

Inclusiveness of European Union labour markets in relation to young people

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Abstract. In the recent years the professional situation of young people (aged 15–24) compared to that of older age groups (referred to as adults) has deteriorated. In 2020 the unemployment rate among young people in 23 European Union countries (in 19 countries in 2019, which was the last year before the outbreak of the COVID-19 pandemic) was, compared to 2003, significantly higher than that of adults, showing a growing gap between the situation of these two groups of workers on the labour market. The aim of the paper is to assess the situation of young people on the EU labour markets. The analyses based on data obtained from Eurostat cover the years 2003–2020. For the purposes of the analyses, the concept of 'labour market inclusiveness' was introduced, understood as a feature of the economy in which access to jobs is similar for all groups of economically active people. The inclusiveness of the national labour markets in the EU has been defined from a static and long-term perspective. For the long-term approach, the method of statistical measurement of α inclusiveness was applied. The final result of the analysis is a typology of the EU labour markets developed on the basis of the proposed definitions, taking into account the level of inclusiveness and the availability of jobs for young people and adults. The research confirms that the national labour markets are considerably diversified. These differences are visible in terms of the unemployment of young people and adults, the reaction of markets to economic shocks and the level of labour market inclusiveness.

Keywords: inclusiveness, labour market, unemployment, young people, EU countries

JEL: J6, O52, O11, O14

Inkluzywność unijnych rynków pracy względem osób młodych

Streszczenie. Ostatnie lata przyniosły pogorszenie sytuacji zawodowej osób młodych (w wieku 15–24 lat) w stosunku do osób ze starszych grup wiekowych (zwanymi dalej dorosłymi). W 2020 r. w 23 krajach Unii Europejskiej (a w 2019 r. – ostatnim roku przed pandemią – w 19 krajach) stopa bezrobocia osób młodych była w porównaniu z 2003 r. znacznie wyższa niż stopa bezrobocia osób dorosłych, co świadczy o rosnącym dystansie między sytuacją tych dwóch grup pracowników na rynku pracy. Celem badania omawianego w artykule jest ocena sytuacji osób młodych na unijnych rynkach pracy. Analiza danych, pochodzących z Eurostatu, objęła lata 2003–2020. Na potrzeby badania wprowadzono pojęcie *inkluzywności rynków pracy* rozumiane jako charakterystyka gospodarki, w której dostęp do miejsc pracy jest zbliżony we wszystkich grupach osób aktywnych zawodowo. Inkluzywność krajowych rynków pracy w UE

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została zdefiniowana w ujęciu statycznym i wieloletnim. W przypadku ujęcia wieloletniego zastosowano statystyczny pomiar α inkluzyjności. Opierając się na zaproponowanych definicjach, opracowano typologię unijnych rynków pracy z uwzględnieniem poziomu inkluzyjności oraz dostępności miejsc pracy dla osób młodych i dorosłych. Na podstawie badania potwierdzono silne zróżnicowanie rynków pracy. Różnice te są widoczne zarówno w poziomie bezrobocia osób młodych i dorosłych oraz reakcji rynków na szoki gospodarcze, jak i w poziomie inkluzyjności rynków pracy.

Słowa kluczowe: inkluzyjność, rynek pracy, bezrobocie, osoby młode, kraje UE

1. Introduction

The labour market is one of the essential driving forces in the economy. The well-being of the residents and the development opportunities of the regions depend on it to a great extent. The employment policy is a type of economic policy which addresses the problem of full employment as its primary goal. The postulates related to the achievement of, *de facto*, possibly high and effective employment include the availability of work for all job seekers, adaptation processes, productivity and equal access to employment according to individual skills. Young people who start their professional career and lay the foundations for their further personal life play a special role on the labour market. The efficient entry into this market forms the backbone of the development of their further professional path.

In turn, unemployment, as indicated by Choudhry et al. (2013, p. 1) 'is detrimental for society from many points of view: it is a waste of resources; it causes a permanent loss of human capital, thus dampening long run growth prospects; it has an impact on health and it diminishes well-being of society (not only for the unemployed); it causes an expansion of fiscal costs for the government (lower taxes and higher expenditures)'. Remaining unemployed in the first years after entering the labour market may have an adverse effect on the development of the entire professional career. It imposes a long-lasting burden on an individual's prospective employment opportunities, future earnings and well-being (Dietrich & Möller, 2016). On the example of Germany, Schmillen & Umkehrer (2017) discovered some long-lasting 'scarring effects' of this type of unemployment. The authors found that each additional day of unemployment during the first eight years on the labour market increases the odds of becoming unemployed in the following 16 years by half a day. This effect is more likely to impact individuals who experience long and repetitive periods of unemployment in the early stage of their professional career.

Supporting young people in their effective entry into the labour market has become one of the crucial political and development priorities at both the EU and national levels. These problems are of particular importance given the trends noticeable in the recent years, including:

- the declining number of young people in the EU (see section 3);
- the continuously deteriorating position of young people on the labour market.

Examining either structural or macroeconomic determinants of unemployment or employment of young people does not always lead to unambiguous conclusions, which may then serve as recommendations on an EU scale. In addition, the situation on individual labour markets is highly diversified and complex. One of the most important correlations between the macroeconomic situation and the situation of young people on the labour market is its strong reaction to economic shocks and business cycles. Additionally, it is worth emphasising that unfavourable trends in the economy and employment tend to affect young people even more strongly (Bal-Domańska, 2021; Bod'a & Považanová, 2021; Choudhry et al., 2013; Dunsch, 2017; Hutengs & Stadtmann, 2013) and an improvement in the unemployment rate of young people came with a certain delay in relation to the economy (Choudhry et al., 2013). A question arises as to what extent the situation of young people differs from that of adults and how inclusive are national labour markets for young people?

The source literature indicates that for the years 1999–2006 the unemployment rate for young people is, on average, twice as high as that of adults (Perugini & Signorelli, 2010). Nevertheless, EU labour markets show quite extensive differences also in this respect.

The aim of the paper is to assess the situation of young people on the EU labour markets. 28 EU member states were selected for the study (Figure 1). The evaluation of the inclusiveness of EU labour markets was based on the most recent data available at the time of the analysis. Ultimately, the study covered 18 years, from 2003 to 2020, which is a sufficiently long period to observe certain changes resulting both from changes in systems (such as countries joining the EU structures) and changes connected with social and economic relations (including those caused by the economic crisis of 2008).

The basic research question is as follows: to what extent is young people's unemployment rate the result of an unfavourable situation on the labour market, and to what extent is it related to the difficult situation of this group of people?

2. Research method

The answers to the formulated research questions were provided using econometric methods that allow the assessment of the diversification and consistency of changes in the unemployment of young people aged 15–24 (YUR) and adults at the age of their highest labour market activity, i.e. 25–54 (AUR). The conducted analysis resulted in the classification of EU countries in terms of how friendly their labour markets are towards young employees.

The study was based on panel data relating to 28 EU countries (including the United Kingdom) for the years 2003–2020. Due to the absence of data for the United Kingdom in 2020, the values from 2019 replaced those in the missing year. The following indicators were used as the basic measures to assess the situation on the EU labour markets:

- YUR – annual unemployment rate of young people aged 15–24;
- AUR – annual unemployment rate of adults at the age of their highest labour market activity, i.e. 25–54.

These indicators are based on the results of the European Labour Force Survey (EU-LFS). The EU-LFS is a quarterly survey, while the annual data contain the four reference quarters in the year. In accordance with this methodology, individuals from the YUR and AUR groups were not employed during the reference week, were actively seeking a job during the past four weeks and were available to begin working immediately or within two weeks. The unemployment rate is the number of unemployed persons as a percentage of the labour force. The labour force is the total number of people who are employed and unemployed (Eurostat, n.d.).

The age range included in the YUR and AUR indicators resulted from the availability of data in the Eurostat database. Thus, the analysis addresses officially defined age groups. It should be noted that in many EU countries, the age of 15–19 is the period of education at the ISCED 3–4 level (e.g. in Poland, education is compulsory until the age of 18), and for people aged 19–24 at the tertiary level (ISCED 5–7). However, those who do not continue education face the issue of entering the labour market.

When designing the research procedure, the goal was to determine the inclusiveness of national labour markets as the inclination of a given economy towards treating young people and adults equally (this procedure may as well be applied to other vulnerable groups of workers). For this purpose, a comparative analysis was carried out to show the degree of the inclusiveness of young people and adults at the age of their highest labour market activity as the absorption capacity of a given labour market. In assessing the inclusiveness of labour markets, the correlation between young people's and adult unemployment rates is of crucial importance, whereas the level of unemployment itself is of lesser importance.

