Cowork4YOUTH | Collaborative and Sharing Workspaces Policies for Youth in EEA Peripheral Regions

# Determinants of Regional Youth Employment in Greece, Ireland, Italy, and Spain

## Transnational Report on employment potential for young people through alternative sectors

**Project Partner:**

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Dublin, Ireland

23rd October 2023

Cowork4YOUTH is funded by Iceland, Liechtenstein and Norway through the EEA and Norway Grants Fund for Youth Employment

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# 1. Introduction

*'Collaborative and sharing workspaces: policies for youth in EEA peripheral regions'* (Cowork4YOUTH) is a joint research project including seven European partner institutions funded by Iceland, Liechtenstein and Norway through the EEA and Norway Grants Fund for Youth Employment. The projects main objectives is to enhance knowledge on the impact of existing policies on youth employment, in order to increase employment opportunities for young people in less developed European Economic Area (EEA) regions and offering policy suggestions that will boost employment opportunities in these regions.

This study focuses on four selected European countries, Italy, Spain, Greece, and Ireland. It aims to examine the incidence of youth employment, its evolution over time and the drivers that have determined variations in youth employment in a causal framework in a cross-regions comparison over time. The aim of this research is to enable policy makers to identify, and target, factors that are responsive to change in order to help facilitate the further development of youth employment activities at a regional level in the EU. The study identifies trends and sectors that may have had positive or negative employment potential for young people over time.

We examine patterns in youth employment using a specifically designed panel data set constructed from the quarterly Labour Force Surveys of 28 EU countries over a 15-year period (2008-2021). Youth employment decreased across all the regions between 2008 and 2014, from around 80 per cent to 60 per cent, as a long-term consequence of the great recession in 2008. Since 2014, it has increased over time, before falling off again in 2020 because of the COVID-19 pandemic recession. During 2021, it started to rise again, reaching around 75 per cent. The evidence points towards convergence in youth employment at a rate of 10% per annum between 2008 and 2014, and conversely, convergence at a rate of 5% per annum post-2014. In terms of the determinants of youth employment, we find evidence to support policies aimed at improving the proportion of individuals with tertiary education, the regional participation rates, and GDP per capita as a means of increasing youth employment within regions. Examining further the post-2014 period to understand the magnitude of the effects the variables of interest had on youth employment during this most recent period, we find that negative impacts associated with 'brown' jobs and 'co-work' sectors have had



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the strongest impact in the regions classified as being most affected by decarbonisation. The findings suggest that while youth employment may respond to policy variables, the impact of particular policies will tend to vary depending on specific regional labour market contexts.

# 2. Literature

This section presents relevant literature on youth employment in Europe; it will provide an overview on labour market trends that could potentially have an impact in enhancing young people's employment opportunities. In particular, we examine the relatively underdeveloped relationship between green employment and the transition to a carbon-neutral economy, and the increase in remote working practices and the use of co-working spaces. In our model examining youth employment determinants, we use regional level data, therefore we also review some studies that used a similar approach. Lastly, we identify the regions among our sample of selected countries that are to be considered as: (i) particularly affected by the green transition; and (ii) where co-working practices are most common.

## 2.1 Youth Employment

Enhancing youth employment is among the priorities of the European Employment Strategy, in line with the achievement of one of the goals of the European Pillar of Social Rights: having at least 78 per cent of the population aged 20 to 64 in employment by 2030.[1] The integration of young people into the labour market is crucial for the future of each country and generally young people tend to be more exposed to the risk of unemployment than older people for many reasons. Youth employment is more responsive to business cycle compared to those of 'prime age': during expansive phases, youth and adults' employment rates are both high, while during recession periods the unemployment rates rise fastest for young people than for adults (Eurofound, 2012). For example, during the 2008 Great Recession, youths tended to be employed in cyclically sensitive industries (for instance, construction and accommodation), and held part-time jobs or had temporary contracts. Employment protection rules, regulating the use of temporary employment, are known to affect the labour market hiring and mobility dynamics, of young entrants in particular.

[1] For more information, see: https://ec.europa.eu/social/main.jsp?catId=1226&langId=en.



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Therefore, countries without strict employment protection are those where young people experience unstable labour market conditions and higher risk of unemployment (OECD, 2010).

When entering the labour market, young people deal with unique challenges: the transition from formal education to employment can result in a period of instability; a lack of work experience and/or lower productivity may result in a barrier from being hired by employers, that may prefer to hire more experienced workers than younger persons, to avoid training costs and have a higher qualified workforce. Within the literature, there is evidence of the positive relationship between high educational attainment and employment outcomes: the higher the level of education, the higher the probability of entering and remaining employed. Therefore, a higher level of education can protect against unemployment. Young people with lower levels of educational attainment are particularly vulnerable in the labour market. Moreover, among young people there can be particularly vulnerable groups of workers that may have difficulties in accessing the labour market or remaining continuously in employment or accessing education. 'Not in Employment, Education or Training' is the term often used to refer to these young people and is defined as the share of young people who, regardless their educational level, are not in employment, education or training. The NEETs' concept first appeared in the EU policy agenda in 2010 and since then has been a constant concern and policy target at EU and national level.

Over the years, EU countries have been actively involved in planning and implementing policy measures with the aim of increasing youth's employability and labour market participation. Kelly et al. (2022) reported evidence on the impact of youth employment policies across Ireland, Greece, Spain, and Italy (the same countries under study in this report) for the period 2008 to 2020. They showed that after the Great Recession youth employment rates fell in all the countries and by 2019 no country had returned to pre-recession levels. In 2019, youth unemployment rates resulted between 20 and 30 per cent across Greece, Spain and Italy, with a lower rate (9.1 per cent) in Ireland. NEETs rates among youths deteriorated after the recession and they recovered by 2019 in Ireland, Greece and Spain, but not in Italy where they have failed to decrease significantly from 2014 levels. In both Spain and Ireland males dominated NEET rates after the peak of the crisis, but in more recent years females have constituted the larger percentage of NEETs. The authors also found that the European-led Youth Guarantee (YE) and Reinforced Youth Guarantee (RYG) policies may have been



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overshadowed by significant national policies of labour market liberalisation pursued in the early years of the Great Recession, particularly in Greece and Ireland.

As already stated, reducing the number of NEETs is a major policy priority in the European Union and supported by a considerable amount of EU funding. In 2022, 11.7 per cent of young people in Europe were NEETs and the target of the European Pillar of Social Rights Action Plan aims at reducing the NEET rate to 9 percent by 2030. Redmond et al. (2023, forthcoming) showed how young NEETs face high poverty risk, social exclusion, labour market scarring and adverse health consequences. In addition, the group presents a high level of heterogeneity that makes it difficult for policymakers to directly tailor policies towards them: the category needs to be disaggregated and specific policies are required for specific groups. The authors also identified emerging labour market trends that could potentially have an impact on reducing NEET rates and enhancing young employment opportunities, whose study is relatively underdeveloped: the green economy, the increase in remote working practices and the use of co-working spaces, and the platform economy. In the next sections, we investigate these emerging labour market trends in more detail.

## 2.2 Green Economy

The green economy is defined as being ‘low carbon, resource efficient and socially inclusive’ (UNEP, 2011; Redmond et al., forthcoming 2023). Over the last few years, European and international organisations and European citizens have been expressing increasing concern about climate change, global warming, and environmental degradation. International and European institutions and single countries have been addressing their policies to combat climate change effects and to help carry out a transition to a low-carbon economy. In 2019, the European Commission launched the ‘European Green Deal’. The objective of the new deal is to make the European Union the first climate neutral continent in the World by 2050, through a decarbonisation process and a transition to clean and renewable energies. In July 2021, the European Commission presented the ‘Fit for 55’ strategy, setting an intermediate target in order to meet the climate-neutrality goal by 2050: the EU committed to reducing greenhouse gas emissions by 55 per cent by 2030 and it introduced a package of legislative proposals and policy initiatives ‘to make the EU's climate, energy, land use,



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transport and taxation policies fit for reducing net greenhouse gas emissions by at least 55 per cent by 2030 '.

According to the ILO's (2016) definition, 'green jobs are decent jobs that contribute to preserve or restore the environment, be they in traditional sectors such as manufacturing and construction, or in new, emerging green sectors such as renewable energy and energy efficiency'. They can be divided into two categories: (i) jobs that design and produce goods or provide services that benefit the environment, such as green buildings, clean transportation, and renewable energy (by developing, producing or maintaining green technologies) in an output perspective; (ii) jobs that contribute to more environmentally friendly processes in the production of any product or service, e.g., increasing water/energy efficiency, improving recycling systems in a process perspective. The decarbonisation process and the transition to clean and renewable energies will involve job destruction in the most carbon-intensive industries (OECD, 2017; European Commission, 2022), with 'brown' jobs located in sectors with a high pollution or emissions intensity in process or product (IMF, 2022). The exact definition of green jobs and the related green skills and the approach to empirically operationalise the concepts remain controversial (Eurofound, 2023). In this study, we attempt to define a conceptual operationalisation of 'green' sectors i.e., where 'green' and 'greening' jobs are most dominant and 'brown' sectors. Our classifications are heavily informed by the relevant literature, informed by CoWork4Youth partners' expertise, and based on the NACE rev.2 classification for sectors.

Decarbonisation of the economy is very likely to cause job losses, to a large extent, in the mining and quarrying sector (NACE B) as it reflects the shrinkage of coal, lignite, petroleum and natural gas extraction activities (Montt et. al., 2018). Therefore, we consider 'Brown' jobs to be located in this sector. Coal mining is a first example of an economic activity that is planned to being phased out entirely. The labour demand contraction in this sector will particularly affect countries and regions that have always been very dependent on these sources. Employment in coal mining has always been a small share of total employment in the European Member States and has declined over the years: from 0.17 per cent to 0.11 per cent of total employment between 2008 and 2021 (Vandeplas et al., 2022). Nonetheless, the employment shares in these activities at a regional level can still be important, due to the local concentration of extraction activities; therefore, some regions are



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expected to be more affected by the green transition than others (JRC, 2021; CEDEFOP, 2021). In 2019, the European Commission launched the Just Transition Mechanism that "is a key tool to ensure that the transition towards a climate-neutral economy happens in a fair way, leaving no one behind". It represents a financial support addressed to regions particularly affected by the transition, in order to alleviate the socio-economic consequences of the decarbonisation process, and to reduce the social and territorial disparities, not to worsen them.

The green transition is expected to create jobs in the electricity sector, due to the electrification of the economy and the shift to clean and renewable energies, such as hydro, biomass, solar thermal, solar photovoltaic, tide and wave, and geothermal (ILO, 2018). Water supply and waste management are expected to benefit from circular economy policies and create new jobs (CEDEFOP, 2021). Employment is to be created in sustainable transport, namely in the sector's production and service supply, such as the promotion of quality public transport, sustainable mobility plans and improvement in vehicle efficiency (ILO, 2012). In accordance with this, we classify as 'green' sectors, or as sectors with high 'greening' potential i.e. sectors where 'green' jobs are or have the potential to be a relevant share of total employment in the sector: Electricity, gas, steam and air conditioning supply (NACE D); Water supply; sewerage, waste management and remediation activities (NACE E); Transportation and storage (NACE H). 'Green' jobs are to be found also in sustainable and organic agriculture, even if the share is small relatively to total employment in agriculture. For the purpose of this study, we use a specific classification of sectors in relation to green and brown employment. Nonetheless, we are aware of possible limitations of this approach, and that the use of a rigid classification could exclude important aspects, as 'green' and 'brown' jobs could cut across different sectors, also some that are not taken into account in this study.

### 2.2.1 Green Economy and Youth Employment

In recent times, young people are more concerned than other age groups about climate change and environmental degradation and are using their voices in order to raise the policymakers' awareness and contribute to the design and implementation of climate policies (UNDP, 2022). 'Green jobs' tend to be associated with technological advanced environments, where young workers tend to perform



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better compared to older adults (ILO 2017). Moreover, young people are also more likely than other age groups to receive an education with a 'green' component and to have access to 'green' skills accumulation more easily; this implies that youth are likely to benefit from the creation of 'green' jobs and that the transition to a carbon-neutral economy has the potential to generate employment opportunities for this group (Janta et al., 2023). ILO (2019) shows how national employment policies can serve as entry points to designing effective strategies for green jobs for youth. It may also be the case that green jobs require some technical and technological skills that need longer time to be accumulated, therefore they are not easy to be accessed by young people at beginning of their career and are held by a more mature, educated, and experienced adult workforce. In the present study, we try to expand the research on the association between green economy and youth employment rates.

## 2.3 Remote Working Practices and the Use of Co-Working Spaces

Another labour market trend underdeveloped in the literature that could potentially create and boost youth employment opportunities is the increase in remote working practices and the use of co-working spaces. Remote working has notably increased during the COVID-19 pandemic, as a result of mandatory temporarily workplaces closures given public health measures. According to EU-LFS data, in 2021 around 22 per cent of employees were usually or sometime working from home, while almost 40 per cent of self-employed were doing so (Eurofound, 2022). Coworking spaces are flexible physical locations where individuals, or companies, can work alongside other professionals (Redmond et al. 2023, forthcoming).

