by the data under analysis; this includes the overall number of observations, the number and type of variables, the distribution of observation along the various dimensions under analysis, and missing data. In each passage of clustering, we make transparent decisions, from the choice of the number of clusters to the identification of the indicators to be used in clustering the groups of co-occurrences. While the process of progressive reduction of multiple categories produces some loss of information, it makes it possible to single out common features that would otherwise not be observable and to use them for policy analysis. In the grouping of regions obtained, it is possible to highlight the common elements of homogeneity within groups of regions (Pagliacci et al., 2020).

Both K-means and K-medians clustering techniques were applied, assigning a random seed. However, we report only the results from the K-medians cluster analysis, although the results are consistent between the two solutions. We used the Euclidean distance as the measure of dissimilarity and ran the clustering algorithm for a total of 100,000 iterations, assigning each observation individually to one of the groups. K-medians is a non-hierarchical grouping technique: data are divided into k partitions, or clusters, where each partition represents a cluster. The division process follows an algorithm that assigns each element to the group with the closest (median) centre so that objects within the same group are as similar as possible (high intra-class similarity). In contrast, objects from different groups are as dissimilar as possible (low inter-class similarity). The cluster analysis with the k-medians method will thus produce k different clusters with the greatest possible distinction. K represents the number of groups specified by the analyst; the decision on k is often ad hoc and depends on prior knowledge, assumptions, and practical experience (Salas-Velasco, 2023; Steinley, 2006).

The decision to opt for four clusters is based upon a range of methods and tests, reported in the Supplementary File. To determine the optimal number of clusters, we employed four different methodologies to ensure the robustness of our choices. First, we computed the Calinski pseudo-F statistic, searching for an inflexion point that indicates an ideal number of clusters. Furthermore, we visualised the centroids in relation to the first two discriminant functions, which collectively accounted for more than 55% of the total variance. We also calculated the within-group sum of squares to evaluate the compactness of data points within each cluster. Lastly, we conducted a model-based cluster analysis by computing the

Bayesian Information Criteria. All four methods converged on a four-cluster solution for both analyses conducted, with the analysis performed using the "mclust" package in *R*. The choice of four clusters allows us to single out significant aggregations of regions in terms of relevant analytical dimensions and a combination of time—and level—variation. This approach allows us to combine the two four-cluster classifications, providing an interpretation that considers both developments over time and across regions. Additional clusters would have led to an excessive number of aggregations, hampering the possibility of interpretation connected to our analytical frame. Our reference framework considers widely used indicators of STWT outcomes in national and regional analysis, in conjunction with broad contextual indicators that proxy the main socio-economic traits of the regions.

5. Empirical Results

Using regions as units of analysis allows us to identify and explore variations below the country level. Table 1 presents the percentage of variance components explained by the state, year, and regional levels of a subset of STWT proxies and regional characteristics. Notably, the table reveals significant regional variation, accounting for approximately 40% of the variance in each of the chosen proxies. This finding is consistent with prior research that underscores the significance of analysing the contextual opportunity structures for youth (Raffe, 2014; Scandurra et al., 2021a). The granularity in the distribution of regional transition patterns is also confirmed by visual inspection of Figure A10 in the Supplementary File. As general trends, we can observe an overall increase in tertiary qualifications among youth between 2007 and 2019, and a decrease in the share of medium and low-educated youth. Employment outcomes slightly deteriorate across educational levels, although the strongest decrease is displayed for low-qualified youth. The preliminary overview provided by Table 1 and Figure A10 justifies further investigation of differences and trajectories among EU regions.

Table 2 and Figure 1 show the results of the cluster analysis based on the moving average of STWT outcomes and contextual indicators between 2007 and 2019. The table provides normalised means of the indicators by cluster, allowing one to identify the most distinctive characteristics of a cluster that distinguish it from the other clusters and the overall averages. Four clusters have been identified: (a) low skills equilibrium, (b) strong knowledge economy, (c) strong labour market integration, and (d) unequal opportunities and risks.

The first cluster, *low skills equilibrium* (a), includes 69 regions that display—on average—a skewed distribution of educational attainment, as the shares of low educated are above average, and the highly qualified are below average. Employment opportunities and youth participation in the labour market are markedly low, as

Table 1. Variance decomposition of selected variables.

	Between State	Between Year	Within State
NEET rate: 15–29	58.90	2.22	38.88
Share of ISCED 5–8: 25–34	50.38	8.60	41.02
Employment rate ISCED 3–4: 20–34	50.20	4.50	45.30
Employment rate ISCED 5–8: 20–34	58.95	1.58	39.48
Scientists and engineers share: active population	47.50	14.15	38.35

Source: Authors' own elaboration based on Eurostat (2023).