For a more complete understanding of the problem, a typology of the EU countries was created, taking into account their level of unemployment, which was included in the final assessment. The concept of inclusiveness has been defined in both a static and long-term approach.

The stages of econometric analysis included:

1. Determining the groups of countries following a similar path of changes in terms of YUR and AUR.

2. Comparing the level of YA inclusiveness of labour markets – static approach.
3. Typology of countries according to their labour market inclusiveness of young people – static approach.
4. Estimating the labour market inclusiveness of young people at the level of the EU countries – long-term approach.

2.1. Determining the groups of countries following a similar path of changes in terms of YUR and AUR

Based on data series relating to the unemployment rate in the years 2003–2020 and using the k -means method, two independent classifications of the EU countries were developed to analyse the path of changes in unemployment rates. The first classification referred to the paths of changes in YUR and the second took into account AUR. The k -means algorithm (Macqueen, 1967) aims to separate n objects (countries) in k non-overlapping groups as to minimise the distances between the points and the centre of their group. The squared Euclidean distance was used for the classification, while k unique random observations were adopted as the initial group centres. The analysis of the dendrogram prepared using Ward's method allowed determining the number of classes (using an L2 squared dissimilarity measure for YUR = 5,000 and for AUR = 1,000). The division into three groups of countries was adopted for each of the AUR and YUR variables; the number of groups was also indicated as optimal by the Calinski-Harabasz index (Caliński & Harabasz, 1974). Additionally, the defined number of classes is consistent with the results presented by Pennoni and Bal-Domańska (2021).

The purpose of using classification methods (time-series clustering; Aghabozorgi et al., 2015) was to determine groups of countries with a similar unemployment rate throughout the entire analysed period (2003–2020). As a result, regions with similar unemployment paths among young people and adults were obtained.

The calculations were performed using STATA 10 software.

2.2. Comparing the level of YA inclusiveness of labour markets – static approach

For the purposes of this study, the concept of 'inclusiveness of the labour markets' was defined. Inclusive labour markets occur in economies where the unemployment rate is similar in all the economically active groups (e.g. adults, young people or other groups). Non-inclusive markets are characterised by an unemployment rate, which is significantly higher among one group (e.g. young people) than the reference group (e.g. working mobility age).

In order to identify the scale of static inclusiveness in individual years, the YA indicator was used. It represents the relation between young people's (aged 15–24) unemployment rate and the unemployment rate of the population aged 25–54, i.e. at their highest labour market activity, which is usually characterised by the lowest unemployment rate:

$$YA = YUR/AUR.$$

It has been arbitrarily adopted that the indicator level exceeding the value of 2.5 reflects a significantly more difficult situation of young people on the labour market, thus signalling problems with inclusiveness of a given economy. This, on the one hand, allows the identification of a certain level of inequality in the involvement of young people and adults in the labour market, resulting, for example, from different attitudes as well as life and professional choices. On the other hand, this level is so high that exceeding it raises concerns about the disproportions regarding the availability of employment for young people.

2.3. Typology of countries according to their labour market inclusiveness of young people – static approach

The YA indicator and the unemployment rate of the mobile age population (25–54) were used to develop a classification of countries into four groups. This typology takes the form of a statistical assessment of domestic labour markets against the background of the other analysed 27 EU countries in a given year t . The following types of labour markets were distinguished:

- group 1: Favourable labour market, which includes countries presenting a good labour market situation with regard to young people and adults. It encompasses economies in which, in a given year, the AUR was below the median, calculated on the basis of the value for the 28 EU countries, and the YA indicator did not exceed 2.5, indicating a similar situation of young people and adults;
- group 2: Unfavourable for young people, which includes countries whose labour market situation may be described as good in relation to adults (aged 25–54), although with a clearly higher unemployment rate among young people. These economies are at risk of non-inclusiveness. In this group, in the analysed year, the AUR was below the median calculated on the basis of the value for the 28 EU countries, and the YA indicator exceeded 2.5, indicating a clearly more difficult situation of young people compared to that of adults;
- group 3: Difficult labour market, which includes countries with a difficult labour market situation in relation to adults (as a measure of the overall labour market capacity), with relatively small differences between the situation of adults and

young people. This group includes economies characterised by the AUR, which in a given year was above the median calculated on the basis of the value for the 28 EU countries in a given year, and the YA indicator did not exceed 2.5, demonstrating a relatively similar situation of young people and adults;

- group 4: Difficult labour market, particularly for young people, which includes countries whose situation on the labour market is difficult for both young people and adults. It includes economies where, in a given year, the AUR is above the median calculated on the basis of the value for the 28 EU countries, and the YA indicator exceeds 2.5, additionally showing a clearly more difficult situation of young people compared to that of adults.

The adoption of an arbitrary value of the YA indicator, in this case set at the level of 2.5, requires further explanation. As presented above, the existing research shows that, in the long-term perspective, the YUR compared to the AUR is approximately twice as high (Bal-Domańska, 2020; Choudhry et al., 2013; Perugini & Signorelli, 2010). When analysing the period of 2003–2020 statically, the average annual value of the YA indicator for all the studied countries ranged from 2.6 in 2003–2004 up to 3.1 in 2020 (with the median at a very similar level). These values clearly exceeded the long-term estimates. Ultimately, in the study, including the presented typology (Tables 1 and 4), the value of $YA = 2.5$ was adopted.

The countries whose labour markets are included in group 2 (Unfavourable for young people) or 4 (Difficult labour market, particularly for young people) represent non-inclusive economies for young people.

2.4. Estimating the labour market inclusiveness of young people at the level of the EU countries – long-term approach

To identify the scale of the overall inclusiveness in the long-term approach (i.e. using data from the entire analysed period), linear regression models were used, defined as the linear relation of the AUR and YUR:

$$YUR_t = \alpha_0 + \alpha_1 AUR_t + \varepsilon,$$

where the level of the overall inclusiveness is defined by the α_1 coefficient.

The α_1 (marginal) coefficient of inclusiveness provides information on how much the YUR is going to increase/decrease in a situation when the AUR (25–54) grows by 1 unit (percentage point). It was assumed that in countries with a high level of inclusiveness, the α_1 coefficient will not go beyond the value of 1.7, in those with a medium level of inclusiveness the α_1 coefficient will not exceed 2.5, while after surpassing the value of 2.5, the country is considered a non-inclusive market for

young people, i.e. they encounter significant difficulties in entering the labour market, whereas no comparable difficulties are observed for adults.

Estimation techniques for panel data (random effects models) were used to estimate the coefficient at the level of EU countries as well as a group of countries defined by their level of reactivity to crises (Baltagi, 2005; Greene, 2000; Wooldridge, 2009), while the estimation of models for individual countries was based on the Ordinary Least Squares (OLS) method (Asteriou & Hall, 2016).

The results for the random effects model with robust error as well as the estimation with autoregressive disturbance of first order (AR(1) disturbance) were presented to verify the models for the EU and groups of countries based on the panel data approach.

The significance Student's t -test of structural parameter (coefficients), the coefficient of determination (R^2), as well as the Breusch-Pagan tests for heteroscedasticity (Breusch & Pagan, 1979) and the Durbin-Watson test for autocorrelation were used to verify the models for individual countries. In the case of heteroscedasticity the null hypothesis is H_0 : the variance is constant, in other words, it presents evidence against the null hypothesis that $t = 0$ in $Var(e) = \sigma^2 \exp(\hat{y}t)$, where the fitted values are used for \hat{y} . The null hypothesis for the autocorrelation test is H_0 : no first order serial correlation. Robust errors were used to interpret the findings in models where problems with the sphericity of the random term were identified.