The Cowork4YOUTH project focuses on co-working spaces, hubs, and other collaborative workplaces, where people, and young people in particular, can gather and work in a common space, while sharing experience and knowledge. Coworking spaces can provide young people training for digital and entrepreneurial skills (Avdikos et al., 2021), or just a place where they can socially interact and build relationships. For the purpose of this study, we identified the sectors where co-working practices are most commonly used. Economic sectors where there is prevalence of co-working practices are those with a large share of jobs that can be performed remotely, where usually much



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work is office-based and reliant on intensive networked computer use (Fana et al., 2020). Moreover, they can be sectors where the collaborative element can be effective in fostering creativity and business innovation (Avdikos et al., 2022; Papageorgiou et al., 2022)). Information technology jobs are very suitable for telework and can be easily carried out in co-working spaces; financial activities companies can benefit from finding space opportunities where they can meet their clients; also, professionals (for instance, in public relations, marketing or sales) as well as freelancers or start-up entrepreneurs can use co-working practices (Regional co-working analysis, 2020). Therefore, the sectors identified and classified as 'co-working' sectors are the followings: Information and communication (NACE J); Professional, scientific and technical activities (NACE M); Financial and insurance activities (NACE K); Administrative and support service activities (NACE N). In the present study, we try to expand the research on the association between co-working practices and youth employment rates.

## 2.4 Regional Focus

As already mentioned, this study focuses on four selected European countries, Italy, Spain, Greece and Ireland, and aims at examining the incidence of youth employment and its evolution over the years; we use a fixed effect model as a causal framework to identify the drivers that have determined variations in youth employment rates over time. The approach we use is cross-regional: we consider regional employment shares as well as several independent variables extracted at regional level.

A similar approach in a panel-setting framework using regional level data was used by Di Cataldo et al. (2017) to analyse the determinants of employment creation and long-term unemployment across European regions over the 1999-2010 period, with a particular focus on factors such as transport infrastructure, innovation, human capital, and government quality. De Noni et al. (2018) used a similar approach to investigate which factors drive the innovation performances of less innovative European regions (operationalised as the regional cumulative number of patents per million inhabitants) when it comes to reduce the gap with highly innovative regions. By using regional data with a similar panel regression model, Majchrowska et al. (2012) explore the determinants of



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employment at NUTS2 level in Poland over the period 1999-2010, and, among other factors, analyse the impact on employment of minimum wage- defined as the minimum to average wage ratio in a region.

One of the critical elements of the present study has been the identification of regions particularly related to the relevant labour market trends identified: the green economy and the decarbonisation process (where it is possible to geographically identify green and brown jobs) and co-working practices. Several regions have been identified by the EU Commission among those territories that will be particularly affected by the decarbonisation process and are part of the Just Transition Mechanism: specific sectors in these regions are considered to be particularly exposed to the consequences of the green transition and are to receive financial support through the Just Transition Fund (JTF), in order to achieve the decarbonisation of the area.

In Spain, the regions under the umbrella of The Just Transition Mechanism are the six Autonomous Communities: Galicia (ES11), Asturias (ES12), Aragón (ES24), Castilla y León (ES41), the Balearic Islands (ES53) and Andalusia (ES61). In some of these areas the coal mining industry and petrol based heavy industry have been prevalent for years until the end of the 20$^{th}$ century, but over the last few years the regions implemented strategies for the energy transition, consisting of a number of measures such as reduction of oil dependency and investment in renewable energies, and also policies to reallocate ex-miners into other sectors through re-training. The EU Commission estimates that through the European Union's Just Transition Fund (EU JTF) 6,000 jobs will be created in these territories, and over 1,900 companies, mostly SMEs, will receive support.

In Greece, the regions most affected by the economic and social impacts of the energy transition, mainly regarding the expected loss of jobs in fossil fuel production and use, and covered by the Just Transition Mechanism are North Aegean (EL41), South Aegean (EL42), Crete (EL43), Western Macedonia (EL53) and the Peloponnese (EL65) (Just Transition Program, 2021; SDAM, 2021). In Italy, the areas most exposed to the consequences of the transition to a carbon-neutral economy (those still dependent on fossil fuels including coal, peat and bituminous shale) are the areas of the Province of Taranto (Puglia-ITF4) and Sulcis Iglesiente (Sardegna-ITG2). They will receive financial



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aid from the Just Transition Fund. Moreover, the Fund will support the retraining of thousands of workers for green jobs related to the clean energy transition and circular economy, apart from supporting the construction of infrastructure for renewable energies (EU Commission, 2022). Italy has made the commitment to close by 2025 all coal-fired thermal power plants, which account for less than 10 percent of national electricity production. Nowadays seven regions are already 'coal-free', as they have zeroed out coal consumption recently: Valle d'Aosta (ITC2), Abruzzo (ITF1), Molise (ITF2), Campania (ITF3), Basilicata (ITF5), Trentino-Alto Adige (ITH1 and ITH2), Emilia Romagna (ITH5) and Marche (ITI3) (Italy for Climate, 2021). In Ireland, the Midlands region has been identified as the area most negatively affected by the closure of peat-reliant power stations; therefore, it will be the target of the EU JTF.

For the purpose of this study, we also identify the regions where co-working spaces are most prevalent. This work has been informed by the relevant literature and by CoWork4Youth partners' expertise based in their home countries. Moreover, (REFERENCE NEEDED FOR GREEK PUBLICATION-Kostas?) identified for each region in each country the number of co-working spaces (CWS). As a robustness test of what was initially identified by the partners, we calculated the CWS average at country level and compared the number of CWS by region to the national CWS average. Whenever the regional share is at least 20 per cent above the country average, the region is considered a to have high-prevalence of co-working spaces.[2]

In summary, for Italy, coworking spaces are mostly located in regions with large cities: Piemonte (ITC1), Lombardia (ITC4), Veneto (ITH3), Emilia-Romagna (ITH5) Toscana (ITI1), and Lazio (ITI4). Our calculations are in line with Italian Coworking Survey 2021 main findings. In Greece, co-working spaces are mostly prevalent in Attica (EL30) and Central Macedonia (EL52). In Spain, the regions with most prevalence of co-working spaces are Galicia (ES11), Comunidad de Madrid (ES30), Cataluña (ES51), Comunidat Valenciana (ES52) and Andalucía (ES61). In Ireland, almost all the counties have a large number of co-working spaces: in 2020, the three Regional Assemblies of Ireland identified a total of 67 co-working hubs (both privately and publicly owned) in the Northern

[2] Tables available by request from the authors.



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and Western region; 158 co-working hubs in the Eastern and Midland region; 105 co-working hubs in the Southern region (Regional co-working analysis, 2020).

# 3 Data and Methodology

To date, most research on youth employment has used country specific cross-sectional or panel datasets and has focused on identifying the individual or firm-level characteristics associated with youth employment and/or the impact of youth employment on outcomes such as wages and job satisfaction. These micro-level studies cannot provide an indication of extent to which youth employment is driven by labour demand, labour supply or other macroeconomic factors.

The aim of this paper is to present long-run trends in youth employment across four selected European countries (Italy, Spain, Greece and Ireland), at a regional level (NUTS2), to measure the degree of convergence or divergence in the evolution of youth employment between NUTS2 regions over time and to investigate the underlying drivers of youth employment. Since no reliable time-series data on youth employment exist to allow a systematic cross-region comparison across time, the data development aspect is a key contribution of the current study. The data used in this study is the quarterly anonymised country level files of the European Union Labour Force Study (EU-LFS) for the period Q1 2008 up to Q4 2021. The EU-LFS is a large household sample survey providing quarterly results on labour participation of people aged (at least) 15 and also on people outside the labour force. It is conducted in all EU-27 Member States, four candidate countries, and three European Free Trade Association (EFTA). The Labour Force Surveys are conducted by the national statistical institutes across Europe and then centrally processed by Eurostat.

## 3.1 Regional-NUTS Classification

We use the country level micro data to create a regional macro level data panel: for each variable extracted for each region, almost 60 quarterly observations are generated. We employ the NUTS 2021 classification at NUTS 2 level, and for Italy, Spain and Greece 53 regions are the data identifiers.



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However, data for Ireland must be collapsed into one region due to numerous changes to regional classification: previously the NUTS 2 regions were two separate regions and they were changed into three separate regions in 2018. However, problematically, some areas have been moved to one region to another one, making the comparison over time impossible. For each region, in each quarter, for each extracted variable, the observations reflect the average share of that variable.

## 3.2 Variables Construction

Our dependent variable is youth employment, and it is defined for each region in each quarter as the percentage of young people aged 15 to 29 in the labour force reporting to be in employment. We extract several independent variables that are considered to reflect demand and supply-side factors that may potentially drive youth employment. On the labour supply side, we consider the overall labour market participation rate, the share of migrants in the labour force as well as part-time workers and the share of women in the labour force. On the demand side, we take into account business cycle effects by the inclusion of per capita GDP at the regional level, sourced from Eurostat as a data source external to the EU-LFS. As a main focus of this study, we extract the share of employment in several sectors related to the process of transition to a carbon-neutral economy, meaning sectors where 'green' jobs are predominately located, and sectors where most 'brown' jobs are predominately found; we also extract the share of employment in sectors where co-working practices are most common. We employ the NACE Rev.2 classification, which is the 'statistical classification of economic activities in the European Community', provided by Eurostat.[3] The relevant sectors have been identified through different steps: (i) informed by the literature presented in the previous section, (ii) informed by the Cowork4YOUTH consortium partners, (iii) presented as part of the validation process to an audience of experts at the conference 'Employment Opportunities for Young People', held at the ESRI in May 2023. Table 1 shows the sectors classification.

[3] For additional information: Glossary:Statistical classification of economic activities in the European Community (NACE) - Statistics Explained (europa.eu)



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**Table 1: Classification of Sectors**

| 'Green' sectors | 'Brown' sectors | 'Co-Work' sectors |
|---|---|---|
| **NACE D:** Electricity, gas, steam and air conditioning supply | **NACE B:** Mining and quarrying | **NACE J:** Information and communication |
| **NACE E:** Water supply; sewerage, waste management and remediation activities | | **NACE K:** Financial and insurance activities |
| **NACE H:** Transportation and storage | | **NACE M:** Professional, scientific and technical activities |
| | | **NACE N:** Administrative and support service activities |

*Source: author's elaboration.*

As factors both relative to labour demand and supply, we consider the share of tertiary educated people, that is people holding a bachelor's or master's degree or PhD. We also add a variable to reflect the degree of symmetry between labour demand and supply, that is the ratio of workers employed in high-skilled professional occupations to workers in middle and low-skilled occupations. This can also be considered a measure of job polarisation in the employment structure, which is generally associated with a hollowing out of mid-skilled, mid-paid jobs, while high and low-skilled jobs remain stable or grow over time.

Finally, we classify the NUTS2 regions in three categories in order to expand further on the spatial element of the analysis: regions that are the most exposed to the decarbonisation process and the transition to a carbon-neutral economy labelled as 'Decarbonisation Regions'; regions where there is a relevant concentration of co-working spaces labelled as 'Co-Work Regions' ; other regions related neither to the decarbonisation process nor to prevalence of co-working spaces labelled as 'Other Regions'. The classification process has been the same as the one adopted per sectors. The maps in Figure 1 shows decarbonisation regions for Italy, Spain and Greece. The detailed list of region names is shown in Appendix Table A.