Table 2. Indicators moving average by clusters, 2007–2019.

Groups	ED. ISCED 0–2	ED. ISCED 3–4	ED. ISCED 5–8	EMP. ISCED 0–2	EMP. ISCED 3–4	EMP. ISCED 5–8	NEET	SCIEN. & ENG.	GDP	POPUL.
1. Low skills equilibrium	0.239	0.480	0.283	0.514	0.685	0.759	−0.214	0.976	0.029	1.035
2. Strong knowledge economy	0.150	0.409	0.441	0.602	0.788	0.869	−0.119	0.102	0.060	1.415
3. Strong labor market integration	0.122	0.600	0.279	0.552	0.848	0.886	−0.095	0.102	0.049	0.993
4. Unequal opportunities and risks	0.188	0.424	0.388	0.633	0.810	0.888	−0.127	0.962	0.069	1.037
Total	0.175	0.481	0.345	0.569	0.777	0.844	−0.142	0.100	0.049	1.135

Notes: ED. = Education; EMP. = Employment; SCIEN. & ENG. = Scientists and engineers on the active population; POPUL. = Population 20–64. Source: Authors' own elaboration based on Eurostat (2023).

displayed by high NEET rates and, conversely, low employment rates by all qualification levels. Low levels of regional GDP and below-average development of knowledge-intensive sectors complete this low-skill equilibrium group, mostly composed of regions from Southern and Southern/Eastern Europe. Interestingly, the main economic centres of these countries are not part of the first group.

The second cluster, *strong knowledge economy* (b), is composed of 76 regions with very high levels of tertiary education qualifications, which translates into positive labour market outcomes, especially for highly educated youth and those with below-average NEET levels. This group displays favourable contextual conditions regarding knowledge-intensive sectors and regional GDP levels; these regions are also attractive and highly populated. This group is geographically variegated, although it includes a few regions from Central Europe. Dynamic regions, capitals, and metropolitan areas tend to cluster in this group (for instance, Madrid, Paris, Bratislava, Bucharest, Lombardy).

The third cluster, *strong labour market integration* (c), includes 63 regions characterised by very high levels of upper secondary education and strong integration for the medium-qualified youth. The share of low and highly educated is comparatively low, and job opportunities are low for the low qualified, favouring instead medium and high qualifications, resulting in very low NEET levels. The economic conditions are slightly less favourable than those of Group 2, with the share of scientists and engineers being above average and the GDP levels being average. The geographic core of this group, characterised by strong youth integration, is in Central Europe (Austria and Germany), with additional regions from Northern and Eastern Europe.