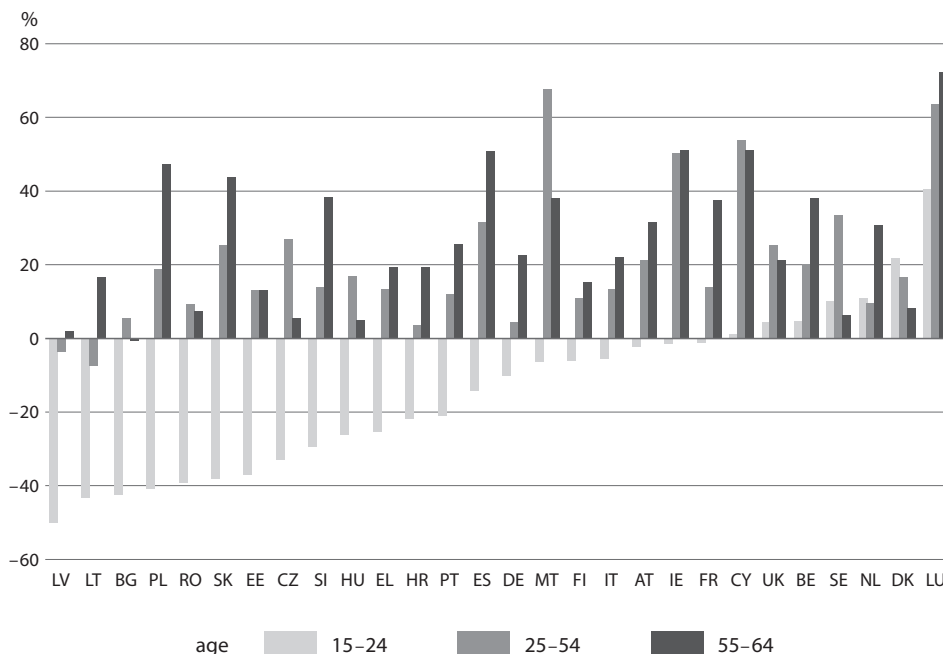
The calculations were performed using STATA 10 and GRETL software.

3. Changes in the structure of the population by working age group

The number of young people aged 15–24 in 2020 in comparison to 2003 has significantly decreased across EU countries (Figure 1), primarily in Bulgaria, Latvia, Lithuania and Poland, where the decline was above 40%. In nine other countries the number of young people decreased by about 30% and only in seven countries the number increased (among them the largest growth, i.e. by about 40% was noted in Luxembourg and by 22% in Denmark). At the same time, the number of people aged 25–54 declined in 17 EU economies (and increased in 11). Only the number of the oldest age group (55–64) went up in 27 out of the 28 member states (a decline of 0.6% was observed only in Bulgaria).

Changes in the age structure of the working population have affected the quality of the available labour and human capital resources, generational replacement, demand for specific jobs and are additionally reflected in an unfavourable situation related to the social insurance policy (taking into account the increasing life expectancy).

Figure 1. Changes in the number of working age people (15–64) by age group in 2020 in comparison to 2003 in 28 EU member states^a



a In the case of the United Kingdom the changes concern the year 2019.

Note. AT – Austria, BE – Belgium, BG – Bulgaria, CY – Cyprus, CZ – Czechia, DE – Germany, DK – Denmark, EE – Estonia, EL – Greece, ES – Spain, FI – Finland, FR – France, HR – Croatia, HU – Hungary, IE – Ireland, IT – Italy, LT – Lithuania, LU – Luxembourg, LV – Latvia, MT – Malta, NL – the Netherlands, PL – Poland, PT – Portugal, RO – Romania, SE – Sweden, SI – Slovenia, SK – Slovakia, UK – the United Kingdom.

Source: author's work based on Eurostat data.

Despite the decreasing number of young people aged 15–24 (which resulted in a reduced demand for jobs in this age group), their labour market situation is not improving. In 2020, the YUR in 27 EU countries reached 16.8% (15% in 2019), the AUR was 6.6% (6.2% in 2019), while among the population aged 55–74 unemployment reached the level of 4.8% (the same as in 2019). The observations above indicate a strong position of people aged 54+, whose situation on the labour market measured by the unemployment rate did not decline due to the COVID-19 pandemic.

4. Classification of EU countries in terms of unemployment rate dynamics

The situation of young people is usually strongly related to the overall situation on the labour market. However, the intensity of the response of labour markets to

economic turmoil is widely diversified between countries. Figure 2 presents an unemployment rate profile in the years 2003–2020 in particular groups of countries. It should be noted that during the period under study, the world economies were affected by two crises: the financial crisis which began on the United States property market in 2008 and the COVID-19 pandemic, which started in 2020 (i.e. in the last year of the analysis).

Following the dynamic approach covering a series of observations for a total of 18 years, three groups of economies were identified based on the value of the adult unemployment rate (AUR groups) and three groups of economies similar in terms of the average level of young people's unemployment (YUR groups).

The Stable group included economies with the lowest unemployment rates and the ones which reacted to the emerging shocks, particularly to the 2008 financial crisis, with a small increase in unemployment. The Reactive group includes a large number of economies with moderate unemployment rates. The last group, Difficult, comprises few countries with the highest levels of unemployment, in which – following a sharp rise in unemployment after the 2008 crisis – the labour market situation remained difficult and never returned to the pre-crisis level.

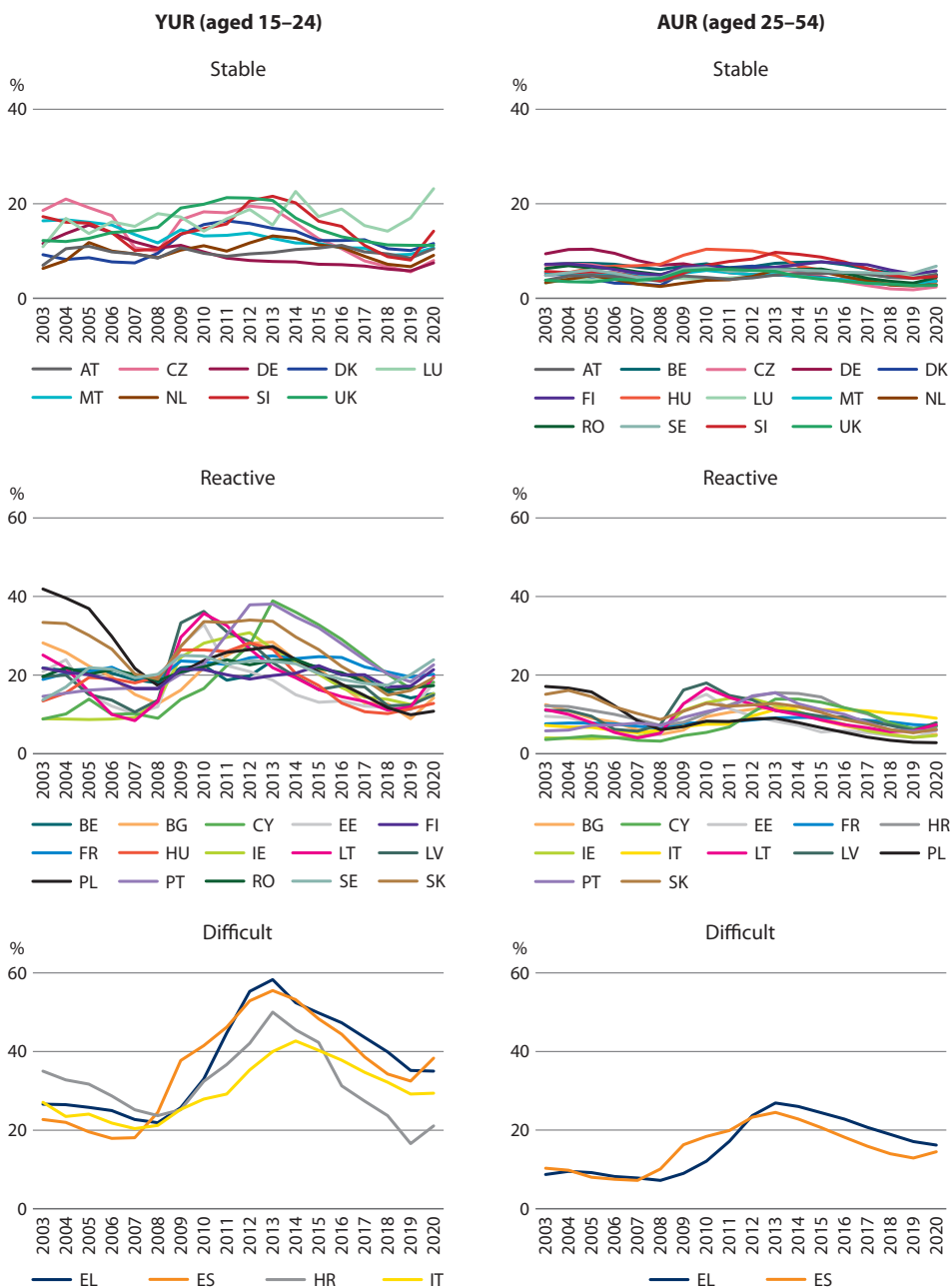
When comparing the unemployment rate profile in the group of young people and adults, some similarities can be observed which are manifested in, for example, the response to the 2008 economic crisis. The primary difference is a clearly higher YUR level compared to the AUR, as well as a much stronger amplitude of changes.