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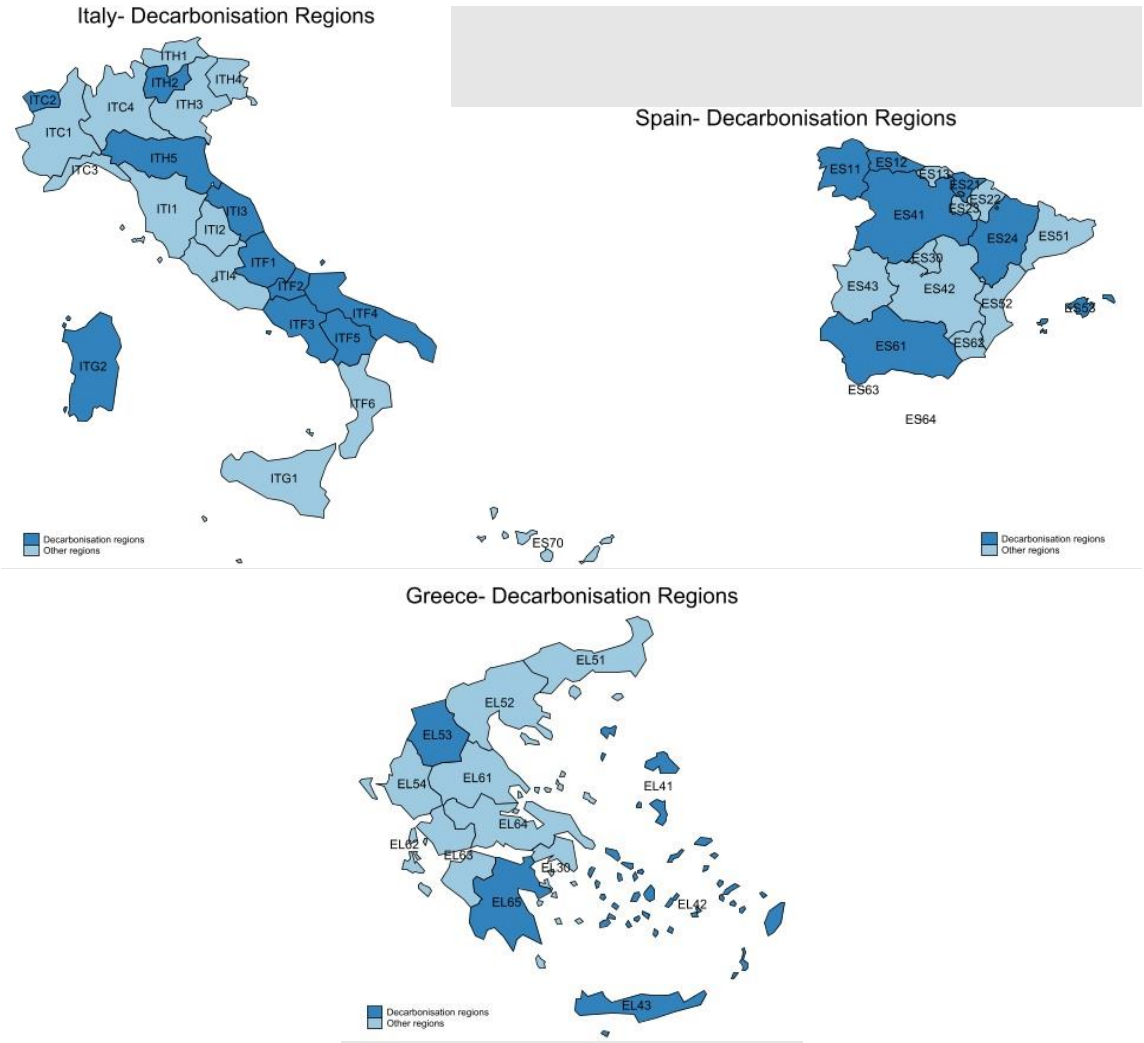
## Figure 1: Regions Most Affected by Decarbonisation




*Note: Dark blue regions are affected by the process of transition to a carbon-neutral economy.*

*Source: author's elaboration of Eurostat/GISCO data.*

Figure 2 shows regions for Italy, Spain and Greece with a relevant concentration of co-working spaces. The detailed list of regions is shown in Appendix Table B.



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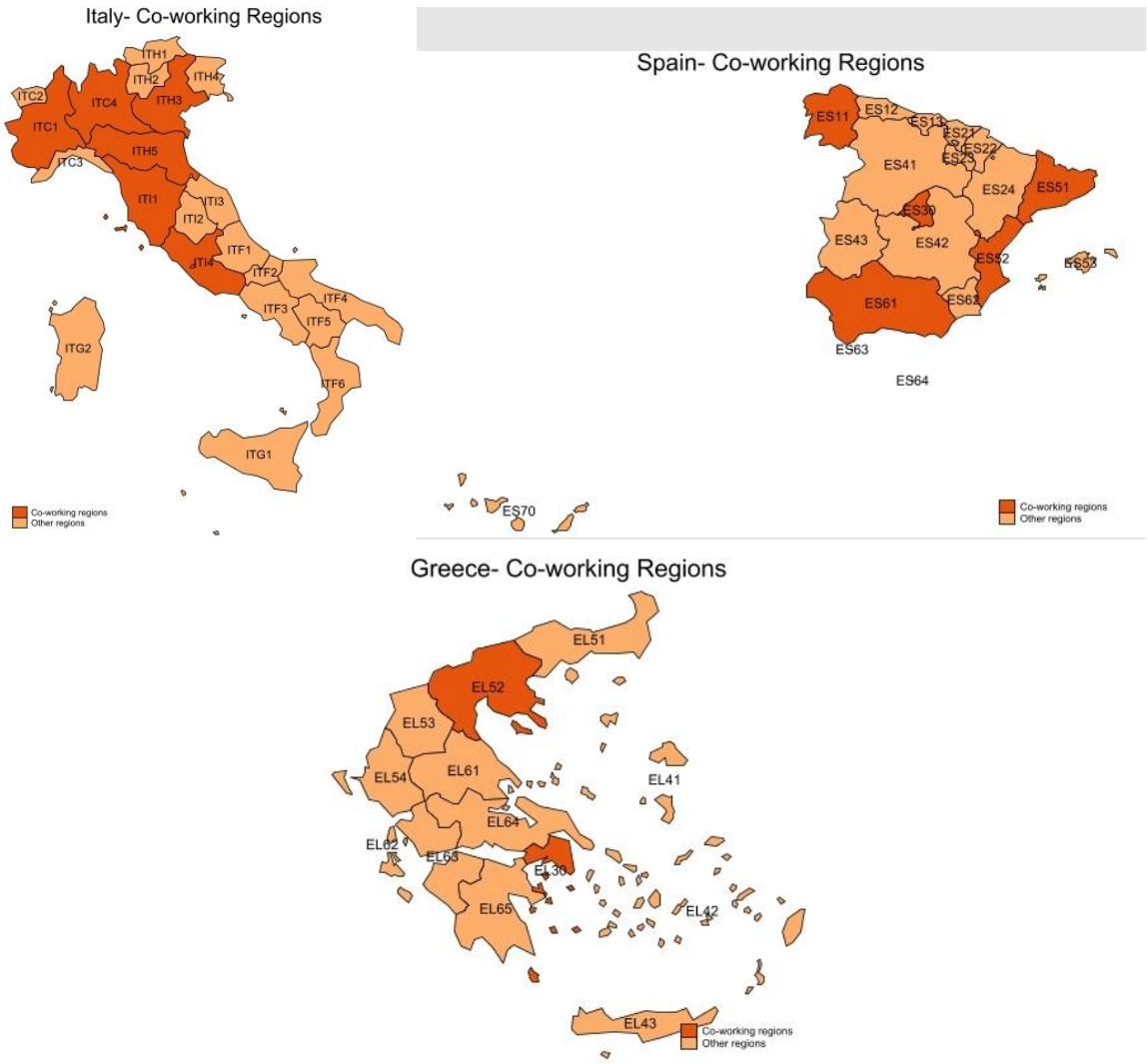
**Figure 2: Regions with a High Density of Co-Working Spaces**




*Note: Dark orange regions are co-working regions.*

*Source: author's elaboration of Eurostat/GISCO data.*

Recall that due to changes in NUTS 2 classification, Ireland must be collapsed into one region and is considered a decarbonisation region and a co-work region (see Figure 3).



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**Figure 3: Ireland Classified as One Unique Region affected by Decarbonisation and High-Density Co-Working**


*Source: author's elaboration of Eurostat/GISCO data.*

Lastly, in order to check the robustness of our findings in relation to the determinants models, we further analyse regional classification splits: (i) all regions, (ii) regions where co-working spaces are dominant, (iii) regions most affected by decarbonisation, (iv) other regions. We expect to see an intensification of our results related to the relevant sector variables.

## 3.3 Methodology

The data used in this study is the quarterly anonymised country level files of the European Union Labour Force Survey (EU-LFS) for the period covering Q2 2008 through Q2 2021. In this section, we look at regional employment trends across 54 regions in the four EU countries under study (Ireland, Greece, Spain and Italy). The aim is to examine the extent to which youth employment rates have been either converging or diverging across the NUTS2 regions from 2008 to 2021. We estimate this by using a Barro regression,

$$\frac{ln\, y(t) - ln\, y(0)}{t} = \beta_0 + \beta_1\, ln\, y\,(0) + \varepsilon \qquad (1)$$



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which examines the relationship between the growth rate of youth employment, $\frac{ln\,y(t)-ln\,y(0)}{t}$, and its initial level, $ln\,y\,(0)$. If the estimated coefficient of the regressor is negative, it implies convergence across regions: in this case, regions whose initial levels of youth employment are lower, tend to have higher growth rates over time and catch-up faster with regions with higher initial level of employment. On the other hand, a positive coefficient implies divergence in youth employment rates across regions. We begin and end our analysis in Q2 2008 and Q2 2021, respectively, to ensure an accurate and comparable assessment of the employment rate dynamics. Using the same initial and final quarter allows us to analyse trends, and abstract from seasonal or structural changes in employment rates over time. Using a chow-test, we identify that the structural break in the data occurs in 2014 Q2 (Chow, 1960).[4] Specifically, 2014 Q2 represents the moment average youth employment rates begin trending upwards following a steady decline from 2008 Q2.[5] Thus, the period of analysis is split into two distinct periods, namely, pre-2014 (period where employment rates steadily fall) and post-2014 (period where employment rates steadily rose) and perform Barro regressions for both periods.

Subsequently, we estimate the determinants of youth employment rates. We begin by examining the general framework for panel estimation,

$$y_{it} = \beta_0 + \beta_j X_{ijt} + \alpha_i + \varepsilon_{it} \quad (1)$$

[4] We implement a Chow-test, to investigate the presence of a structural break in the youth employment rate over this period of analysis. The Chow-test allows us to assess whether the coefficients of two distinct groups are significantly different. Formally, the Chow-test calculates an F-statistic based on the differences in the sum of squared residuals between the combined model and the separate models for each group. This F-statistic is compared against a critical value from the F-distribution to assess whether the differences in coefficients are statistically significant. In our context, we aimed to ascertain whether there is a notable change in the relationship between time and the youth employment rate, potentially signifying a structural shift. For more information, see Chow (1960).

[5] In our analysis, we selected Q2 2014 (and surrounding quarters for robustness checks) as the potential breakpoint, guided by a visual inspection of the data showing a potential shift in the trend around that time (this is shown clearly in Figure 4). Upon applying the Chow-test, an F-statistic of 21.81 was obtained. To interpret this result, we computed the right-tailed cumulative probability for an F-distribution with 2 and 53 degrees of freedom (reflecting the degrees of freedom in the numerator and denominator of the F-statistic). This computation yielded an exceedingly low probability of approximately 1.229 ×10^(-7). In essence, this probability represents the likelihood of observing an F-statistic as extreme as 21.81 or greater under the assumption that no structural break exists (null hypothesis). The exceptionally low p-value from the probability calculation strongly rejects the null hypothesis, providing robust evidence that the observed structural break around the second quarter of 2014 in the youth employment rate data is not a random occurrence. This substantiates our conclusion of a significant change in the relationship between time and youth employment, allowing us to proceed with pre- and post-break Barro regression analyses as a follow-up analytical strategy.



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Where $y_{it}$ is the dependent variable observed for region $i$ at time $t$, $\beta_0$ is a constant term, $\beta_j$ is a vector of coefficients associated with the matrix of $j$ independent variables, $X_{ijt}$. $\alpha_i$ is the time invariant, region-specific, unobservable characteristic and $\varepsilon_{it}$ the error term. In terms of the specific panel modeling approach adopted, we opt for a fixed effect estimator that allows us to model the determinants of youth employment while controlling for time invariant regional level fixed effects.[6] We have sought to include in our models several controls that reflect the level and composition of both labour demand and supply as well as measures designed to reflect the degree of balance between demand and supply-side factors. Related to the existing literature, business cycle effects are also controlled for by the inclusion of measures of per capita GDP. Nevertheless, we cannot easily reflect all potential explanations for youth employment within our models. For instance, labour demand and supply might be perfectly synchronized yet youth employment might still fall due to frictions arising from asymmetric information and/or institutional factors that prevent labour market clearance or variations in individual preferences related to either job mobility or work–life balance. The EU-LFS provides us with a rich dataset, however, the data has limitations on variables to reflect such factors, especially at a NUTS2 regional level, for the sample of countries included in this study.

[6] The fixed effect estimator was chosen after conducting a Hausman (1978) specification test to detect violations of the random-effects modelling assumption that the explanatory variables are orthogonal to the unit effects. A significant test result was taken as evidence of correlation between the explanatory variables and the unit effects, therefore, implying that the random-effects model should be rejected in favour of the fixed-effects model. In conducting the test, as recommended for linear regression comparisons, we specified that the two covariance matrices used in the test be based on a common estimate of disturbance variance ($\sigma^2$).