The fourth cluster, *unequal opportunities and risks* (d), is slightly residual, being the less numerous (44 regions) and more geographically concentrated: it mostly describes the traits of UK regions (apart from London), with a few other regions, such as Portugal and Romania. The group displays mostly close-to-average values in terms of educational qualifications. The economy provides high employment opportunities for young people, and
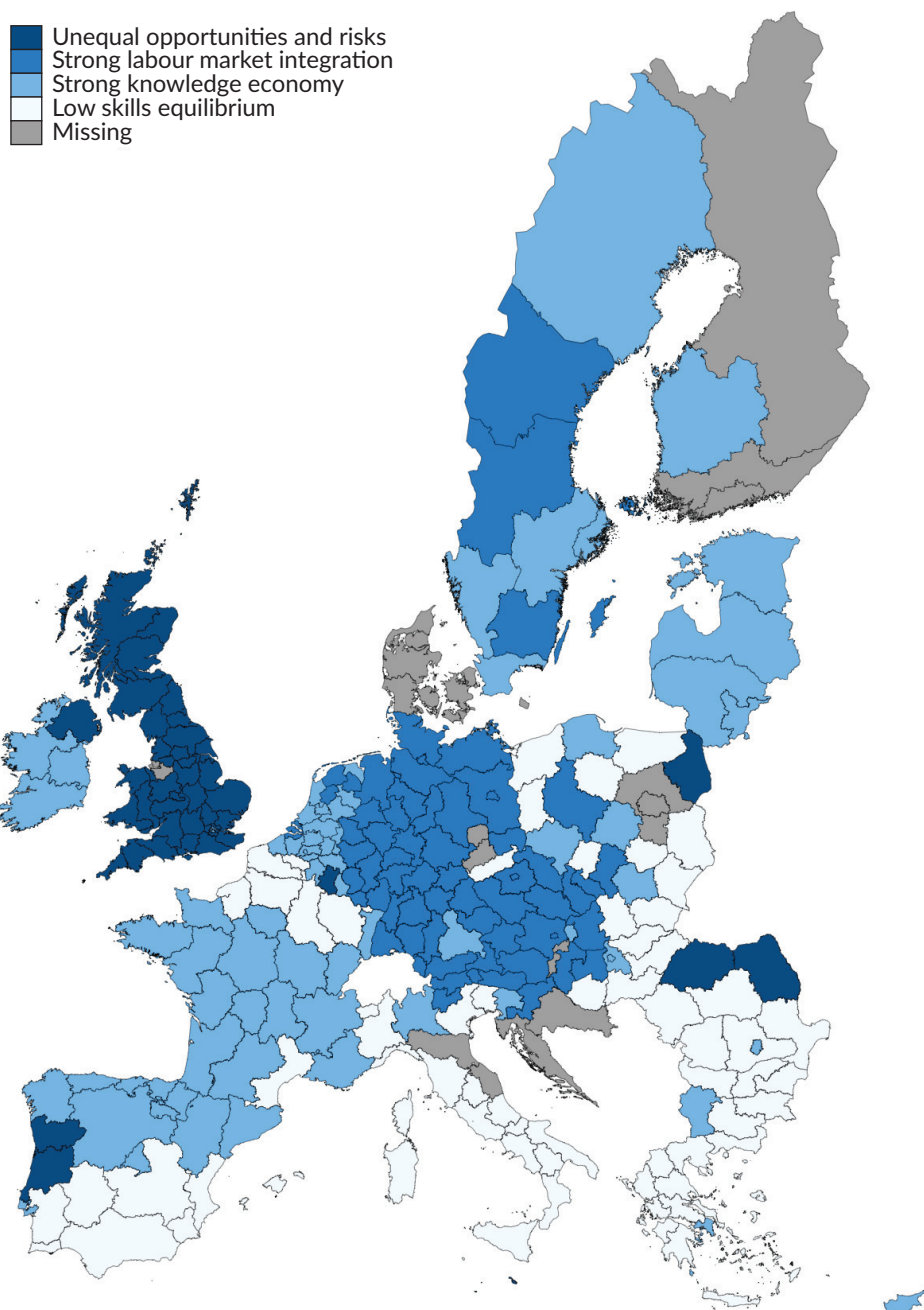
Figure 1. Groups of regions according to their moving average 2007–2019. Source: Authors' own elaboration based on Eurostat (2023).

especially for the tertiary educated. However, NEET rates are higher than in Groups 2 and 3, signalling that some young people may encounter difficulties in accessing the labour market more than others. The regional welfare is very high, although the development of knowledge-intensive sectors is below average.

Table 3 and Figure 2 show the results of the cluster analysis based on the relative rate of change of STWT outcomes and contextual indicators between 2007 and 2019. The average trajectories identify a decrease in the share of low and upper-secondary educational attainment and a deterioration of employment

Table 3. Indicators relative rate of change by clusters, 2007–2019.

Groups	ED. ISCED 0–2	ED. ISCED 3–4	ED. ISCED 5–8	EMP. ISCED 0–2	EMP. ISCED 3–4	EMP. ISCED –8	NEET	SCIEN. & ENG.	GDP	POPUL.
1. Strongly improving youth integration	−0.066	−0.146	0.521	0.187	0.023	0.075	−0.253	0.657	0.032	−0.002
2. Human capital and knowledge-intensive growth	−0.243	−0.073	0.543	0.052	−0.013	0.029	−0.136	1.505	0.014	0.001
3. Low human capital and development trapped	−0.206	0.020	0.149	−0.138	−0.042	−0.066	0.052	0.374	0.017	−0.001
4. Declining and growing unequal	−0.307	−0.068	0.466	−0.186	−0.051	−0.067	0.252	0.750	0.015	−0.002
Total	−0.195	−0.072	0.425	−0.006	−0.017	−0.002	−0.038	0.803	0.021	−0.001

Notes: ED. = Education; EMP. = Employment; SCIEN. & ENG. = Scientists and engineers on the active population; POPUL. = Population 20–64. Source: Authors' own elaboration based on Eurostat (2023).

opportunities for youth across all educational levels after 2007, although less pronounced for the highly qualified. Four clusters can be identified: (a) strongly improving youth integration, (b) human capital and knowledge-intensive growth, (c) low human capital and trapped development, and (d) declining and growing unequal.