The Stable group relating to young people (Figure 2, YUR (15–24): Stable) consists of nine countries, whose reaction to economic shocks was moderate. All of these countries also belong to the Stable group for adults (AUR (25–54): Stable). One of them is Luxembourg, characterised by a fairly independent trend in its reaction to shocks; however, since 2016 it presented a higher and clearly growing YUR compared to other countries in this group.

Fifteen EU economies were classified to the Reactive group relating to young people, out of which five also belonged to the Stable group for adults (Belgium, Finland, Hungary, Romania and Sweden). The reaction of these economies to the crisis was milder. In the remaining economies of the Reactive group, the YUR was prone to much stronger negative reactions.

In general, the economies of the Reactive group in comparison to the Stable one were characterised by a higher YUR and many of those countries reacted more intensely to the 2008 crisis, which resulted in a significant deterioration of the situation of young people on the labour market.

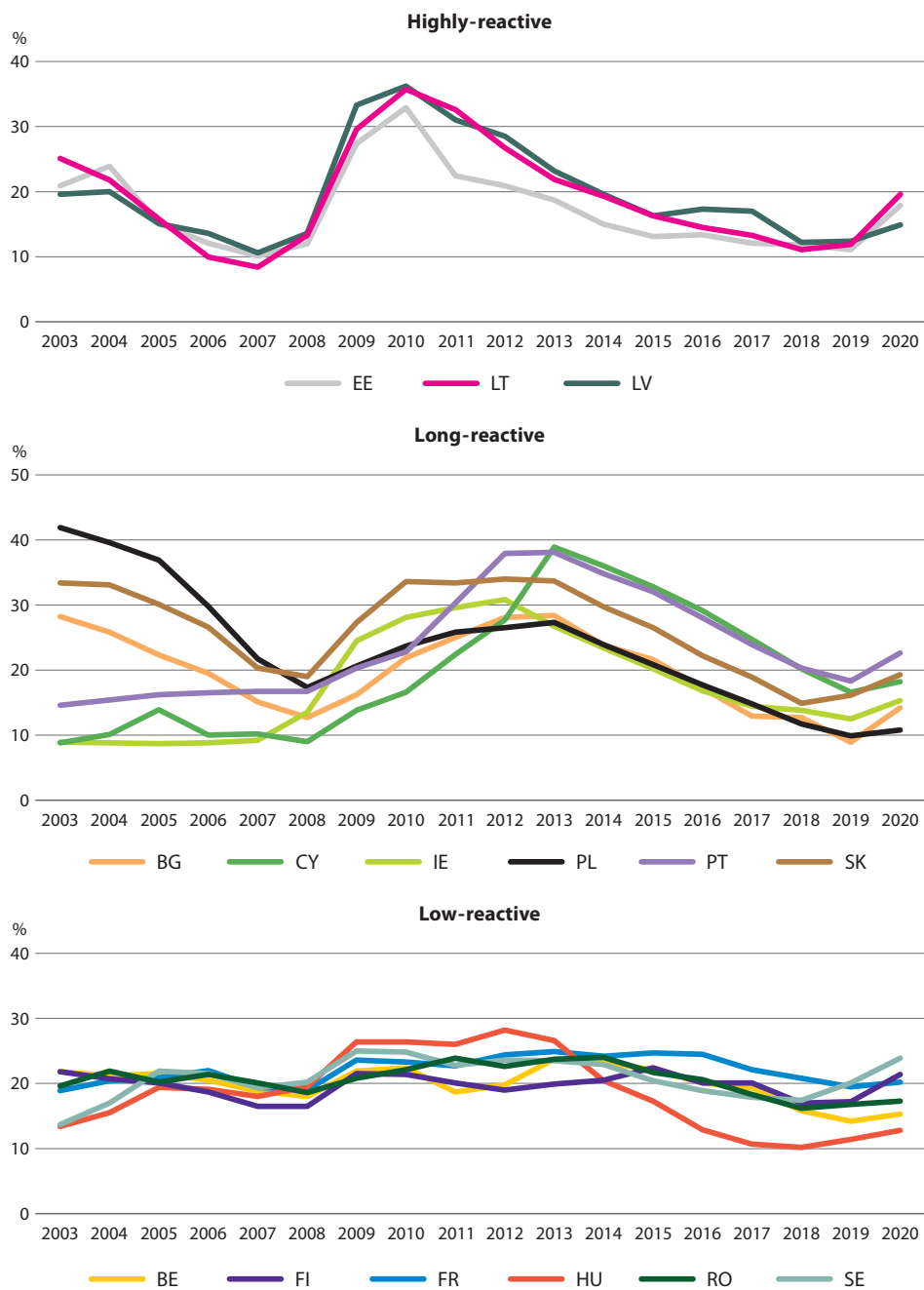
Figure 2. Changes in the YUR and AUR by groups of EU countries in the years 2003–2020^a



^a In the case of the United Kingdom the changes concern the period of 2003–2019.

Note. As in Figure 1.

Source: author's work based on Eurostat data.

Figure 3. Changes in YUR in the sub-groups of the reactive groups in the years 2003–2020

Note. As in Figure 1.

Source: author's work based on Eurostat data.

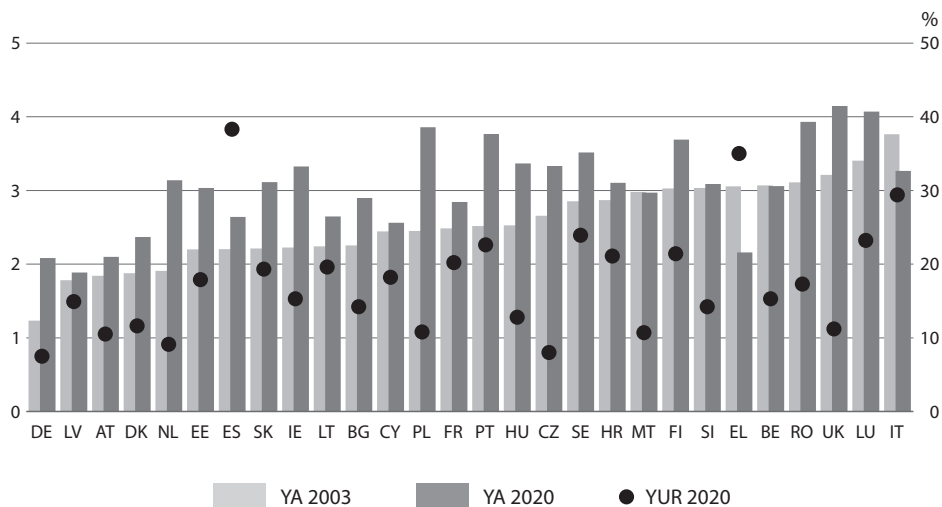
As noted above, not all of the economies included in Reactive group reacted strongly to the crisis. Among them, the Low-reactive economies include Belgium, Finland, France, Hungary, Sweden and Romania, whose growth of YUR in the period 2009–2011 was relatively low. The main difference between the Stable group and Low-reactive sub-group is the level of the YUR, which for the Stable economies ranges from 10% to 20%, while for the Low-reactive countries it is about 20% and more. Another sub-group covers three Highly-reactive economies: Estonia, Latvia and Lithuania. These economies, despite noting an intense increase in YUR in 2009, moved quickly to the stage of recovery from the crisis, unlike the other five economies, where the negative impact of the crisis was experienced until 2013 (Long-reactive sub-group). A detailed characteristic of the Reactive group economies is presented in Figure 3.

The last, Difficult group includes countries whose situation on the labour market was most challenging. These economies reacted very strongly to the 2008 crisis and recorded an increasing unemployment rate until 2013, although even after that period the situation on their labour markets was the most difficult from among all the EU member states (Figure 2). In the case of the AUR, the group of economies in the most difficult situation included two countries: Greece and Spain. In turn, with reference to young people, four economies were listed: Croatia, Greece, Italy and Spain.

5. Typology of EU countries in terms of labour market inclusiveness – static approach

In the recent years, an ongoing deterioration of the situation of young people on the labour markets compared to that of adults, has been observed. In 2003, the YA relation ranged from 1.2 (Germany) to 3.8 (Italy). In 2020, this relation deteriorated in 24 countries and ranged from 1.9 (Latvia) to 4.1 (Luxembourg, the United Kingdom; Figure 4). A decline in the YA relation was recorded in Greece and Italy, whereas in two other countries the situation did not change (Belgium and Malta). The value of the YA relation increased by over 50% in the following five countries: Germany, Ireland, the Netherlands, Poland and Portugal. It is worth highlighting that in the case of Germany, the Netherlands and Poland, the deterioration of the YA relation took place along with a relatively low unemployment rate on their labour markets, also relating to young people (Figure 4).