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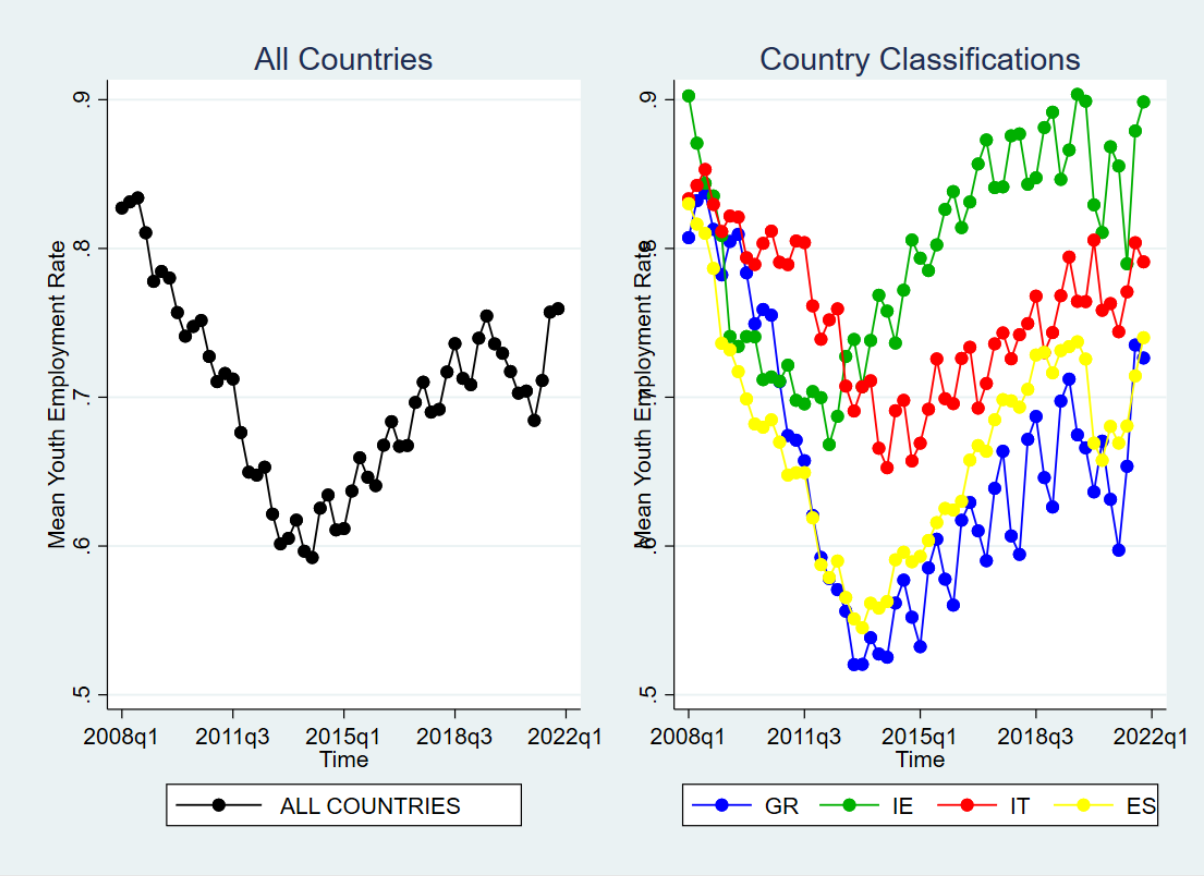
# 4. Results

## 4.1 Youth Employment Trends

Figure 4 shows the average youth employment rate over time by country. Youth employment is defined as the percentage of young people aged 15 to 29 in the labour force reporting to be in employment. Following the great recession, youth employment fell in all the countries, and the most severe declining rates have occurred in Greece and Spain, followed by Ireland and Italy. After 2014, youth employment recovered and increased at a faster rate in Ireland, followed by Italy, Spain and Greece. During the COVID-19 pandemic the rates fell off again, most severely in Greece, but the trends resumed recovery in 2021.

**Figure 4: Mean Youth Employment Rate by Country**




*Source: EU-LFS data (authors' elaboration)*



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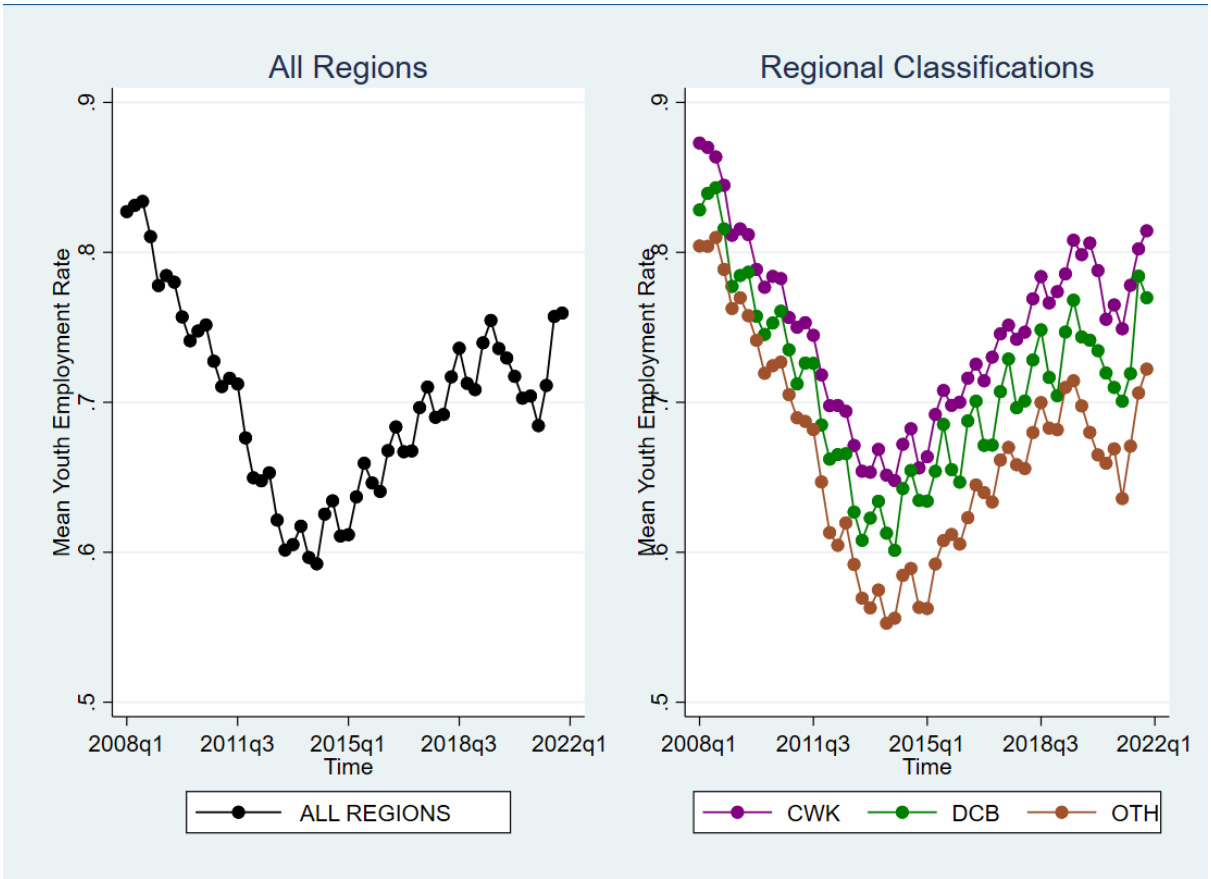
Figure 5 plots the average youth employment rate over time for all the regions in the sample and then, separately, for the different region types ('Decarbonisation', 'CoWorking' and 'Other'). Youth employment decreased across all the regions between 2008 and 2014, from around 80 per cent to 60 per cent, as a long-term consequence of the great recession in 2008. Since 2014, it has increased over time, before falling off again in 2020 because of the COVID-19 pandemic recession. During 2021, it started to rise again, reaching around 75 per cent. Next, we further investigate by grouping the different regions as classified within this report. We observe that the trend is the same as the one described above, but youth employment has always been highest in regions with prevalence of co-working spaces (more urban settings), followed by regions particularly related to the decarbonisation process (more rural settings) and then the regions classified as 'other'.

**Figure 5: Mean Youth Employment Rate by Region Type**




*Source: EU-LFS data (authors' elaboration)*



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## 4.2 Barro Regression Analysis

As previously stated, for the purpose of this study, we want to investigate if youth employment rates have converged, or diverged, over the period across regions. Divergence encompasses a scenario whereby the gap between regions with the highest and lowest rates of employment are expanding over time while convergence indicates the opposite. A positive statistically significant coefficient from the Barro regression implies divergence while a negative coefficient suggests convergence. We investigate separately the effects by different region types, namely, co-working, decarbonisation, and other regions and we also test for divergence/convergence before and after 2014. We further examine the dynamics between gender in all regions and across regional classifications.

The resulting estimates from the Barro regressions for total youth employment are presented in Table 2. When considering the entire period, no statistically significant convergence or divergence is found across all regions. There is however evidence of divergence in areas classified as 'co-working', at a rate of 7 per cent per year. When we split the data into pre- and post-2014, two clear results are found. From 2008 to 2014, there was ongoing divergence across all regions: youth employment rates diverged by roughly 10 per cent per year, and this was mainly driven by the co-working regions, where the gap between the highest and the lowest rates of employment was increasing by 25 per cent per year. This indicates that these were the regions most affected during the period of volatility that followed the Great Recession, when we saw a general drop in youth employment rates (shown in Figures 5 and 6). Conversely, after 2014, ongoing convergence is found across all regions, with youth employment rates converging at a rate of 5 per cent per year, therefore at a slower pace compared to the diverging phase (pre-2014). All regions reported the same statistically significant trend, but the decarbonisation regions were catching up at a faster rate than the others.



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## Table 2: Barro Regressions Results by Regional Classifications

| Youth Employment Shares | All Regions Coefficients | CoWork Regions Coefficients | Decarbon. Regions Coefficients | Other Regions Coefficients |
|---|---|---|---|---|
| **Total Sample Period: Q2 2008 – Q2 2021** | 0.012<br>(0.011) | **0.068*****<br>**(0.013)** | -0.036*<br>(0.019) | 0.028*<br>(0.016) |
| **Pre-2014 Q2 Period: Q2 2008 – Q2 2014** | **0.100*****<br>**(0.035)** | **0.253*****<br>**(0.062)** | 0.023<br>(0.040) | 0.081<br>(0.048) |
| **Post-2014 Q2 Period: Q2 2014 – Q2 2021** | **-0.053*****<br>**(0.011)** | **-0.049*****<br>**(0.009)** | **-0.079*****<br>**(0.021)** | **-0.050****<br>**(0.018)** |

*Notes: The regions in each classification are documented in the Appendix and the numbers are as follows: 54 regions in all; 13 regions in 'CoWork'; 20 regions in 'Decarbonisation'; and 23 regions in 'Other'.*
*Source: EU-LFS (authors' calculations)*

A separate analysis was carried out on male and female youth employment and the results are shown in Table 3 and 4. Since male and female youth employment rates are an element of total youth employment, it is unsurprising that they follow a similar trend. Figure 6 below shows the average female youth employment rate (Panel A) and the average male youth employment rate (Panel B) over time across all regions. In 2008, male youth employment was higher than female youth employment (respectively, 85 per cent and under 80 per cent). The rates both decreased over time as a result of the great recession, but they fell at a faster rate for females. Post-2014, youth employment recovered and increased at a faster rate for males than females. During the COVID-19 pandemic the rates fell off again, but the trends have recovered in 2021, with male youth employment still slightly higher than female youth employment.



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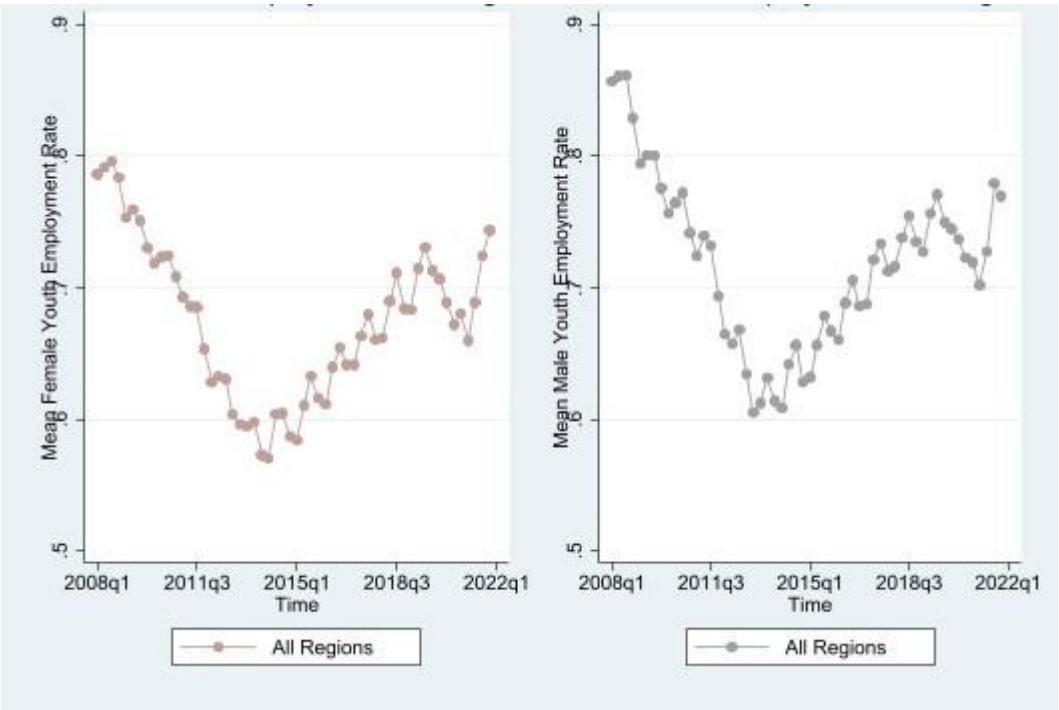
**Figure 6: Mean Female and Male Youth Employment Rate Across All Regions**




*Source: EU-LFS data (authors' elaboration)*

When considering the entire period for female employment, no statistically significant convergence or divergence is found across all regions (see Table 3). There is however evidence of divergence in areas classified as 'co-working' (6 per cent per year), and evidence of convergence in areas classified as 'decarbonisation regions' (4 per cent per year). The ongoing divergence pre-2014 was entirely driven by the coworking regions at a high rate (22 per cent per year), with no statistically significant effects shown for the other regions. Interestingly, after 2014, female youth employment rates were converging across all regional classifications, ranging between five and nine per cent per year. Similar results are found among males, but post-2014 the gap between the highest and the lowest rates of employment was decreasing at a lower rate than for females, across all regions (see Table 4).