The first cluster, *strongly improving youth integration* (a), is composed of 79 regions showing a strong trend towards increasing higher education qualifications as the maximum level of education among youth in combination with a pronounced decrease in upper secondary attainment and a slow decrease in those who are low educated. Regional GDP grew at a highly sustained pace with respect to the other groups, although with below-average growth in knowledge-intensive sectors, and the population decreased, owed in some regions to ageing and migration outflows of the active population (mostly in Eastern regions). These regions are effective in providing job opportunities for youth, being, in particular, the only group with growing employment rates for medium-qualified youth and reducing the share of young people outside the education and labour market systems. Regarding outcomes from the labour market, integration grew for all levels of qualification, and the share of NEET decreased strongly. These regions are mostly located in Central and Eastern Europe. Accessing the EU (2004/2007) had a positive impact on the overall economic and youth integration performance of the Eastern regions.

The second cluster, *human capital and knowledge-intensive growth* (b), includes 62 regions that displayed strong gains in tertiary education qualifications vis-à-vis shrinking shares of medium and low-educated youths. Conditions in the labour market generally improved, except for those who are medium qualified.
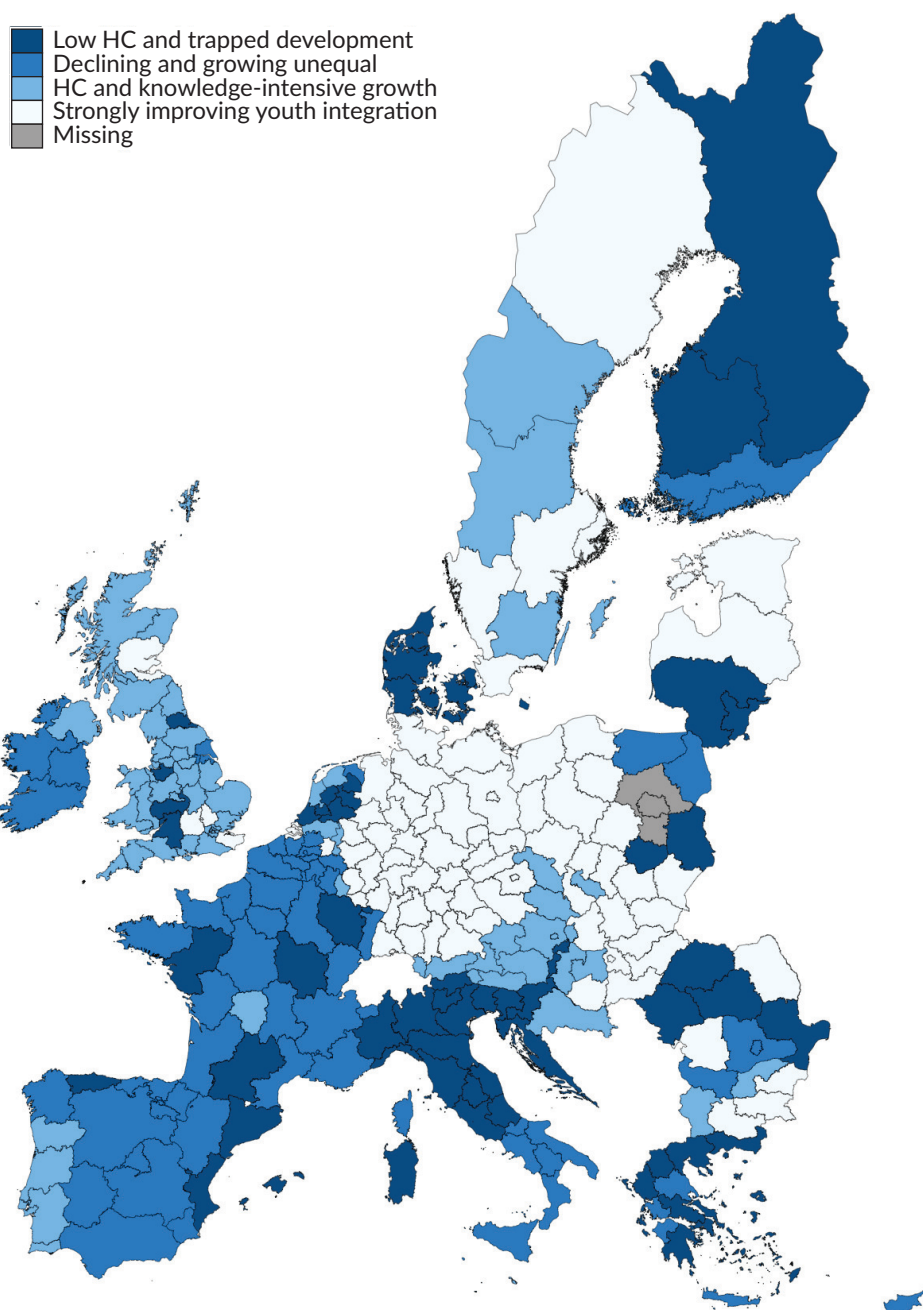
Figure 2. Groups of regions according to their relative rate of change 2007–2019. Source: Authors' own elaboration based on Eurostat (2023).