Figure 4. Comparison of the level of the EU labour market inclusiveness in 2003 and 2020 against the background of YUR in 2020^a



^a In the case of the United Kingdom the changes concern 2019.

Note. As in Figure 1. YA – a static measure of inclusiveness in individual years, representing the relation between YUR nad AUR. Source: author's work based on Eurostat data.

To assess the situation of young people on the labour market, a typology of countries in selected years has been developed (Table 1; the characteristics of individual labour markets are presented in the Research method section).

When comparing the results of the typology for the subsequent years (2003, 2019, 2020), certain changes are observable among the countries included in the particular groups. The first group is characterised by the most favourable situation on the labour market and a high level of the inclusiveness of young people. Here, only Austria was present in each of the analysed three years. The United Kingdom is one of the countries with a good overall situation on the labour market, however, with a clearly worse position of young people. In turn, Latvia, despite its difficult situation on the labour market, could boast a relatively high level of young people's inclusiveness. A large group of countries (i.e. 12) was facing labour market difficulties for years, in particular a high YUR. In each of the analysed years, this group included the following countries: Croatia, Finland, Italy, Portugal and Sweden.

Table 1. Typology of EU countries in terms of the level of inclusiveness of the EU labour markets and YUR – static approach

Type of labour market	Characteristic	2003	2019	2020
		AUR Median 7.1%	AUR Median 4.6%	AUR Median 5.4%
Favourable labour market	good situation in the labour market and low YA relation AUR: good YA: low	Austria Cyprus Ireland Netherlands	Austria Bulgaria Denmark Germany Slovenia	Austria Denmark Germany
Unfavourable for young people	good situation on the labour market with a relatively high YUR AUR: good YA: high	Luxembourg United Kingdom	Czechia Estonia Hungary Ireland Malta Netherlands Poland Romania United Kingdom	Belgium Bulgaria Czechia Hungary Ireland Malta Netherlands Poland Romania Slovenia United Kingdom^a
Difficult labour market	difficult situation on the labour market and low YA relation AUR: high YA: low	Bulgaria Denmark Estonia France Germany Latvia Lithuania Poland Slovakia Spain	Greece Latvia Lithuania	Greece Latvia
Difficult labour market, particularly for young people	difficult situation on the labour market and large disproportions in the YA relation AUR: high YA: high	Belgium Croatia Czechia Finland Greece Hungary Italy Malta Portugal Romania Slovenia Sweden	Belgium Croatia Cyprus Finland France Italy Luxembourg Portugal Slovakia Spain Sweden	Cyprus Croatia Estonia Finland France Italy Lithuania Luxembourg Portugal Slovakia Spain Sweden

a The 2020 values for the United Kingdom typology was based on the 2019 values.

Note. AUR: high – above median; AUR: good – below median. YA: high – above 2.5; YA: low – below 2.5. Countries in bold represent the given type of labour market in all the analysed years.

Source: author's work.

When comparing the size of the groups, a clear decrease is visible in the number of countries with difficult labour market conditions, although with a high level of the

inclusiveness of young people, in favour of an increasing number of countries characterised by a relatively good situation for the adults, but a difficult one for young people. This leads to the conclusion that young people form the weakest group and most severely affected by negative phenomena in the economy. Despite the introduction of numerous EU and national programmes supporting the employment of young people, their situation on the labour market remains unfavourable and continues to decline. In 2020 two groups of countries with low levels of the inclusiveness of young people (Unfavourable for young people and Difficult labour market, particularly for young people) included as many as 23 countries (14 countries in 2003). This situation is largely the effect of a growing gap between YURs and AURs.

6. Econometric assessment of the EU labour market α inclusiveness of young people – long-term approach

In the final stage of the study, an attempt was made to estimate the overall inclusiveness of young people in the EU economies. The estimates included the entire EU28, the groups of countries selected on the basis of the dynamics of changes in the YUR (YUR groups) and for individual economies.

The estimates of the inclusiveness indicator at the EU level (Table 2) are consistent with the findings of other authors relating to other periods (Perugini & Signorelli, 2010) and indicate, on average, an over twice higher YUR compared to the AUR. In the groups selected on the basis of the YUR profile in 2003–2020, the Stable group shows the highest inclusiveness, and the Reactive group – the lowest. In the estimation process using techniques for panel data based on the random effects (RE) model (which the Hausman test suggested as the best), some problems occurred with the autocorrelation of the random term. In order to minimise its negative impact on the estimation results, both models with robust standard errors were used in the inference process and, additionally, models with AR(1) disturbances. The coefficients for two of the three analysed groups of countries in both estimation methods demonstrate a great similarity, which is a credible proof of the stability of the estimates. The exception is the result for the Difficult group, consisting of only four countries, which makes it impossible to fully reliably estimate the value of the inclusiveness parameter. In this case, the discrepancy of the parameter values is large, although each time the values classify this group of economies below the inclusiveness level of the Stable class.

The R^2 statistics higher than 0.7 indicate a good fit of the models to the data. Slightly worse findings were recorded for the Stable group, which resulted in a fairly large confidence interval, showing a wide range of values of the examined parameter.

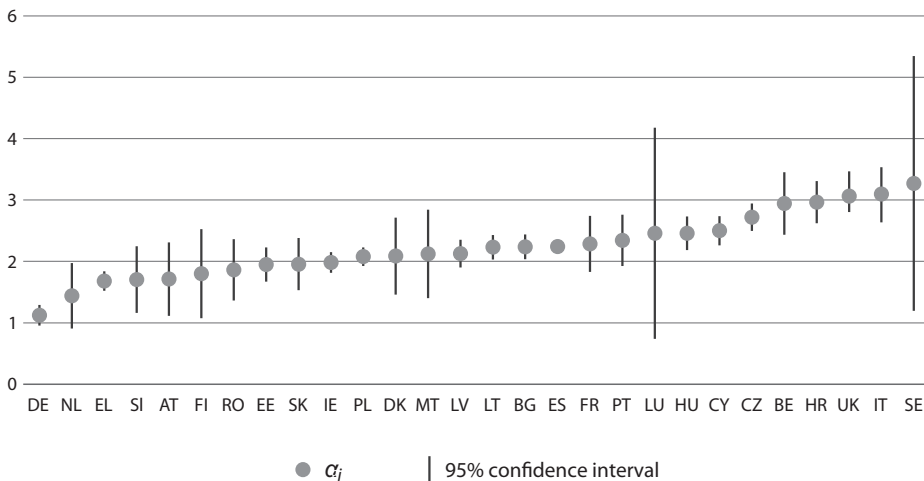
Table 2. Estimates of α inclusiveness based on the data panel in the groups of EU28 countries determined according to the YUR dynamics in the years 2003–2020 – long-term approach based on panel data

Type of countries	α_i inclusiveness coefficient	95% confidence interval	R^2		
			overall	between	within
RE model with robust standard errors					
EU28	2.10	1.89–2.31	0.827	0.772	0.898
Stable	1.83	1.19–2.47	0.313	0.001	0.699
Reactive	2.16	2.04–2.28	0.756	0.219	0.918
Difficult	1.74	1.42–2.05	0.850	0.993	0.916
RE GLS regression with AR(1) disturbances					
EU28	2.13	2.04–2.21	0.826	0.772	0.898
Stable	1.86	1.58–2.13	0.313	0.001	0.699
Reactive	2.14	2.04–2.24	0.756	0.219	0.918
Difficult	2.10	1.88–2.31	0.850	0.993	0.916

Source: author’s work based on Eurostat data.

Figure 5 and Table 3 show the estimates of the economic inclusiveness parameters for individual countries. Depending on the degree of inclusiveness, these values vary from 1.124 for Germany to 3.270 for Sweden.

Figure 5. Estimates of the α_i (marginal) coefficient of inclusiveness (period of 2003–2020) – long-term approach



Note. As in Figure 1.
Source: author’s work based on Eurostat data.

For some estimates, certain estimation problems were encountered, e.g. a low degree of the R^2 fit, which resulted in quite large confidence intervals for the

coefficient of inclusiveness, especially noticeable in the case of Luxembourg, Sweden and several other countries, although to a lesser degree. Other problems concerned the autocorrelation of the random term. Nevertheless, they did not have a significant impact on the values of the coefficients. In order to avoid the undesirable effects, robust standard errors were used in the interpretation of the findings.

For a better illustration of the correlations between YUR and AUR, Figures 5 and 6 show a regression profile for the selected countries.