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## Table 3: Barro Regression Results for Female Youth Employment Growth

| Female Youth Employment Shares | All Regions Coefficients | CoWork. Regions Coefficients | Decarbon. Regions Coefficients | Other Regions Coefficients |
|---|---|---|---|---|
| **Total Sample Period: Q2 2008 – Q2 2021** | -0.015 (0.009) | **0.058** (0.020)** | **-0.043** (0.016)** | -0.011 (0.014) |
| **Pre-2014 Q2 Period: Q2 2008 – Q2 2014** | **0.074** (0.025)** | **0.216*** (0.058)*** | 0.043 (0.035) | 0.077 (0.047) |
| **Post-2014 Q2 Period: Q2 2014 – Q2 2021** | **-0.128*** (0.017)*** | **-0.045*** (0.013)*** | **-0.087*** (0.016)*** | **-0.076*** (0.013)*** |

*Notes: The regions in each classification are documented in the Appendix and the numbers are as follows: 54 regions in all; 13 regions in 'CoWork'; 20 regions in 'Decarbonisation'; and 23 regions in 'Other'.*
*Source: EU-LFS (authors' calculations)*

## Table 4: Barro Regression Results for Male Youth Employment Growth

| Male Youth Employment Shares | All Regions Coefficients | CoWork Regions Coefficients | Decarbon. Regions Coefficients | Other Regions Coefficients |
|---|---|---|---|---|
| **Total Sample Period: Q2 2008 – Q2 2021** | 0.019 (0.017) | **0.050** (0.018)** | -0.037 (0.025) | 0.046 (0.028) |
| **Pre-2014 Q2 Period: Q2 2008 – Q2 2014** | 0.058 (0.037) | **0.212** (0.075)** | -0.006 (0.050) | 0.063 (0.065) |
| **Post-2014 Q2 Period: Q2 2014 – Q2 2021** | **-0.067*** (0.016)*** | **-0.055*** (0.011)*** | **-0.093*** (0.028)*** | **-0.070** (0.029)** |

*Notes: The regions in each classification are documented in the Appendix and the numbers are as follows: 54 regions in all; 13 regions in 'CoWork'; 20 regions in 'Decarbonisation'; and 23 regions in 'Other'.*
*Source: EU-LFS (authors' calculations)*

The Barro regression results showed ongoing divergence in youth employment rates across regions between 2008 and 2014, and convergence after 2014. As a robustness check for our findings, we plot the standard deviation of youth employment rates across regions: divergence would be consistent with increasing cross-regions dispersion over time, while convergence would be consistent with falling dispersion. Our results are confirmed: Figure 7 (left panel) shows increasing standard deviation across regions from 2008 to 2014 and decreasing standard deviation afterwards. Divergence rates appear similar across the different region groups, while convergence seems strongest within co-working regions and decarbonisation regions, and more modest within other regions (see Figure 7, right panel).



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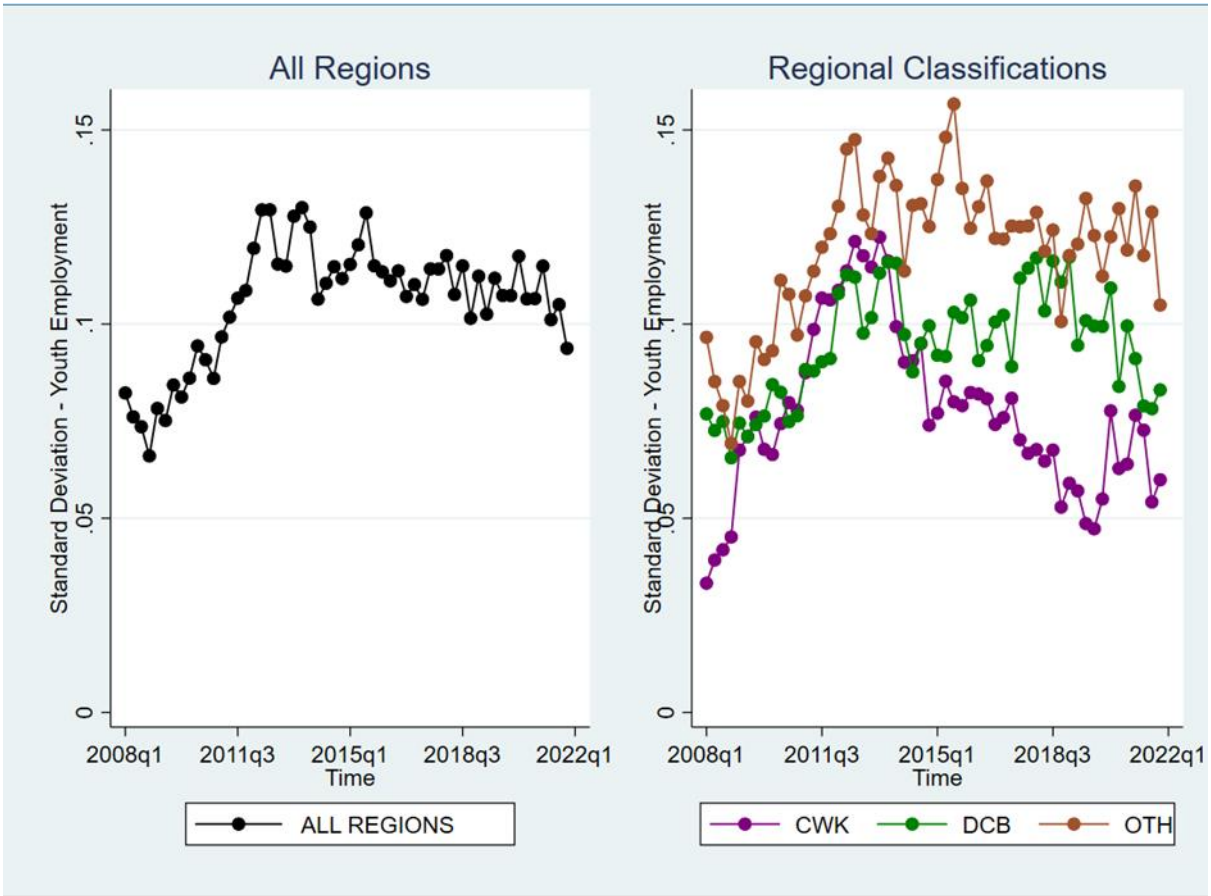
**Figure 7: Standard Deviation of Youth Employment Rate by Region Type**




*Source: EU-LFS data (authors' elaboration)*

## 4.3 Determinants of Youth Employment

In this section, we present the results of several specifications of the fixed effects model estimated to identify the determinants of youth employment over time. We present the descriptive statistics of the variables used in our model in Appendix D. Table 5 below estimates the determinants of youth employment over the entire time period (2008-2021) and separately pre-2014 Q2 and post-2014 Q2. For the purpose of this study, the regressors of interest are the dummy variables that identify the sectors we classified as 'co-working' sectors, 'green' sectors and 'brown' sectors. We also provide the results of models with a more detailed sectoral breakdown, i.e. we use individual dummies for the individual sectors included within our group classifications.

First, examining the impact of brown sector employment share, we observe that it is negatively associated with youth employment, particularly in the period post-2014, with no evidence of



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impacts pre-2014. Every one per cent increase in the share of individuals employed in the brown sector corresponds on average to a decrease of 1.52 per cent in the share of youth employment. This is an important result, because as the world is going through a decarbonisation process and a transition to a carbon-neutral economy, the share of people employed in brown sectors is certainly decreasing and therefore this can have a positive impact on youth employment.

Second, when it comes to the green sectors, over the full sample, we observe that youth employment is negatively impacted pre-2014 when the labour market experienced a growth in the share of individuals employed in these sectors within all regions. That is, a one per cent increase in the share of individuals employed in the green sector is associated with a decrease in the youth employment rate by approximately 0.61 per cent. The sectors driving these results (pre-2014) are the electricity and transportation sectors (at a ten per cent significance level). However, we do not observe any evidence of impacts related to the share of individuals employed in the green sectors during the post-2014 recovery period. It may possibly be the case that 'green jobs' may require higher or more specific training that require more time and experience, given the more advanced technological processes involved, and therefore, may take longer for youths to find jobs in these areas.

Third, youth employment is negatively impacted when the share of individuals working in sectors classified as co-working increases. Specifically, a one per cent increase in employment in these sectors is associated with a 0.3 per cent reduction in the share of young people employed, within regions. The impact is driven by the period preceding 2014 and originates from the professional and administrative services sectors (at a ten per cent significance level). While for the co-working sectors at the overall level there is no evidence of impact post-2014, for the financial sector the marginal effect is negative and statistically significant. Therefore, a one per cent increase in employment share in the financial sector is associated with a decrease in youth employment on average by 1.17 per cent. Young people have historically been more likely to find work in low-wage, low-skilled jobs where there is less competition from older workers, predominately working in wholesale and retail, accommodation and food, with smaller relative shares working in these sectors classified as 'co-work' (O'Reilly et al, 2018).



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Lastly, the data highlights several notable trends regarding other control variables. Over the entire period of time, we observe that tertiary education and GDP per capita positively impacts youth employment. Conversely, the share of migrants in the labour force and the ratio of high-to-low skilled occupations, a measurement for job polarisation, negatively impacts youth employment. To a lesser extent, the participation rate positively impacts youth employment while the share of part-time employment and the share of female labour force participation negatively impacts youth employment rates over the entire time period (significant at the 10 per cent level).

When splitting the sample in pre- and post-2014, the impact of the share of migrants in the labour force on youth employment is determined entirely pre-2014, with its effect disappearing post-2014. While the ratio of high-to-low skilled occupations and GDP per capita strongly affect youth employment pre-2014, the effects are significant only at a 10 per cent level in the post-2014. However surprising the drop off of significance in terms of GDP per capita may appear, the impact of the COVID-19 pandemic may partly explain this result. The effects of tertiary education on youth employment are entirely driven by the period post-2014. Female and part-time youth employment effects are entirely observed in the pre-2014 period, while participation rate effects mainly post-2014.