These regions are attractive territories, with population growth and a strong trend towards a knowledge economy, although the growth of regional welfare was below average in the period considered. Regions of the second group are mostly located in the UK and Austria but also include regions from Portugal, Sweden, and Eastern Europe.

The third cluster, *low human capital and trapped development* (c), is composed of 61 regions that experienced a moderate expansion of educational qualifications but a low pace of growth for higher qualifications.

Employment conditions deteriorated for all qualification levels, and the share of those excluded from the labour market grew. This group shows signs of a "development trap," i.e., a below-average regional welfare growth and scarce signs of improved productivity and innovation in the economy, coupled with a slight population loss. These regions are mostly located in Spain, France, and the South of Italy. Irrespective of their levels of youth integration, they show signs of stagnation, as human capital grows slowly and the local economy is not dynamic, lacking the necessary infrastructural conditions for innovation.

The cluster *declining and growing unequal* (d) includes 50 regions that managed to increase educational levels vis-à-vis a strong shrinkage of low-educated youth over the period. However, the economic crisis strongly impacted youth opportunities in the labour market. As a sign of the diffused difficulties facing youth in the transition from school to work after 2007, we observe pronounced NEET increases and employment rates decreases, vastly above average for all educational levels. The regional economy grew at a slow pace, although there are signs that knowledge-intensive sectors are being developed. Finally, the regional population shrank due to population ageing and out-migration flows, especially in the Greek and Eastern regions. This group is composed of regions located mostly in Southern Europe but also collects trajectories of regions from Central, Northern, and Eastern Europe.

6. Discussion and Conclusions

In this article, we explored the subnational dynamics of STWT outcomes. We focused on European regions (NUTS 2) as case units, looking at patterns of change and averages of groups of regions between 2007 and 2019. The inclusion of education attainment and employment rates by educational level, together with socio-economic conditions, provides an overarching picture of the geography of youth opportunities in EU regions. We detected four groups of regions with similar averages across the period considered and four groups of regions with similar trajectories of change over time.

In Table 4, we perform a simple cross-tabulation of the clusters based on the moving average and the relative rate of change, offering valuable insights into the dynamics of regional patterns. The table shows that out of the 73 regions with strong levels of youth labour market integration (Cluster 3 Moving Average), only six went through a deteriorating pattern in the last 13 years. This suggests that the majority of the regions in which youth were strongly integrated into the labour market did not experience drastic changes in their employment patterns. In contrast, most low-skill equilibrium territories (Cluster 1 Moving Average) maintained their low skills path of (under)development. However, it is worth noting that 19 out of the 79 regions included in this category showed a pattern of change towards improving trends in youth integration and STWT. This is the case of several Eastern European territories which have benefited from EU access and new market openings, as well as from out-migration of young people, which could have slightly eased the competition for jobs. Interestingly, the table indicates a more diverse pattern for regions with a strong knowledge economy (Cluster 2 Moving Average). These regions, which typically rely on knowledge-intensive sectors, have generally witnessed a worsening of their development pattern in terms of employment outcomes. This suggests that even regions with a focus on knowledge-based industries and services have not been immune to challenges in the labour market and were strongly hit by the Great Recession and its aftermath. A significant share of these regions shows a worrying risk of being trapped in a trajectory of stagnating development (Diemer et al., 2022) and struggling youth labour market integration.

Table 4. Crosstabulation clusters of regions based on relative rate of change and on moving average (2007–2019).

		Moving Average Clusters			
		1. Low skills equilibrium	2. Strong knowledge economy	3. Strong labour market integration	4. Unequal opportunities and risks
Relative Rate of Change Clusters	1. Strongly improving youth integration	16	17	41	5
	2. Human capital and knowledge-intensive growth	3	11	16	32
	3. Low human capital and development trapped	24	33	1	3
	4. Declining and growing unequal	26	15	5	4

Source: Authors' own elaboration based on Eurostat (2023).