Table 3. Estimates of α inclusiveness for individual EU economies in the years 2003–2020 – long-term approach

Country	α_i coefficient of inclusiveness ^a	R^2	Breusch-Pagan test (p -value)	AR(1) ^b / Durbin-Watson statistic
Germany	1.124	0.959	0.003	0.211/1.08
Netherlands	1.439	0.671	0.261	0.466/0.79
Greece	1.680	0.956	0.121	0.777/0.46
Slovenia	1.705	0.648	0.544	0.515/0.82
Austria	1.712	0.697	0.279	0.106/1.46
Finland	1.801	0.633	0.362	0.335/1.18
Romania	1.864	0.708	0.180	0.525/0.77
Estonia	1.948	0.933	0.737	-0.108/1.81
Slovakia	1.956	0.820	0.288	0.777/0.45
Ireland	1.983	0.968	0.024	0.986/0.37
Poland	2.078	0.972	0.994	0.804/0.40
Denmark	2.088	0.777	0.316	0.502/0.85
Malta	2.122	0.636	0.069	0.569/0.78
Latvia	2.128	0.961	0.562	0.035/1.84
Lithuania	2.231	0.958	0.754	0.475/1.01
Bulgaria	2.237	0.972	0.339	-0.304/2.25
Spain	2.241	0.986	0.763	0.837/0.45
France	2.287	0.727	0.487	0.490/0.80
Portugal	2.342	0.842	0.353	0.896/0.37
Luxembourg	2.457	0.364	0.143	-0.311/2.33
Hungary	2.459	0.957	0.400	0.164/1.48
Cyprus	2.500	0.969	0.509	0.316/1.32
Czechia	2.722	0.941	0.610	0.523/0.91
Belgium	2.944	0.903	0.489	0.158/1.64
Croatia	2.964	0.954	0.397	0.193/1.59
Italy	3.096	0.913	0.072	0.767/0.47
Sweden	3.270	0.502	0.026	0.671/0.45
United Kingdom	3.065 ^c	0.959	0.329	0.622/0.69

a Significant at the level of 0.004. b AR(1) – first-order coefficient of autocorrelation of disturbance error. c The 2020 United Kingdom estimates were based on values for 2019. For the period 2003–2019 α_i is 3.120.

Source: author's work based on Eurostat data; calculation in STATA 10 and GRETL.

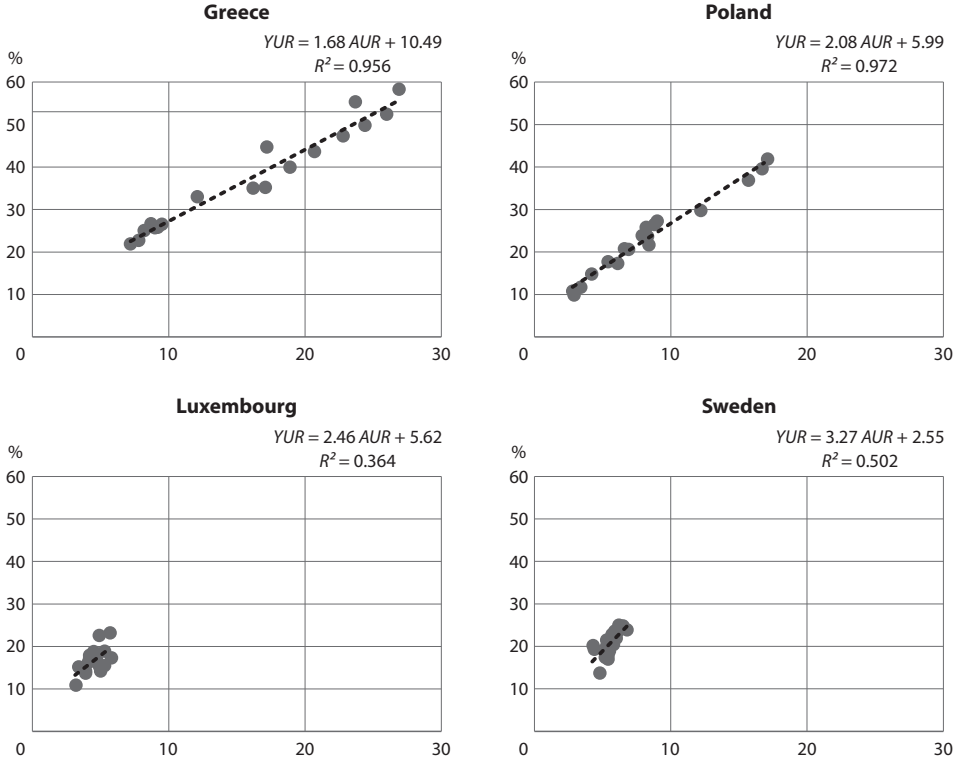
Between the presented regressions (Figure 6), not only different slopes of the straight line are visible (showing a different level of inclusiveness), but also clear differences in the level of the unemployment rate over time. In the case of two

countries, Luxembourg and Sweden, a good situation in the adult labour market is visible (*X* axis) and a relatively high YUR (*Y* axis).

In the case of Luxembourg, the obtained results show a relatively low determination coefficient ($R^2 = 0.364$), suggesting a low level of coincidence between the changes in the situation of young people and adults, and large deviations from the regression line. In this country, the changes in the YUR and AUR occurred to some extent independently.

Greece recorded a high YUR (reaching almost 60% in 2012–2013) and a high AUR (reaching 27% in 2013–2014). The situation in Greece and Poland changed significantly in the analysed period (Figure 6 and 7).

Figure 6. Regression of the inclusiveness for selected EU countries (period of 2003–2020)

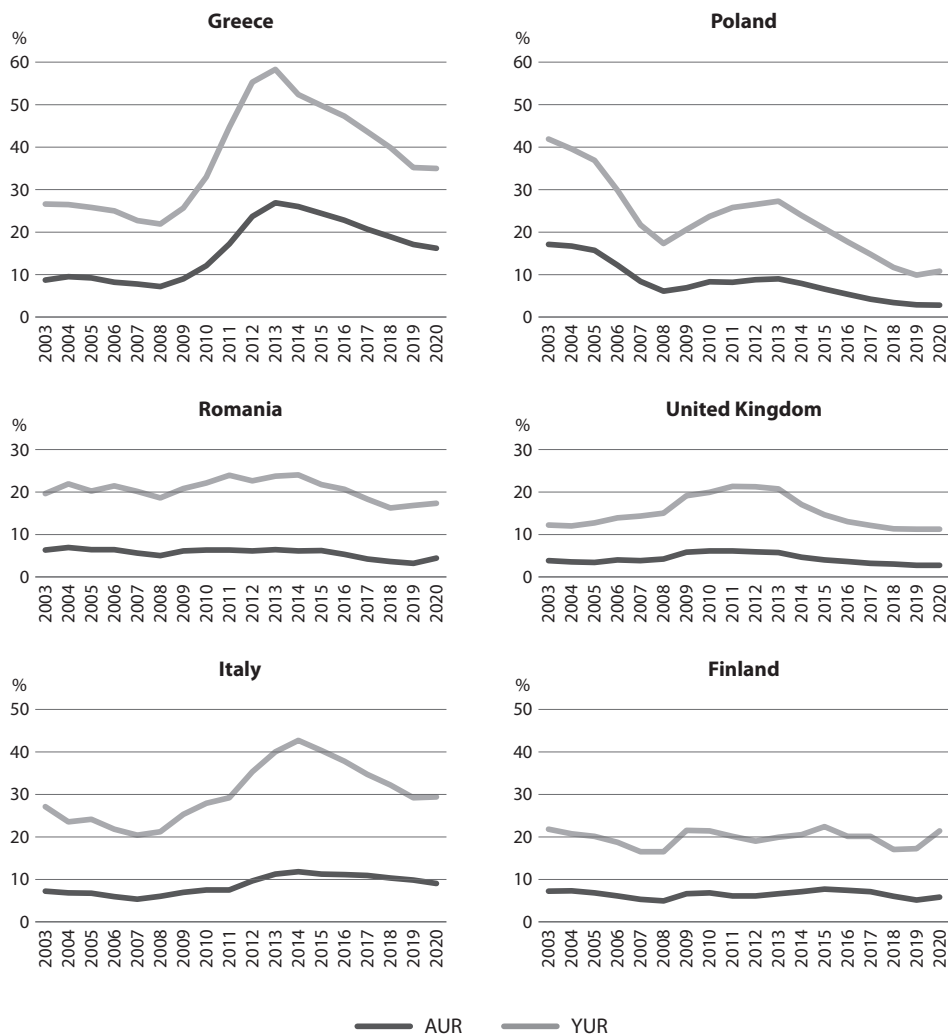


Source: author's work based on Eurostat data.