## Table 5: Fixed Effects Results: Determinants of Youth Employment across NUTS2 Level Regions in Greece, Italy, Ireland & Spain (2008-2021; pre-2014 Q2; post-2014 Q2; sectoral splits)

| VARIABLES | ALL | ALL (Sectoral splits) | PRE-2014 | PRE-2014 (Sectoral splits) | POST-2014 | POST-2014 (Sectoral splits) |
|---|---|---|---|---|---|---|
| | (i) | (ii) | (iii) | (iv) | (v) | (vi) |
| | | | | | | |
| **Lagged Youth Employment** | 0.729*** | 0.723*** | 0.689*** | 0.684*** | 0.550*** | 0.540*** |
| | (0.035) | (0.037) | (0.034) | (0.031) | (0.041) | (0.040) |
| **Participation rate** | 0.299* | 0.316** | 0.212 | 0.224* | 0.471** | 0.480** |
| | (0.156) | (0.156) | (0.131) | (0.130) | (0.201) | (0.202) |
| **Share of migrants in the labour force** | -0.242*** | -0.220** | -0.383*** | -0.378*** | 0.120 | 0.130 |
| | (0.090) | (0.093) | (0.071) | (0.066) | (0.227) | (0.227) |
| **Share of females in labour force** | -0.188* | -0.195** | -0.330*** | -0.313*** | -0.036 | -0.046 |
| | (0.095) | (0.097) | (0.106) | (0.097) | (0.126) | (0.128) |
| **Share of part-time workers** | -0.246* | -0.244* | -0.296** | -0.294** | 0.160 | 0.138 |



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| | | | | | | |
|---|---|---|---|---|---|---|
| | (0.125) | (0.126) | (0.126) | (0.118) | (0.225) | (0.217) |
| **Tertiary education** | 0.644*** | 0.619*** | 0.364 | 0.354 | 0.970*** | 0.912*** |
| | (0.124) | (0.099) | (0.299) | (0.271) | (0.186) | (0.172) |
| **Ratio of High-Low SOC** | -0.066*** | -0.070*** | -0.065*** | -0.068*** | -0.045* | -0.047* |
| | (0.021) | (0.020) | (0.019) | (0.022) | (0.026) | (0.026) |
| **lnGDP Per Capita** | 0.115*** | 0.114*** | 0.248*** | 0.250*** | 0.093* | 0.101* |
| | (0.030) | (0.030) | (0.040) | (0.036) | (0.050) | (0.052) |
| | | | | | | |
| **Green sectors** | -0.243* | | -0.609*** | | 0.131 | |
| | (0.140) | | (0.214) | | (0.167) | |
| **Electricity and gas** | | -0.418 | | -1.125* | | -0.508 |
| | | (0.275) | | (0.604) | | (0.445) |
| **Water/waste management** | | -0.920** | | -0.599 | | -0.414 |
| | | (0.420) | | (0.412) | | (0.741) |
| **Transportation** | | -0.044 | | -0.525* | | 0.354 |
| | | (0.175) | | (0.272) | | (0.256) |
| **Brown Sectors** | -1.522*** | | -0.620 | | -1.390** | |
| | (0.497) | | (0.818) | | (0.528) | |
| **Mining** | | -1.561*** | | -0.658 | | -1.527*** |
| | | (0.474) | | (0.783) | | (0.425) |
| **Co-Working Sectors** | -0.300*** | | -0.324*** | | -0.201* | |
| | (0.095) | | (0.104) | | (0.111) | |
| **Information/Communications** | | -0.153 | | 0.129 | | -0.295 |
| | | (0.259) | | (0.240) | | (0.333) |
| **Financial Services** | | -0.462 | | 0.024 | | -1.175*** |
| | | (0.289) | | (0.309) | | (0.431) |
| **Professional Services** | | -0.088 | | -0.399* | | 0.224 |
| | | (0.155) | | (0.218) | | (0.184) |
| **Administrative Services** | | -0.460*** | | -0.486* | | -0.131 |
| | | (0.171) | | (0.254) | | (0.198) |
| **Q2 Seasonal Dummy** | 0.022*** | 0.022*** | 0.022*** | 0.022*** | 0.019*** | 0.019*** |
| | (0.004) | (0.003) | (0.004) | (0.004) | (0.004) | (0.004) |
| **Q3 Seasonal Dummy** | 0.016*** | 0.017*** | 0.019*** | 0.019*** | 0.016*** | 0.016*** |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.005) | (0.005) |
| **Q4 Seasonal Dummy** | -0.006** | -0.006** | -0.004 | -0.003 | -0.004 | -0.004 |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| **Constant** | -1.007*** | -1.002*** | -2.109*** | -2.139*** | -1.058** | -1.121** |
| | (0.284) | (0.283) | (0.361) | (0.347) | (0.450) | (0.463) |
| | | | | | | |
| **Observations** | 2,970 | 2,970 | 1,350 | 1,350 | 1,620 | 1,620 |
| **R-squared** | 0.741 | 0.742 | 0.869 | 0.870 | 0.524 | 0.530 |
| **Number of regions** | 54 | 54 | 54 | 54 | 54 | 54 |
| **Prob > F** | 0 | 0 | 0 | 0 | 0 | 0 |

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

*Source: EU-LFS (authors' calculations)*



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Table 5 revealed that youth employment was unaffected by changes in overall employment in the green and co-working sectors post-2014 while the brown sectors did. Table 6 looks at the post-2014 period by sectoral breakdown. We look at the post-2014 period to understand the magnitude of the effects the variables of interest had on youth employment during this most recent period. Specifically, to ascertain if the 'green', 'brown', and 'co-working' sectors findings from Table 5 remain consistent across our regional classification. To reemphasize, our classification of 'decarbonisation' regions includes predominantly rural settings, while 'co-working regions' are predominantly urban settings, and 'other' regions falling somewhere between the other two. Column 1 shows the results from the fixed effects models in all regions while column 2 presents the sectoral breakdown. Columns 3 to 8 illustrate the findings for the determinants of youth employment in the classified regions. Specifically, each even numbered column represents the sectoral breakdown.

First, examining the impact of brown sector employment share, we observe that the negative impact already seen in Table 5 is driven solely by the areas classified as being affected by decarbonisation (column 3). Second, post-2014 we see no evidence that the share of individuals employed in green sectors impacts youth employment across all regions or the region types as we classify them. However, we observe a negative impact of the employment share in 'electricity and gas' sector on youth employment in the regions classified as 'other' (to the magnitude of 1.7 per cent). Third, over the entire sample period we see evidence of a reduction in the share of youth employment following an increase in the share of individuals employed in the co-working sectors. This result is driven by the 'decarbonisation' regions, by the financial and information and communications sector in particular. For instance, a one per cent increase in the share of individuals employed in the financial sector in the regions classified as being affected by decarbonisation, is followed by a fall in the youth employment rate by approximately 1.6 per cent. Regarding the information and communications sector, the data indicates a fall in youth employment of 0.9 per cent following a unitary rise in its employment share. Further the financial services sector also negatively impacts youth employment in the co-working regions. That is, a unit increase in the share of people working in the financial sectors reduces youth employment by approximately 1.1 per cent.



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In the post-2014 period, the participation rate, the share of people with a tertiary education level and GDP per capita all positively impacted youth employment rates across all regions. While tertiary education is consistently positive and statistically significant across all the regional classifications, the participation rate is statistically significant in the 'co-working' regions and those classified as 'others', whereas youth employment in the 'decarbonisation' regions is only relevantly affected by the GDP per capita. Lastly, findings from Table 1 showed that the share of migrants in the labour force did not affect youth employment across all regions. Nevertheless, there is evidence of a negative impact on youth employment emerging from the 'co-working' regions, at only a 10 per cent level of significance. Since 'co-working' regions represent only the 25 per cent of all the regions, it is likely that the coefficient has been averaged out, due to the insignificance found in all the other regions. Similarly, we observed that the ratio of high to low skilled occupations is significantly and negatively affecting youth employment strongly and purely in the 'co-working' regions. Although the fact that, as previously mentioned, the regions classified as 'co-working' represent one quarter of all the regions, the negative impact related to the measurement for job polarisation still appears across all regions, but at a 10 per cent level of significance.



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## Table 6: Fixed Effects Results: Determinants of Youth Employment across NUTS2 Level Regions in Greece, Italy, Ireland & Spain (POST-2014; regional classification; sectoral splits)

| VARIABLES | All regions | All regions (sectoral splits) | Decarbon. regions | Decarbon. regions (Sectoral splits) | Co-Work regions | Co-Work regions (Sectoral splits) | Other regions | Other regions (Sectorial splits) |
|---|---|---|---|---|---|---|---|---|
| | (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) | (viii) |
| | | | | | | | | |
| **Lagged Youth Employment** | 0.553*** | 0.543*** | 0.476*** | 0.475*** | 0.706*** | 0.669*** | 0.568*** | 0.555*** |
| | (0.042) | (0.041) | (0.063) | (0.058) | (0.041) | (0.035) | (0.055) | (0.058) |
| **Participation rate** | 0.443** | 0.451** | 0.198 | 0.236 | 0.462*** | 0.472*** | 0.632** | 0.636** |
| | (0.202) | (0.202) | (0.230) | (0.231) | (0.143) | (0.138) | (0.280) | (0.281) |
| **Share of migrants in LF** | 0.116 | 0.123 | -0.189 | -0.139 | -0.329* | -0.323* | 0.434 | 0.425 |
| | (0.222) | (0.224) | (0.310) | (0.300) | (0.169) | (0.156) | (0.282) | (0.255) |
| **Share of females in LF** | -0.033 | -0.038 | -0.142 | -0.159 | 0.118 | 0.132 | -0.080 | -0.049 |
| | (0.127) | (0.128) | (0.270) | (0.296) | (0.223) | (0.200) | (0.194) | (0.180) |
| **Share of part-time workers** | 0.154 | 0.131 | -0.186 | -0.208 | -0.074 | -0.108 | 0.536** | 0.491** |
| | (0.223) | (0.215) | (0.250) | (0.272) | (0.188) | (0.192) | (0.235) | (0.207) |
| **Tertiary education** | 0.963*** | 0.908*** | 1.205*** | 1.089*** | 0.972*** | 0.923*** | 0.831*** | 0.835*** |
| | (0.181) | (0.167) | (0.398) | (0.369) | (0.212) | (0.189) | (0.163) | (0.152) |
| **Ratio of High-Low SOC** | -0.044* | -0.046* | -0.077 | -0.077 | -0.115*** | -0.109*** | -0.021 | -0.018 |
| | (0.025) | (0.026) | (0.066) | (0.062) | (0.033) | (0.032) | (0.018) | (0.022) |
| **lnGDP Per Capita** | 0.100** | 0.106** | 0.122** | 0.138** | 0.020 | 0.023 | 0.113* | 0.130* |
| | (0.047) | (0.049) | (0.051) | (0.051) | (0.029) | (0.029) | (0.059) | (0.068) |
| **Green sectors** | 0.089 | | -0.268 | | 0.258 | | 0.196 | |
| | (0.160) | | (0.440) | | (0.434) | | (0.212) | |
| **Electricity and gas** | | -0.505 | | 0.048 | | -2.538* | | -1.743*** |
| | | (0.460) | | (0.446) | | (1.279) | | (0.465) |
| **Water/waste management** | | -0.399 | | -1.577 | | 0.446 | | 0.437 |
| | | (0.674) | | (1.159) | | (1.120) | | (0.398) |
| **Transportation** | | 0.296 | | -0.067 | | 0.428 | | 0.327 |
| | | (0.258) | | (0.659) | | (0.439) | | (0.328) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **Brown Sectors** | -1.535*** | | -2.777*** | | 0.473 | | -0.923 | |
| | (0.519) | | (0.885) | | (1.964) | | (1.089) | |
| **Mining** | | -1.690*** | | -2.864*** | | 0.578 | | -0.859 |
| | | (0.415) | | (0.665) | | (2.182) | | (1.045) |
| **Co-Working Sectors** | -0.226** | | -0.567*** | | -0.057 | | -0.099 | |
| | (0.112) | | (0.197) | | (0.265) | | (0.192) | |
| **Information/Communications** | | -0.351 | | -0.927** | | 0.148 | | -0.078 |
| | | (0.343) | | (0.419) | | (0.539) | | (0.426) |
| **Financial Services** | | -1.134** | | -1.591*** | | -1.124*** | | -0.371 |
| | | (0.435) | | (0.550) | | (0.371) | | (0.856) |
| **Professional Services** | | 0.195 | | -0.076 | | 0.164 | | 0.181 |
| | | (0.188) | | (0.346) | | (0.388) | | (0.164) |
| **Administrative Services** | | -0.173 | | -0.466 | | 0.035 | | -0.205 |
| | | (0.198) | | (0.405) | | (0.456) | | (0.194) |
| **Q2 Seasonal Dummy** | 0.019*** | 0.019*** | 0.021** | 0.021*** | 0.006 | 0.006 | 0.022*** | 0.022*** |
| | (0.004) | (0.004) | (0.007) | (0.007) | (0.005) | (0.005) | (0.006) | (0.005) |
| **Q3 Seasonal Dummy** | 0.016*** | 0.017*** | 0.020** | 0.020** | 0.001 | 0.001 | 0.018*** | 0.019*** |
| | (0.005) | (0.005) | (0.009) | (0.009) | (0.002) | (0.002) | (0.006) | (0.006) |
| **Q4 Seasonal Dummy** | -0.004 | -0.004 | -0.007* | -0.008* | -0.008 | -0.008* | 0.005 | 0.006 |
| | (0.003) | (0.003) | (0.004) | (0.004) | (0.004) | (0.004) | (0.005) | (0.006) |
| | | | | | | | | |
| **Constant** | -1.104** | -1.153** | -0.908* | -1.070* | -0.357 | -0.357 | -1.477*** | -1.645*** |
| | (0.415) | (0.431) | (0.520) | (0.518) | (0.317) | (0.322) | (0.470) | (0.569) |
| | | | | | | | | |
| **Observations** | 1,674 | 1,674 | 713 | 713 | 434 | 434 | 651 | 651 |
| **R-squared** | 0.540 | 0.546 | 0.472 | 0.479 | 0.770 | 0.777 | 0.593 | 0.602 |
| **Number of regions** | 54 | 54 | 23 | 23 | 14 | 14 | 21 | 21 |
| **Prob>F** | 0 | 0 | 0 | 0 | | | 0 | 0 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

*Source: EU-LFS (authors' calculations)*



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# Conclusion

Transitioning young people into productive work is a key labour market challenge and employment prospects for youth are a cause of concern for policymakers. This study focuses on four selected European countries, Italy, Spain, Greece, and Ireland to examine the incidence of youth employment, its evolution over time and the drivers that have determined variations in youth employment in a causal framework in a cross-regions comparison over time. The project 'Collaborative and sharing workspaces: policies for youth in EEA peripheral regions' (Cowork4YOUTH) is a joint research project including seven European partner institutions funded by Iceland, Liechtenstein and Norway through the EEA and Norway Grants Fund for Youth Employment.