Overall, the findings highlight the presence of high path dependency patterns, indicating a strong tendency to continue along their established trajectories that resulted in significant divergence in human capital and youth regional employment outcomes across the EU. The persistence of these patterns underscores the need for targeted interventions and policies to address the underlying causes of the territorial divide and promote more inclusive and balanced employment opportunities for youth across all EU regions.

The findings align with the existing body of literature showing the persistent nature of youth regional employment outcomes over time, supporting the notion that these outcomes exhibit a high degree of inertia, even during the post-recession period of the late 2000s, as Scandurra et al. (2021a, 2021b) showed. This suggests that once certain regional patterns and trends in youth employment are established, they tend to persist despite external economic factors. It is crucial to continue monitoring and analysing the dynamics of youth employment patterns to inform policy decisions and ensure that interventions are effective in breaking the cycle of persistent youth unemployment and fostering improved prospects for youth within EU territories.

Despite this general dynamic, it is also important to note that a few changes have been observed. Some Mediterranean territories combine deteriorating youth labour market opportunities with an increasing upward trend in the supply of human capital. The observed changes in these territories may be attributed to various factors, such as the decreasing cost-benefit opportunities for investing in education. Positive trends in youth integration can also be observed in several Eastern EU regions after 2007.

Our findings should be interpreted carefully due to some limitations. In fact, the article considers aggregate regional outcomes based on available comparable data. Socio-economic differences of access within social groups are considered by education level, but were unable to consider the intersectionality of such differences and further cumulative disadvantages. Further, institutional differentiations were not included in the analysis, a point that future research should consider when trying to unpack the complex mechanisms that connect multi-level institutions and territorial contexts (Kazepov & Cefalo, 2022; Rodríguez-Pose, 2020). Although we are aware of the importance of specific institutional determinants and related policies addressing STWTs,

our main focus was to single out the variation of STWT outcomes within regional socio-economic contexts. We consider this article part of a research agenda aiming to investigate the regional dimension of STWTs by looking at the variations in outcomes and the impact of institutional and socio-economic conditions of different welfare mixes. Further empirical studies should advance in explaining and unpacking these complex territorial dynamics considering institutional indicators.

In conclusion, the findings of this study highlight the relevance of contextual factors that underlie the observed patterns of STWT. These factors bear significant policy implications, particularly as regions with more favourable economic configurations may have a greater capacity to benefit from national education and labour market policies. On the other hand, this could point to the risk of territorial effects magnifying the combined consequences of disadvantages for low-skilled youth in deprived regions (Cefalo & Scandurra, 2023; Fusaro & Scandurra, 2023). The existence of pockets of exclusion within lagging regions poses specific challenges for social policy and European cohesion. It is imperative to prevent the spread of spatial inequalities, as this represents a significant challenge for the European social model. Efforts should be directed towards developing targeted policies and interventions that promote equal opportunities and mitigate the negative consequences faced by disadvantaged youth in these regions.

Conflict of Interests

The authors declare no conflict of interest.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

References

Bruno, G., Marelli, E., & Signorelli, M. (2014). The rise of NEET and youth unemployment in EU regions after the crisis. *Comparative Economic Studies*, *56*(4), 592–615.

Buchanan, J., Anderson, P., & Power, G. (2017). Skill ecosystems. In C. Warhurst, K. Mayhew, D. Finegold, & J. Buchanan (Eds.), *The Oxford handbook of skills and training* (pp. 444–464). Oxford University Press.

Capsada-Munsech, Q., & Valiente, O. (2020). Sub-national variation of skill formation regimes: A comparative analysis of skill mismatch across 18 European regions. *European Education*, *52*(2), 166–179.

Cefalo, R., & Scandurra, R. (2021). Territorial disparities in youth labour market chances in Europe. *Regional Studies, Regional Science*, *8*(1), 228–238.

Cefalo, R., & Scandurra, R. (2023). What, for whom, and under what circumstances: Do activation policies increase youth employment in the EU? *Journal of European Social Policies*, *33*(4), 391–406.

Cefalo, R., Scandurra, R., & Kazepov, Y. (2020). Youth labour market integration in European regions. *Sustainability*, *12*(9), Article 3813. https://doi.org/10.3390/su12093813

Ciccia, R., & Javornik, J. (2019). Methodological challenges for comparative welfare state research: Capturing intra-country variation in cross-national analyses. *Journal of Comparative Policy Analysis*, *21*(1), 1–8.