At the same time, Poland saw an improvement on its labour market (lower unemployment rates), but the differences between the situation of young people and adults (YA: 2003 – 2.5; 2020 – 3.9) increased, and in Greece a significant growth in unemployment rates was observed in both age groups, along with an improvement

in the inclusiveness of young people (YA: 2003 – 3.1; 2020 – 2.2). A difficult situation was observed in Italy, where the level of inclusiveness was very low. A slight decline in the YA correlation was a certain positive signal (YA: 2003 – 3.8; 2020 – 3.3), however, occurring along with high levels of YUR and AUR.

Figure 7. Changes in YUR and AUR values in selected EU countries



Source: author's work based on Eurostat data.

When interpreting the coefficient of inclusiveness, it is worth emphasising that its value is influenced by the consistency of changes in YUR and AUR, i.e. even with a strong, but simultaneous increase in both age groups' unemployment rates, the level of inclusiveness tends to be high (Figure 7 – Finland, Greece and Romania). In turn, when the YUR fluctuates more than the AUR, the inclusiveness level drops (and the coefficient of inclusiveness takes high values). It is also significant to mention here that this is a certain averaging over the entire period.

Summarising the obtained coefficients of inclusiveness, it can be indicated that for the inclusiveness intervals defined in the Research method section of this paper and based on the *a priori* values of 1.7 and 2.5:

- only three countries were classified as presenting a high level of long-term inclusiveness of young people: Germany, Greece and the Netherlands;
- six countries were identified as non-inclusive: Belgium, Croatia, Czechia, Italy, Sweden and the United Kingdom;
- 19 economies were characterised by a moderate level of long-term inclusiveness of young people.

7. Characteristics of the EU labour markets in the context of the situation of young people – summary

The results of the econometric analysis presented above allowed the examination of the EU economies from various angles, including the dynamics of changes in unemployment rates in the studied period (divided into Stable, Reactive and Difficult), the level of the YUR and AUR (typology of labour markets), and also the level of inclusiveness in the static (YA) and long-term (coefficient of α inclusiveness) approach.

Table 4 summarises the most important findings for each country. The first part of the Table shows the results of the long-term analysis (period 2003–2020), the second part addresses the situation in 2020. The countries are presented in groups divided into four types of economies: Favourable labour markets (3 economies), Unfavourable for young people labour markets (11 economies), Difficult labour markets (2 economies) and Difficult labour markets, particularly for young people (12 economies). Comparing the situation in 2020 with the assessment based on the previous years allows for a broader perspective in approaching the problem. Before elaborating on the results presented in Table 4, it is worth devoting attention to the differences in the estimates of the inclusiveness level (coefficient) and the median value determined on the basis of the value of the YA indicator. They result from different interpretations of these values. The median contains information about the average level of the YA indicator in the analysed period. Its values were almost the

same as the arithmetic mean of the YA value. The coefficient of inclusiveness provides information about the consistency of the changes in YURs and AURs and, to some extent, is independent of the initial YA value.

Table 4. Final typology of individual EU economies concerning the level of inclusiveness of young people, of labour market reactivity to crises and the situation of both young people and adults on the labour market

Country	Adult groups	Young people groups	Median YA	α_i coefficient of inclusiveness	State of inclusiveness	YUR	AUR	YA
	2003–2020					2020		
Favourable labour market								
Germany	stable	stable	1.6	1.12	inclusive	7.5	3.6	2.1
Austria	stable	stable	2.1	1.71	medium	10.5	5.0	2.1
Denmark	stable	stable	2.3	2.09	medium	11.6	4.9	2.4
Unfavourable for young people								
Netherlands	stable	stable	2.5	1.44	inclusive	9.1	2.9	3.1
Slovenia	stable	stable	2.2	1.71	medium	14.2	4.6	3.1
Malta	stable	stable	2.8	2.12	medium	10.7	3.6	3.0
Czechia	stable	stable	2.9	2.72	non-inclusive	8.0	2.4	3.3
United Kingdom ^a	stable	stable	3.6	3.06	non-inclusive	11.0	3.0	4.1
Romania	stable	low-reactive	3.7	1.86	medium	17.3	4.4	3.9
Hungary	stable	low-reactive	2.9	2.46	medium	12.8	3.8	3.4
Belgium	stable	low-reactive	3.0	2.94	non-inclusive	15.3	5.0	3.1
Ireland	reactive	long-reactive	2.2	1.98	medium	15.3	4.6	3.3
Poland	reactive	long-reactive	3.0	2.08	medium	10.8	2.8	3.9
Bulgaria	reactive	long-reactive	2.4	2.24	medium	14.2	4.9	2.9
Difficult labour market								
Latvia	reactive	highly-reactive	1.9	2.13	medium	14.9	7.9	1.9
Greece	difficult	difficult	2.5	1.68	inclusive	35.0	16.2	2.2
Difficult labour market, particularly for young people								
Luxembourg	stable	stable	3.7	2.46 ^b	medium	23.2	5.7	4.1
Finland	stable	low-reactive	3.1	1.80	medium	21.4	5.8	3.7
Sweden	stable	low-reactive	3.8	3.27 ^b	non-inclusive	23.9	6.8	3.5
Estonia	reactive	highly-reactive	2.3	1.95	medium	17.9	5.9	3.0
Slovakia	reactive	long-reactive	2.5	1.96	medium	19.3	6.2	3.1
Lithuania	reactive	highly-reactive	2.1	2.23	medium	19.6	7.4	2.6
France	reactive	low-reactive	2.7	2.29	medium	20.2	7.1	2.8
Portugal	reactive	long-reactive	2.6	2.34	medium	22.6	6.0	3.8
Cyprus	reactive	long-reactive	2.6	2.50	medium	18.2	7.1	2.6
Croatia	reactive	difficult	2.9	2.96	non-inclusive	21.1	6.8	3.1
Italy	reactive	difficult	3.6	3.10	non-inclusive	29.4	9.0	3.3
Spain	difficult	difficult	2.4	2.24	medium	38.3	14.5	2.6

a The values for the United Kingdom relate to the 2003–2019 period and to 2019. b Low estimation accuracy.

Source: author's work.

The countries which recorded the most favourable situation on the labour market in 2020 (Favourable labour market group) – Austria, Denmark and Germany – represent economies with stable and relatively resistant to economic shocks labour markets with a high or medium level of the inclusiveness of young people. These countries are characterised by a good labour market situation for both adults and young people.

In turn, two economies – Greece and Latvia – present a generally difficult situation on the labour market compared to the remaining EU countries (Difficult labour market group). They display a very high sensitivity to economic shocks and, at the same time, are characterised by at least an average level of the inclusiveness of young people.

As many as 11 economies were listed among those which, despite the good situation of adults, did not develop appropriate mechanisms for an effective inclusion of young people into their labour markets. As a result, in 2020, in the countries of the Unfavourable for young people group, the situation of young people was clearly adverse, while the situation of adults was relatively good. Most of these economies are either non-inclusive or medium-inclusive. Interestingly, this group included the Netherlands, which was classified among the inclusive economies throughout the entire analysed period. However, in 2020, the YA correlation declined and reached the value of 3.1 against 2.6 recorded in 2019 and, as a result, the country was classified as not very friendly to young people, with a good situation of adults and a high resistance to economic shocks.

The Difficult labour market, particularly for young people group, presenting the most difficult situation on the labour market and a low level of inclusiveness of young people includes 12 economies. Most of them are characterised by low resistance to economic shocks regarding the young people's situation on the labour market, and they are either non-inclusive or with an average level of young people's inclusiveness.

8. Discussion

The presented analysis allows for a comprehensive understanding of the EU labour markets in terms of the position of young people. It is a part of a research trend describing the YUR, which was the subject of numerous studies throughout the late 20th and the beginning of the 21st century. These problems were addressed in, for example: Bruno et al. (2017); Brzinsky-Fay (2017); Dietrich and Möller (2016); European Commission (2011); Hutengs and Stadtmann (2013); International

Labour Organization (2015); Jahn (2018); Mascherini (2018); Organisation for Economic Co-operation and Development (2006); Perugini and Pompei (2015); Perugini and Signorelli (2010) and Pompei and Selezneva (2021).

The presented classification allows for an in-depth description of the EU labour markets in a long-term perspective and also in relation to the final year of the analysis. Going beyond the classic division of countries in terms of the unemployment rate used as a tool for assessing the differences in the situation of the labour markets (e.g. Dietrich & Möller, 2016), the proposed approach allows for a comprehensive description as well as a deeper understanding of the specificity of individual economies.