The aim of this research is to enable policy makers to identify, and target, factors that are responsive to change in order to help facilitate the further development of youth employment activities at a regional level in the EU. The data used in this study is the quarterly anonymised country level files of the European Union Labour Force Survey (EU-LFS) for the period covering Q2 2008 through Q2 2021. The study identifies trends and sectors that may have had positive or negative employment potential for young people over time. Furthermore, as per the project remit, we identify the NUTS2 level regions among our sample of selected countries that are to be considered as: (i) particularly affected by the green transition; and (ii) where co-working practices are most common.

Youth employment is defined as the percentage of young people aged 15 to 29 in the labour force reporting to be in employment. Our descriptive findings show that following the great recession, youth employment fell in all the countries, and the most severe declining rates have occurred in Greece and Spain, followed by Ireland and Italy. After 2014, youth employment recovered and increased at a faster rate in Ireland, followed by Italy, Spain and Greece. During the COVID-19 pandemic the rates fell off again, most severely in Greece, but the trends resumed recovery in 2021. Furthermore, youth employment has always been highest in NUTS2 regions with prevalence of co-working spaces (predominately urban settings), followed by regions particularly related to the decarbonisation process (predominately rural settings) and then our regions classified as 'other'.

The evidence points towards divergence across all regions in youth employment at a rate of 10% per annum between 2008 and 2014, mainly driven by regions classified as 'co-work' regions. Conversely, more recently, the evidence shows convergence at a rate of 5% per annum post-2014, with regions exhibiting the lowest incidences of youth employment in 2014 experiencing the highest growth rates in youth employment over the 2014 to 2021. Further analysis reveals that convergence appears strongest within the 'decarbonisation' regions and most modest among the regions classified as 'co-work' regions. Similar results emerged when male and female youth employment rates were assessed separately with some evidence that the gap between the highest and lowest rates of youth employment across all regions, post-2014, was decreasing at a lower rate for males than for females (approx. 7% per annum compared 13% per annum).

In terms of the factors that potentially drive regional variations in youth employment, a number of key variables emerged from our analysis. First, examining the impact of brown sector employment share, we observe that it is negatively associated with youth employment, particularly in the period post-2014 (no evidence of impacts pre-2014). Every 1 per cent increase in the share of individuals employed in the brown sector corresponds on average to a decrease of 1.52 per cent in the share of youth employment. This is an important result, because as the world is going through a decarbonisation process and a transition to a carbon-neutral economy, the share of people employed in brown sectors is certainly decreasing.

Second, when it comes to the green sectors, over the full sample, we observe that youth employment is negatively impacted pre-2014 when the labour market experienced a growth in the share of individuals employed in these sectors within all regions. That is, a one per cent increase in the share of individuals employed in the green sector is associated with a decrease in the youth employment rate by approximately 0.61 per cent. The sectors driving these results (pre-2014) are the electricity and transportation sectors. However, we do not observe any evidence of impacts related to the share of individuals employed in the green sectors during the post-2014 recovery period. It may possibly be the case that 'green jobs' may require higher or more specific training that require more time/experience given the more advanced technological processes involved, and therefore, may take longer for youths to access jobs in these areas.



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Third, youth employment is negatively impacted when the share of individuals working in sectors classified as co-working increases. Specifically, a 1 per cent increase in employment in these sectors is associated with a 0.3 per cent reduction in the share of young people employed within regions. The impact is driven by the period preceding 2014 and originates from the professional and administrative services sectors. While for the co-working sectors at the overall level there is no evidence of impact post-2014, for the financial sector the marginal effect is negative and statistically significant. Therefore, a one per cent increase in employment share in the financial sector is associated with a decrease in youth employment on average by 1.17 per cent.

Lastly, the data highlights several notable trends regarding other control variables. Over the entire period of time, we observe that tertiary education and GDP per capita positively impacts youth employment. Conversely, the share of migrants in the labour force and the ratio of high-to-low skilled occupations, a measurement for job polarisation, negatively impacts regional youth employment. To a lesser extent, the participation rate positively impacts youth employment while the share of part-time employment and the share of female labour force participation negatively impacts youth employment rates over the entire time period.

Examining further the post-2014 period to understand the magnitude of the effects the variables of interest had on youth employment during this most recent period, we find that the negative impacts associated with 'brown' jobs and 'co-work' sectors have had the strongest impact in the regions classified as being most affected by decarbonisation. The findings suggest that while youth employment may respond to policy variables, the impact of particular policies will tend to vary depending on specific regional labour market contexts. Nevertheless, the work does point to areas where policy could play a role. The findings show that the higher proportion of individuals with tertiary education, higher regional participation rates, and higher GDP per capita positively influences youth employment opportunities across all regions. Therefore, investing in higher education, scholarships, vocational training and wider skill development programmes in the sectors with high potential for 'green' jobs and remote working potential will not only uplift the youth employment rate but also address the negative impacts seen with a rise in the ratio of high-to-low skilled workers. Hadjivassiliou et al. (2019) illustrate how countries perform better where employers



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see an incentive to participate in youth employment programmes, and employers are closely engaged in school-to-work transition regimes and vocational education and training systems. One of the key challenges in terms of policy learning and transfer requires activating regional employers and professional bodies within multi-agency forms of governance to deliver effective programs to overcome some of the adverse consequences for youth that have become evident over the past decade (O'Reilly, 2019).

Further research is needed particularly in the areas of 'green skill' identification and the specific types of jobs being created and the skills needed to do them. Utilising large-scale job advertisement data is one potentially useful way to examine the impact that decarbonisation policies are having on the labour market and produce informed forecast for the number of graduates required needing green skills. For example, it is possible to identify the types of jobs, occupations and the skills required from the next generation of workers in these areas. Such knowledge can be used as a key input into any national, or EU level, skills strategies designed to ensure that the growth of youth employment in green sectors and remote 'co-work' type-sectors is not restricted as a consequence of skill mismatches.

The policies in line with achieving the green transition are usually estimated to have a positive but small net effect on employment (Eurofound, 2019; European Commission, 2020; Vona, 2021), and they will also have distributional effects. The impacts are expected to vary considerably among sectors, will affect countries' income, the employment levels and structure i.e., creating and destroying jobs and changing jobs' skills and tasks content. Therefore, different categories of workers will be affected in different ways. The green transition could lead to: (i) job creation in 'green' sectors that produce goods and services that reduce environmental pressure; and (ii) lead to job destruction in sectors with large environmental footprints ('brown' sectors) (OECD,2017). In relation to this, the European Union's Just Transition Fund (EU JTF) is a relatively new fund created under the 2021-2027 programming round. The Fund's single specific objective is to support the regions and communities in Europe that are most negatively affected by the transition to climate neutrality, in the effort to ensuring that no one is left behind. However, given this study examines data from 2008-2021, it is perhaps too early to detect some of the effects of this regional funding, particularly on youth employment. Implementation of a robust monitoring system to continually



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assess the impacts of these policies is important. As sectors evolve and regional dynamics shift, policymakers should be in a position to adjust strategies in real-time, ensuring youth employment remains a priority.

# Appendix

## Appendix Table A: Regions Most Affected by Decarbonisation Process

| | |
|---|---|
| **Italy** | **ITC2 - Valle d'Aosta/Vallée d'Aoste** |
| | ITF1 - Abruzzo |
| | ITF2 - Molise |
| | ITF3 - Campania |
| | ITF4 - Puglia |
| | ITF5 - Basilicata |
| | ITG2 - Sardegna |
| | ITH1- Provincia Autonoma di Bolzano/Bozen |
| | ITH2 - Provincia Autonoma di Trento |
| | ITH5 - Emilia-Romagna |
| | ITI3 - Marche |
| | |
| **Spain** | ES11 - Galicia |
| | ES12 - Principado de Asturias |
| | ES21 - País Vasco |
| | ES24 - Aragón |
| | ES41 - Castilla y León |
| | ES53 - Illes Balears |
| | ES61 - Andalucía |
| | |
| **Greece** | EL41 - North Aegean |
| | EL42 - South Aegean |
| | EL43 - Crete |
| | EL53 - Western Macedonia |
| | EL65 - Peloponnese |



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## Appendix Table B: Regions with High Density of Co-Working Spaces

| | |
|---|---|
| **Italy** | **ITC1 - Piemonte** |
| | ITC4 - Lombardia |
| | ITH3 - Veneto |
| | ITH5 - Emilia-Romagna |
| | ITI1 - Toscana |
| | ITI4 - Lazio |
| | |
| **Spain** | ES11 - Galicia |
| | ES30 - Comunidad de Madrid |
| | ES51 - Cataluña |
| | ES52 - Comunidad Valenciana |
| | ES61 - Andalucía |
| | |
| **Greece** | EL30 - Attiki |
| | EL52 - Kentriki Makedonia |

## Appendix Table C: Regions Classified as 'Other'

| | |
|---|---|
| **Italy** | **ITC3 - Liguria** |
| | ITF6 - Calabria |
| | ITG1 – Sicilia |
| | ITH4 – Friuli-Venezia Giulia |
| | ITI2 - Umbria |
| | |
| **Spain** | ES13 = Cantabria |
| | ES22 = Comunidad Foral de Navarra |
| | ES23 = La Rioja |
| | ES42 = Castilla-La Mancha |
| | ES43 = Extremadura |
| | ES62 = Región de Murcia |
| | ES63 = Ciudad de Ceuta |
| | ES64 = Ciudad de Melilla |
| | ES70 = Canarias |



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| | |
|---|---|
| **Greece** | EL51 = Anatoliki Makedonia, Thraki |
| | EL54 = Ipeiros |
| | EL61 = Thessalia |
| | EL62 = Ionia Nisia |
| | EL63 = Dytiki Ellada |
| | EL64 = Sterea Ellada |

## Appendix Table D: Descriptive statistics of All Variables included in the determinants model

| Variables | Description | Observations | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|---|
| **Youth employment** | Youth (aged 15 to 29) employed / youth in the labour force | 3,024 | 0.69 | 0.12 | 0.27 | 0.97 |
| **Female Youth employment** | Young females employed / young females in the labour force | 3,024 | 0.67 | 0.14 | 0.15 | 0.98 |
| **Male Youth employment** | Young males employed / young males in the labour force | 3,024 | 0.72 | 0.13 | 0.16 | 0.98 |
| **Participation rate** | Labour force divided by the total working-age population (aged 15 to 64) | 3,024 | 0.67 | 0.06 | 0.45 | 0.80 |
| **Migrant** | Migrants in the labour force | 3,024 | 0.11 | 0.05 | 0.02 | 0.25 |
| **Part-time** | Part-time workers | 3,024 | 0.14 | 0.05 | 0.03 | 0.26 |
| **Female** | Females in the labour force | 3,024 | 0.44 | 0.03 | 0.34 | 0.52 |
| **Tertiary education** | Short-tertiary education, Bachelor, Master and PhD (ISCED 5,6,7,8) | 3,024 | 0.15 | 0.06 | 0.06 | 0.36 |
| **Ratio of High-Low SOC** | Ratio of Workers in High (2,3) to Low (7,8,9) occupations | 3,024 | 0.94 | 0.27 | 0.32 | 3 |
| **GDP** | Regional GDP per capita | 3,024 | 23527.27 | 9041.25 | 10200 | 84900 |
| **Green sectors** | Combined employment in sectors with prevalence of green jobs (NACE D,E,H) | 3,024 | 0.06 | 0.01 | 0.01 | 0.10 |
| **Electricity and gas** | Share of employed in sector NACE D: Electricity, gas, steam and air conditioning supply | 3,024 | 0.006 | 0.006 | 0 | 0.07 |
| **Water/waste management** | Share of employed in sector NACE E: Water supply; | 3,024 | 0.008 | 0.004 | 0 | 0.03 |



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| | | | | | | |
|---|---|---|---|---|---|---|
| | sewerage, waste management and remediation activities | | | | | |
| **Transportation** | Share of employed in sector NACE H: Transportation and storage | 3,024 | 0.04 | 0.01 | 0.005 | 0.09 |
| **Brown sectors** | Combined employment in sectors with prevalence of brown jobs (NACE B) | 3,024 | 0.003 | 0.007 | 0 | 0.07 |
| **Mining** | Share of employed in sector NACE B: Mining and quarrying | 3,024 | 0.03 | 0.07 | 0 | 0.07 |
| **Co-working sectors** | Combined employment in sectors with prevalence of co-working practices (NACE J,K,M,N) | 3,024 | 0.12 | 0.04 | 0.02 | 0.28 |
| **Information/Communication** | Share of employed in sector NACE J: Information and communication | 3,024 | 0.017 | 0.01 | 0 | 0.08 |
| **Financial services** | Share of employed in sector NACE K: Financial and insurance activities | 3,024 | 0.02 | 0.01 | 0 | 0.05 |
| **Professional services** | Share of employed in sector NACE M: Professional, scientific and technical activities | 3,024 | 0.05 | 0.01 | 0 | 0.10 |
| **Administrative services** | Share of employed in sector NACE N: Administrative and support service activities | 3,024 | 0.04 | 0.02 | 0.00 | 0.14 |

Note: Data refers to the average share of each variable over time.