Daigneault, P. M., Birch, L., Béland, D., & Bélanger, S. D. (2021). Taking subnational and regional welfare states seriously: Insights from the Quebec case. *Journal of European Social Policy*, *31*(2), 239–249.

Dalziel, P. (2015). Regional skill ecosystems to assist young people making education employment linkages in transition from school to work. *Local Economy*, *30*(1), 53–66.

de Lange, M., Gesthuizen, M., & Wolbers, M. H. J. (2014). Youth labour market integration across Europe. *European Societies*, *16*(2), 194–212.

Diemer, A., Iammarino, S., Rodríguez-Pose, A., & Storper, M. (2022). The regional development trap in Europe. *Economic Geography*, *98*(5), 487–509.

Dijkstra, L. (2022). *Cohesion in Europe towards 2050: Eighth report on economic, social and territorial cohesion*. Publications Office of the European Union.

Dijkstra, L., Poelman, H., & Rodríguez-Pose, A. (2020). The geography of EU discontent. *Regional Studies*, *54*(6), 737–753.

Eurostat. (2023). *Database*. https://ec.europa.eu/eurostat/data/database.

Eurostat. (2023). *Human resources in science and technology*. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Human_resources_in_science_and_technology#Regional_characteristics_of_people_in_science_and_technology_occupations

Finegold, D., & Soskice, D. (1988). *The failure of training in Britain: Analysis and prescription*. Oxford University Press.

Fusaro, S., & Scandurra, R. (2023). The impact of the European social fund on youth education and employment. *Socio-Economic Planning Sciences*, *88*, Article 101650. https://doi.org/10.1016/j.seps.2023.101650

Garritzmann, J. L., Röth, L., & Kleider, H. (2021). Policy-making in multi-level systems: Ideology, authority, and education. *Comparative Political Studies*, *54*(12), 2155–2190.

Gesthuizen, M., Solga, H., & Künster, R. (2011). Context matters: Economic marginalisation of low-educated workers in cross-national perspective. *European Sociological Review*, *27*(2), 264–280.

Greer, S., Elliott, H., & Oliver, R. (2015). Differences that matter: Overcoming methodological nationalism in comparative social policy research. *Journal of Comparative Policy Analysis: Research and Practice*, *17*(4), 408–429.

Hadjivassiliou, K. P., Tassinari, A., Eichhorst, W., & Wozny, F. (2019). How does the performance of school-to-work transition regimes vary in the European Union. In A. Tassinari, K. P. Hadjivassiliou, W. Eichhorst, & F. Wozny (Eds.), *Youth labor in transition* (pp. 71–88). Springer.

Hodgson, A., & Spours, K. (2013). Tackling the crisis facing young people: Building "high opportunity progression ecosystems." *Oxford Review of Education*, *39*(2), 211–228.

Iammarino, S., Rodriguez-Pose, A., & Storper, M. (2018). Regional inequality in Europe: Evidence, theory and policy implications. *Journal of Economic Geography*, *53*, 898–924.

Kazepov, Y. (Ed.). (2010). *Rescaling social policies: Towards multi-level governance in Europe*. Ashgate.

Kazepov, Y., & Cefalo, R. (2022). The territorial dimension of social investment in Europe. In Y. Kazepov, R. Cucca, E. Barberis, & E. Mocca (Eds.), *Handbook of urban social policy* (pp. 55–71). Edward Elgar.

Keating, M. (2021). Beyond the nation-state: Territory, solidarity and welfare in a multiscalar Europe. *Territory, Politics, Governance*, *9*(3), 331–345.

Müller, W. (2005). Education and youth integration into European labour markets. *International Journal of Comparative Sociology*, 46(5/6), 461–485.

Müller, W., & Gangl, M. (Eds.). (2003). *Transitions from education to work in Europe: The integration of youth into EU labour markets*. Oxford University Press.

O'Reilly, J., Eichhorst, W., Gábos, A., Hadjivassiliou, K., Lain, D., Leschke, J., McGuinness, S., Kureková, L. M., Nazio, T., Ortlieb, R., Russell, H., & Villa, P. (2015). Five characteristics of youth unemployment in Europe: Flexibility, education, migration, family legacies, and EU policy. *SAGE Open*, *5*(1), 1–19. https://doi.org/10.1177/2158244015574962

Pagliacci, F., Pavone, P., Russo, M., & Giorgi, A. (2020). Regional structural heterogeneity: Evidence and policy implications for RIS3 in macroregional strategies. *Regional Studies*, *54*(6), 765–775.