The analysis focused on the growing inequalities in the situation of young people and adults on the EU labour markets, pointing to the weaker position of the former. This problem was also discussed by other authors: Bruno et al. (2017), Choudhry et al. (2013) and Perugini and Signorelli (2010). The obtained results are consistent with the conclusions presented on the basis of other studies and confirm that the average YUR (long-term approach) at the EU28 level is twice as high as the AUR. At the same time, the analysis goes beyond the scope of the considerations presented so far by introducing the concept of labour market inclusiveness, defining its statistical measures and presenting the data for the 28 EU economies (including the United Kingdom, which was an EU member state in the period covered by the study, except for the last year).

9. Conclusions

The basic conclusion which can be formulated on the basis of the aforementioned considerations is the confirmation of the wide diversity in terms of the situation of individual labour markets. These differences are visible in the level of the unemployment of young people and adults, the reaction of markets to economic shocks and the level of labour market inclusiveness. The markets characterised by high unemployment rates do not have to be by principle non-inclusive for young people, as evidenced by the economies of Greece and Romania. At the same time, economies with low unemployment rates may not necessarily be friendly to young people (e.g. Czechia and the United Kingdom).

The developed typology indicated an increasing problem of the non-inclusiveness of young people in the majority of the analysed European economies. In a long-term perspective, six economies were classified as non-inclusive markets for young people (Belgium, Croatia, Czechia, Italy, Sweden and the United Kingdom). One of the consequences of long-term non-inclusiveness in the analysed period is the over-

reactivity of labour markets to changes in the economic environment related to young people, which is associated with a much faster increase in unemployment rates within this age group. In turn, statistically, as many as 23 economies proved to be non-inclusive in 2020 (in comparison to 19 such economies observed in 2019, before the outbreak of the COVID-19 pandemic). It means that in these countries the unemployment rate of young people was at least 2.5 times higher than the corresponding value for adults, and in seven of them it was at least 3.5 times higher (Finland, Luxembourg, Poland, Portugal, Romania, Sweden and the United Kingdom). In comparison, in 2003, 2006 and 2017, the threshold of 2.5 was exceeded by only 14 economies. When assessing the scale of the problem, it is also worth taking into account the actual unemployment rate level. According to the created typology, 12 countries were classified as Difficult labour markets, particularly for young people, whereas another 11 were included in the group where the difficult situation on the labour market referred primarily to young people (Unfavourable for young people), with a relatively low AUR. The best situation on the labour market, also for young people, was recorded in Austria, Denmark and Germany.

The issue of increasing the inclusiveness of young people in individual economies should become the subject of intensified debate on the EU forum. Recent years have seen the worsening situation of young people compared to that of adults. To some extent, this trend can be attributed to a faster decline in the AUR than in the case of the YUR. However, this does not change the fact that the negative trends observed on the labour market are a dangerous phenomenon, especially considering the declining population of young people.

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References

- Aghabozorgi, S., Seyed Shirkorshidi, A., & Ying Wah, T. (2015). Time-series clustering – A decade review. *Information Systems*, 53, 16–38. <https://doi.org/10.1016/j.is.2015.04.007>.
- Asteriou, D., & Hall, S. G. (2016). *Applied Econometrics* (3rd edition). Palgrave Macmillan.
- Bal-Domańska, B. (2020). The Situation of Youth on the European Labour Markets – Econometric Analyses. *Acta Universitatis Lodzianis. Folia Oeconomica*, 2(347), 23–37. <https://doi.org/10.18778/0208-6018.347.02>.

- Bal-Domańska, B. (2021). The impact of macroeconomic and structural factors on the unemployment of young women and men. *Economic Change and Restructuring*. <https://doi.org/10.1007/s10644-021-09341-9>.
- Baltagi, B. H. (2005). *Econometric Analysis of Panel Data* (3rd edition). John Wiley & Sons.
- Bod'a, M., & Považanová, M. (2021). Output-unemployment asymmetry in Okun coefficients for OECD countries. *Economic Analysis and Policy*, 69, 307–323. <https://doi.org/10.1016/j.eap.2020.12.004>.
- Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. *Econometrica*, 47(5), 1287–1294. <https://doi.org/10.2307/1911963>.
- Bruno, G. S. F., Choudhry, M. T., Marelli, E., & Signorelli, M. (2017). The Short- and Long-Run Impacts of Financial Crises on Youth Unemployment in OECD Countries. *Applied Economics*, 49(34), 3372–3394. <https://doi.org/10.1080/00036846.2016.1259753>.
- Brzinsky-Fay, C. (2017). The interplay of educational and labour market institutions and links to relative youth unemployment. *Journal of European Social Policy*, 27(4), 346–359. <https://doi.org/10.1177/0958928717719198>.
- Caliński, T., & Harabasz, J. (1974). A dendrite method for cluster analysis. *Communications in Statistics*, 3(1), 1–27. <https://doi.org/10.1080/03610927408827101>.
- Choudhry, M. T., Marelli, E., & Signorelli, M. (2013). Youth and total unemployment rate: The impact of policies and institutions. *Rivista Internazionale di Scienze Sociali*, 121(1), 63–86.
- Dietrich, H., & Möller, J. (2016). Youth unemployment in Europe – business cycle and institutional effects. *International Economics and Economic Policy*, 13(1), 5–25. <https://doi.org/10.1007/s10368-015-0331-1>.
- Dunsch, S. (2017). Age- and Gender-Specific Unemployment and Okun's Law in CEE Countries. *Eastern European Economics*, 55(4), 377–393. <https://doi.org/10.1080/00128775.2017.1338962>.
- European Commission. (2011). *Youth on the move: an initiative to unleash the potential of young people to achieve smart, sustainable and inclusive growth in the European Union*. Publications Office of the European Union.
- Eurostat. (n.d.). *LFS main indicators (lfsi)*. https://ec.europa.eu/eurostat/cache/metadata/en/lfsi_esms.htm.
- Greene, W. H. (2000). *Econometric Analysis* (5th edition). Pearson Education International.
- Hutengs, O., & Stadtmann, G. (2013). Age effects in Okun's law within the Eurozone. *Applied Economics Letters*, 20(9), 821–825. <https://doi.org/10.1080/13504851.2012.750416>.
- International Labour Organization. (2015). *Global Employment Trends for Youth 2015*. International Labour Office.
- Jahn, D. (2018). Distribution regimes and redistribution effects during retrenchment and crisis: A cui bono analysis of unemployment replacement rates of various income categories in 31 welfare states. *Journal of European Social Policy*, 28(5), 433–451. <https://doi.org/10.1177/0958928717739249>.
- Macqueen, J. (1967). Some methods for classification and analysis of multivariate observations. In M. L. Le Cam, & J. Neyman (Eds.), *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability* (pp. 281–297). The Regents of the University of California.

- Mascherini, M. (2018). Youth Labour in Transition. In J. O'Reilly, J. Leschke, R. Ortlieb, M. Seeleib-Kaiser, & P. Villa (Eds.), *Youth Labour in Transition. Inequalities, Mobility, and Policies in Europe* (pp. 1–30). Oxford Scholarship Online. <https://doi.org/10.1093/oso/9780190864798.001.0001>.
- Organisation for Economic Co-operation and Development. (2006). General Policies to Improve Employment Opportunities for All. In *OECD Employment Outlook. Boosting Jobs and Incomes* (pp. 47–126). https://doi.org/10.1787/empl_outlook-2006-5-en.
- Pennoni, F., & Bal-Domańska, B. (2021). NEETs and Youth Unemployment: A Longitudinal Comparison Across European Countries. *Social Indicator Research*. <https://doi.org/10.1007/s11205-021-02813-5>.
- Perugini, C., & Pompei, F. (Eds.). (2015). *Inequalities During and After Transition in Central and Eastern Europe*. Palgrave Macmillan. <https://doi.org/10.1057/9781137460981>.
- Perugini, C., & Signorelli, M. (2010). Youth labour market performance in European regions. *Economic Change and Restructuring*, 43(2), 151–185. <https://doi.org/10.1007/s10644-009-9082-8>.
- Pompei, F., & Selezneva, E. (2021). Unemployment and education mismatch in the EU before and after the financial crisis. *Journal of Policy Modeling*, 43(2), 448–473. <https://doi.org/10.1016/j.jpolmod.2019.09.009>.
- Schmillen, A., & Umkehrer, M. (2017). The scars of youth: Effects of early-career unemployment on future unemployment experience. *International Labour Review*, 156(3–4), 465–494. <https://doi.org/10.1111/ilr.12079>.
- Wooldridge, J. M. (2009). *Introductory Econometrics A Modern Approach* (5th edition). South-Western. https://economics.ut.ac.ir/documents/3030266/14100645/Jeffrey_M._Wooldridge_Introductory_Econometrics_A_Modern_Approach__2012.pdf.