## Appendix Table E1: Fixed Effects Results: Determinants of Youth Employment across NUTS2 Level Regions in Greece, Italy, Ireland & Spain (Regional classification; 2008Q2-2021Q4)

| VARIABLES | ALL regions | ALL regions (Sectoral splits) | Decarbonisation regions | Decarbonisation regions (Sectoral splits) | Co-Working regions | Co-Working regions (Sectoral splits) | Other regions | Other regions (Sectoral splits) |
|---|---|---|---|---|---|---|---|---|
| | (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) | (viii) |
| **Lagged Youth Employment** | 0.729*** | 0.723*** | 0.656*** | 0.652*** | 0.799*** | 0.775*** | 0.754*** | 0.736*** |
| | (0.012) | (0.012) | (0.020) | (0.020) | (0.019) | (0.020) | (0.021) | (0.022) |
| **Participation rate** | 0.299*** | 0.316*** | 0.243*** | 0.259*** | 0.106 | 0.120 | -0.195** | -0.215** |
| | (0.047) | (0.047) | (0.074) | (0.075) | (0.082) | (0.083) | (0.093) | (0.093) |
| **Share of migrants in the labour force** | -0.242*** | -0.220*** | -0.176* | -0.188* | -0.385*** | -0.361*** | -0.162* | -0.089 |
| | (0.053) | (0.053) | (0.098) | (0.099) | (0.067) | (0.068) | (0.089) | (0.090) |
| **Share of females in the labour force** | -0.188** | -0.195** | -0.427*** | -0.433*** | -0.303* | -0.410** | -0.122 | -0.081 |



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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (0.079) | (0.079) | (0.142) | (0.145) | (0.158) | (0.160) | (0.110) | (0.112) |
| **Share of part-time workers** | -0.246*** | -0.244*** | -0.336*** | -0.352*** | 0.098 | 0.045 | -0.017 | 0.004 |
| | (0.050) | (0.050) | (0.089) | (0.090) | (0.093) | (0.096) | (0.083) | (0.083) |
| **Tertiary education** | 0.644*** | 0.619*** | 0.818*** | 0.737*** | 0.786*** | 0.740*** | 0.310*** | 0.347*** |
| | (0.066) | (0.068) | (0.118) | (0.122) | (0.102) | (0.102) | (0.110) | (0.112) |
| **Ratio of High-Low SOC** | -0.066*** | -0.070*** | -0.094*** | -0.089*** | -0.084*** | -0.089*** | -0.025** | -0.042*** |
| | (0.008) | (0.008) | (0.016) | (0.016) | (0.013) | (0.014) | (0.011) | (0.012) |
| **lnGDP Per Capita** | 0.115*** | 0.114*** | 0.120*** | 0.122*** | 0.069*** | 0.067*** | 0.210*** | 0.205*** |
| | (0.012) | (0.012) | (0.016) | (0.017) | (0.014) | (0.014) | (0.033) | (0.033) |
| **Co-Working Sectors** | -0.300*** | | -0.362** | | -0.040 | | -0.446*** | |
| | (0.079) | | (0.184) | | (0.227) | | (0.159) | |
| **Information/Communications** | | -0.153 | | -0.490 | | 0.367 | | -0.073 |
| | | (0.214) | | (0.389) | | (0.299) | | (0.350) |
| **Financial Services** | | -0.462** | | -1.001*** | | -1.133*** | | 0.508 |
| | | (0.203) | | (0.350) | | (0.302) | | (0.335) |
| **Professional Services** | | -0.088 | | -0.306 | | 0.281 | | 0.259 |
| | | (0.132) | | (0.227) | | (0.243) | | (0.206) |
| **Administrative Services** | | -0.460*** | | -0.293 | | 0.159 | | -0.635*** |
| | | (0.123) | | (0.245) | | (0.256) | | (0.167) |
| **Brown Sectors** | -1.522*** | | -2.277*** | | 1.956 | | -0.090 | |
| | (0.398) | | (0.510) | | (1.326) | | (0.989) | |
| **Mining** | | -1.561*** | | -2.387*** | | 1.407 | | -0.242 |
| | | (0.401) | | (0.521) | | (1.331) | | (0.987) |
| **Green Sectors** | -0.243** | | -0.466*** | | -0.010 | | -0.138 | |
| | (0.106) | | (0.150) | | (0.140) | | (0.117) | |
| **Electricity and Gas** | | -0.418 | | -0.684* | | -0.641 | | -0.594 |
| | | (0.288) | | (0.415) | | (0.758) | | (0.505) |
| **Water/Waste Management** | | -0.920*** | | -1.311*** | | -0.129 | | -0.289 |
| | | (0.267) | | (0.449) | | (0.597) | | (0.384) |
| **Transportaion** | | -0.044 | | -0.032 | | 0.053 | | -0.483** |
| | | (0.124) | | (0.224) | | (0.245) | | (0.188) |
| **Q2 Seasonal Dummy** | 0.022*** | 0.022*** | 0.025*** | 0.025*** | 0.010*** | 0.010*** | 0.017*** | 0.017*** |
| | (0.002) | (0.002) | (0.003) | (0.003) | (0.002) | (0.002) | (0.004) | (0.004) |
| **Q3 Seasonal Dummy** | 0.016*** | 0.017*** | 0.018*** | 0.018*** | 0.008*** | 0.007*** | 0.019*** | 0.020*** |
| | (0.002) | (0.002) | (0.004) | (0.004) | (0.003) | (0.003) | (0.004) | (0.004) |
| **Q4 Seasonal Dummy** | -0.006*** | -0.006*** | -0.010*** | -0.010*** | -0.004* | -0.005* | 0.004 | 0.004 |
| | (0.002) | (0.002) | (0.003) | (0.003) | (0.002) | (0.002) | (0.004) | (0.004) |
| **Constant** | -1.007*** | -1.002*** | -0.827*** | -0.839*** | -0.500*** | -0.405*** | -1.720*** | -1.681*** |
| | (0.118) | (0.118) | (0.168) | (0.172) | (0.143) | (0.147) | (0.308) | (0.311) |
| | | | | | | | | |
| **Observations** | 2,970 | 2,970 | 1,265 | 1,265 | 770 | 770 | 880 | 880 |
| **R-squared** | 0.741 | 0.742 | 0.702 | 0.704 | 0.878 | 0.881 | 0.759 | 0.764 |
| **Number of regions_** | 54 | 54 | 23 | 23 | 14 | 14 | 16 | 16 |
| **Prob>F** | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Notes: Standard errors in parentheses;*** p<0.01, ** p<0.05, * p<0.1
Model descriptions: (i) Fixed Effects–ALL, (ii) Fixed Effects–ALL Sectoral Splits, (iii) Fixed Effects DC, (iv) Fixed Effects DC- Sectoral Splits, (v) Fixed Effects CW , (vi) Fixed Effects CW– Sectoral Splits, (vii) Fixed Effects OT, (viii) Fixed Effects OT- Sectoral Splits



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# Appendix Table E2: Fixed Effects Results: Determinants of Youth Employment across NUTS2 Level Regions in Greece, Italy, Ireland & Spain (Regional classification; PRE-2014)

| VARIABLES | Decarbonisation regions | Decarbonisation regions (Sectoral splits) | Co-Working regions | Co-Working regions (Sectoral splits) | Other regions | Other regions (Sectoral splits) |
|---|---|---|---|---|---|---|
| | (i) | (ii) | (iii) | (iv) | (v) | (vi) |
| | | | | | | |
| **Lagged Youth Employment** | 0.689*** | 0.667*** | 0.708*** | 0.691*** | 0.672*** | 0.665*** |
| | (0.030) | (0.031) | (0.032) | (0.033) | (0.029) | (0.029) |
| **Participation rate** | 0.297** | 0.306** | -0.293* | -0.266* | 0.114 | 0.116 |
| | (0.127) | (0.130) | (0.158) | (0.159) | (0.140) | (0.143) |
| **Share of migrants in the labour force** | -0.193 | -0.223* | -0.316*** | -0.375*** | -0.491*** | -0.458*** |
| | (0.125) | (0.127) | (0.089) | (0.092) | (0.123) | (0.126) |
| **Share of females in the labour force** | -0.129 | -0.210 | -0.610** | -0.714*** | -0.476*** | -0.337** |
| | (0.195) | (0.199) | (0.242) | (0.243) | (0.159) | (0.164) |
| **Share of part-time workers** | -0.547*** | -0.614*** | -0.004 | -0.070 | -0.225** | -0.216** |
| | (0.141) | (0.143) | (0.145) | (0.147) | (0.110) | (0.109) |
| **Tertiary education** | -0.028 | -0.026 | 0.003 | 0.128 | 0.715*** | 0.637*** |
| | (0.279) | (0.279) | (0.259) | (0.264) | (0.240) | (0.241) |
| **Ratio of High-Low SOC** | -0.031 | -0.026 | -0.023 | -0.041** | -0.100*** | -0.113*** |
| | (0.026) | (0.027) | (0.018) | (0.019) | (0.020) | (0.021) |
| **lnGDP Per Capita** | 0.224*** | 0.228*** | 0.202*** | 0.195*** | 0.295*** | 0.279*** |
| | (0.041) | (0.042) | (0.032) | (0.034) | (0.042) | (0.042) |
| **Green sectors** | -0.421* | 0.102 | -0.017 | 0.991** | -0.916*** | -0.462 |
| | (0.251) | (0.569) | (0.306) | (0.476) | (0.241) | (0.487) |
| **Electricity and gas** | | -0.467 | | -1.021** | | 0.855** |
| | | (0.486) | | (0.419) | | (0.434) |
| **Water/waste management** | | -0.555* | | -0.275 | | -0.289 |
| | | (0.304) | | (0.334) | | (0.291) |
| **Transportation** | | 0.037 | | 0.052 | | -0.791*** |
| | | (0.356) | | (0.402) | | (0.220) |
| **Brown Sectors** | -0.828 | -1.134 | 2.783 | 2.621 | -0.761 | -0.684 |
| | (0.839) | (0.843) | (1.816) | (1.826) | (1.285) | (1.282) |
| **Mining** | | -2.373*** | | 0.766 | | 0.386 |
| | | (0.678) | | (0.983) | | (0.833) |
| **Co-Working Sectors** | -0.390* | -0.486 | -0.183 | 0.053 | -0.442*** | -0.453 |
| | (0.208) | (0.618) | (0.214) | (0.848) | (0.156) | (0.539) |
| **Information/Communications** | | -0.023 | | 0.128 | | -1.054*** |



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| | | | | | | |
|---|---|---|---|---|---|---|
| | | (0.292) | | (0.331) | | (0.288) |
| **Financial Services** | 0.029*** | 0.027*** | 0.013*** | 0.013*** | 0.017*** | 0.018*** |
| | (0.004) | (0.004) | (0.003) | (0.003) | (0.004) | (0.004) |
| **Professional Services** | 0.022*** | 0.020*** | 0.013*** | 0.012*** | 0.019*** | 0.020*** |
| | (0.004) | (0.004) | (0.003) | (0.003) | (0.005) | (0.005) |
| **Administrative Services** | -0.005 | -0.005 | 0.000 | -0.000 | -0.001 | -0.001 |
| | (0.004) | (0.004) | (0.003) | (0.003) | (0.005) | (0.005) |
| **Q2 Seasonal Dummy** | -0.421* | | -0.017 | | -0.916*** | |
| | (0.251) | | (0.306) | | (0.241) | |
| **Q3 Seasonal Dummy** | -0.828 | | 2.783 | | -0.761 | |
| | (0.839) | | (1.816) | | (1.285) | |
| **Q4 Seasonal Dummy** | -0.390* | | -0.183 | | -0.442*** | |
| | (0.208) | | (0.214) | | (0.156) | |
| **Constant** | -1.977*** | -1.980*** | -1.293*** | -1.181*** | -2.412*** | -2.314*** |
| | (0.424) | (0.426) | (0.350) | (0.366) | (0.401) | (0.401) |
| | | | | | | |
| **Observations** | 575 | 575 | 350 | 350 | 525 | 525 |
| **R-squared** | 0.852 | 0.856 | 0.944 | 0.945 | 0.868 | 0.871 |
| **Number of regions_** | 23 | 23 | 14 | 14 | 21 | 21 |
| **Prob>F** | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1



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Cowork4YOUTH is funded by Iceland, Liechtenstein and Norway through the EEA and Norway Grants Fund for Youth Employment

## List of Revisions

| Date | Partner | Name | Description |
|---|---|---|---|
| 23.10.23 | ESRI | Output7_CW4Y_ESRI_23OCT23 | Initial Draft for Circulation (incorporating consortium partners inputs from discussions at steering group meetings and presentation at Youth Employment conference at ESRI) |



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