Parreira do Amaral, M., Kovacheva, S., & Rambla, X. (2019). *Lifelong learning policies for young adults in Europe: Navigating between knowledge and economy*. Policy Press.

Prenzel, P., & Iammarino, S. (2021). Labor force aging and the composition of regional human capital. *Economic Geography*, *97*(2), 140–163.

Raffe, D. (2008). The concept of transition system. *Journal of Education and Work*, *21*(4), 277–296.

Raffe, D. (2014). Explaining national differences in education-work transitions: Twenty years of research on transition systems. *European Societies*, *16*(2), 175–193.

Roberts, K. (2009). Opportunity structures then and now. *Journal of Education and Work*, *22*(5), 355–368.

Rodríguez-Pose, A. (2018). The revenge of the places that don't matter (and what to do about it). *Cambridge Journal of Regions, Economy and Society*, *11*(1), 189–209.

Rodríguez-Pose, A. (2020). Institutions and the fortunes of territories. *Regional Science Policy & Practice*, *12*(3), 371–386.

Rosés, J. R., & Wolf, N. (2018). *The economic development of Europe's regions: A quantitative history since 1900*. Routledge.

Salas-Velasco, M. (2023). Vocational education and training systems in Europe: A cluster analysis. *European Educational Research Journal*. Advance online publication. https://doi.org/10.1177/14749041221151189

Scandurra, R., & Alberio, M. (2021). A classification of factors affecting adults' skills distribution. *SAGE Open*, *11*(2), Article 21582440211019738. https://doi.org/10.1177/21582440211019738

Scandurra, R., Cefalo, R., & Kazepov, Y. (2021a). School-to-work outcomes during the Great Recession, is the regional scale relevant? *Journal of Youth Studies*, *24*(4), 441–465.

Scandurra, R., Cefalo, R., & Kazepov, Y. (2021b). Drivers of youth labour market integration across European regions. *Social Indicators Research*, *154*, 835–856.

Scandurra, R., Hermannsson, K., & Cefalo, R. (2020). Assessing young adults living conditions across Europe using harmonised quantitative indicators: Opportunities and risks for policy makers. In M. Pareira do Amaral, X. Rambla, & S. Kovacheva (Eds.), *Lifelong learning policies for young adults in Europe: Navigating between knowledge and economy* (pp. 171–198). Policy Press. https://bit.ly/30j4bMc

Sforzi, F., & Amin, A. (Eds.). (2018). *The institutions of local development*. Routledge.

Simões, F. (2022). *School to work transition in the Resilience and Recovery Facility framework*. European Parliamentary Research Service.

Steinley, D. (2006). K-means clustering: A half-century synthesis. *British Journal of Mathematical and Statistical Psychology*, *59*(1), 1–34.

Tomić, I. (2018). What drives youth unemployment in Europe? Economic vs non-economic determinants. *International Labour Review*, *157*(3), 379–408.

Walther, A. (2017). Support across life course regimes: A comparative model of social work as construction of social problems, needs, and rights. *Journal of Social Work*, *17*(3), 277–301.

Wolbers, M. H. (2007). Pattern of labour market entry: A comparative perspective on school-to-work transitions in 11 European countries. *Acta Sociologica*, *50*(3), 189–210.

About the Authors

Ruggero Cefalo is assistant professor (non-tenured) at the Department of Sociology, University of Vienna. His main research interests include the analysis of skills formation and school-to-work transition systems, social policies from a comparative perspective, multi-level governance, territorial cohesion, and spatial disparities. He has been involved in several International Horizon Projects on youth, learning outcomes, lifelong learning, and territorial cohesion.

Rosario Scandurra (PhD) is Juan de la Cierva postdoctoral fellow, a recently awarded Ramón y Cajal fellow, and a member of the Globalisation, Education, and Social Policies (GEPS) research centre at the Faculty of Sociology, Autonomous University of Barcelona (UAB). His research has examined educational and skills inequalities and how these inequalities are accumulated during the life course. He has served on more than 20 medium and large-scale research projects at national and international levels.

Yuri Kazepov is professor of sociology at the Faculty of Social Sciences (University of Vienna). His research interests address the territorial dimension of social policies from a comparative perspective, including social innovation, governance, participatory practices, school-to-work transitions, etc.; on these themes, he carried out extensive research at the European level.