Econometric Assessment of the Relation Between the Situation of Youth on the Labour Market and the Macroeconomic Factors Among the Eu Countries

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Abstract

Many countries are experiencing serious problems connected with the youth entering the labour market. Young people, at the beginning of their professional career and also family life, face problems related to entering the labour market, concluding "good" contracts and adequate remuneration. The purpose of the article is to assess the situation of young people in the labour market depending on the selected macroeconomic factors. The analysis was conducted using panel data models. Econometric models allow describing the relation between the changes in the macroeconomic situation of a country (e.g. GDP, unemployment rate) and the professional activity of young people. The assessment covered 28-EU countries in the years 2004-2017.

The conducted analysis shows that the labour market situation (measured by unemployment) is an important factor determining the level of youth unemployment. In the countries with a well-developed education system, characterized by high interest in long-life learning, and also in the countries with well-developed educational capital, approached as the education level of the society, the activity of young people on the labour market is higher. The transformations of national economies towards industry and knowledge-intensive services also have a positive impact on improving the situation of youth. These transformations are visible only when considering the changes over time which took place in individual countries (in terms of their average levels for particular countries it was not possible to confirm their statistical significance in explaining the differences regarding the labour market situation of young people).

Keywords: youth, *NEET*, labour market, macroeconomic characteristics

Introduction

Youth (aged 15–24) unemployment is currently one of the greatest development challenges faced by countries in global terms. The most obvious general labour market characteristic of youth unemployment is its higher rate than that of adults (O'Higgins, 1997). In 2017, youth unemployment rate was 16,8% in the EU-28, compared with 18,8% in 2004, respectively. For comparison, the EU-28 total unemployment rate (aged 20-64) was 7,5% 2017, and down from 9% in 2004. Having considered the *NEET* rate, in EU-28 in 2017 13,4% of people aged 15-29 were neither in employment nor in education or training (in 2004 – 15,3%).

Young people are a priority for the European Union's social vision, therefore the challenge of remedying this situation was taken up by developing methods increasing employment opportunities for young people through ensuring more and equal opportunities for them in education and labour market as well as promoting active citizenship and social inclusion for all young people. The Europe 2020 strategy dedicated two of its flagship initiatives to improve the employment situation of young

people: *Youth on the move European Commission 2010* promoting mobility as the mean of learning and increasing employability and *An agenda for new skills and jobs* (European Commission, 2010). Despite introducing the problem of the youth situation to the respective activities and socio-economic policy, many countries experience both difficult and often deteriorating situation of young people, who encounter the following serious barriers when entering the labour market:

1) directly related to the labour market demand and the economic situation,
2) problems of mid-term educational policy and the adaptation of education to the changing needs and structure of the economy and the labour market, including those related to the quality of education and the skills valuable for an employer,
3) labour market flexibility in concluding contracts and conducting business activities independently.

In turn, the following hopes are pinned on young people:

1) higher creativity, innovation and the ability to use modern solutions and technologies,
2) improved work efficiency, new approach to problems of the company functioning,
3) intergenerational personnel exchange.

The above arguments confirm the need for continuous monitoring of the youth situation on the labour market, conducting research on the factors determining changes in this respect and taking initiatives strengthening the position of young people on the labour market, because from an economic perspective, unemployment may be viewed as unused labour capacity, whereas from the social one – as the growing group at risk of exclusion and poverty.

The subject literature presents many studies identifying factors determining the situation of youth on the labour market. This study is focused on the macroeconomic factors.

O'Higgins (1997) lists aggregate demand as one of the main determinants of youth unemployment. A fall in aggregate demand leads to a fall in the demand for labour in general and consequently for young labour as well as adult workers. The research conducted by Blanchflower&Freeman (1996), Moser (1986), Choudhry et al. (2012) and Pissarides (1986) shows that young people are more likely to quit voluntarily their jobs than older workers. Moreover, the company costs of dismissing young people are lower than for older workers.

Among the economic determinants, the economic growth rate is of key importance for youth unemployment. In the study on the Euro Area, Gomez-Salvador & Leiner-Killinger (2008) find that economic conditions, represented by economic growth, are negatively correlated with the youth unemployment rate, i.e., the youth unemployment rate increases when the economic situation worsens in the zone. Choudhry et al. (2012) find similar results in the recent cross-sectional study. Similar research was also conducted by Tomić (2018) and Dunsch (2016).

Cyclical fluctuations, which cause changes in the youth unemployment rate, remain yet another important factor related to changes in the aggregate demand determining the situation of young people on the labour market. The first reaction of firms to a recession is to cease hiring before commencing on the more expensive procedure of redundancies (O'Higgins, 1997). If more young people seek employment, they are more affected by a freeze in new hires. The vulnerability of young people to changes in the labour market is particularly evident during crises periods, such as e.g. the 1987 stock market crash and the subsequent world recession in the early 1990s, in the late 1970s following the oil crisis of 1973 and the early 1980s after the energy crisis of 1979, and finally 2008 – the most recent financial and economic crisis following the collapse of the US investment bank Lehmann Brothers in September 2008. The researchers draw special attention to the impact of economic crises and depression on the youth situation on the labour market. This type of research was carried out by, e.g., Brada, Marelli and Signarelli (2014), Bell&Blanchflower (2011); Chung, Bekker&Houwing (2012); and Blazek&Netrdova (2012).

Wages can have a negative impact on youth employment in as much as, the higher are the relative wages of youth with respect to those of adults the more incentives there are to employ adults as opposed to youths (O'Higgins, 1997). However, the research conducted by Blanchflower & Freeman (1996) shows that the almost universal fall in the relative wages of young workers, which was recorded in the 1990s in OECD countries, despite being accompanied by a sharp reduction in the relative size of the youth cohort, did not lead to any increase in youth employment rates, which also declined over the period.

The education of young people and the general level of education on the labour market, which somewhat reflects the economy structure and the commitment to knowledge-intensive technologies and services, is of great importance for improving the situation of young people on the labour market. Bal-Domańska&Sobczak (2018) analysed the educational potential, defined as the resource of knowledge and skills in the region expressed by the level of formal education, the scientific potential, and the tendency to continue the improvement of qualifications. The analysis shows that low educational potential on the labour market was accompanied by a relatively weaker position of young people on this market, manifested by higher unemployment rate along with low employment rates for those who did not continue their education.

The research findings also confirm the importance of education for the youth labour market development. Bal-Domańska (2019) analysed the situation of young people on the labour market from the perspective two factors: education level and part-time agreements' popularity. The findings showed, that, along with the increase in education level the employment rates of young people are improving and the popularity of part-time employment improves significantly the situation of young people on the labour market. The results of a different research conducted by Bal-Domańska (2018) indicate that the share of workers with tertiary education employed on the regional market is of lesser importance for the situation of youth on the labour market, whereas the willingness to continue learning is of greater importance. Regional markets with the well-developed formal and non-formal adult education and training facilitates enhance reducing the problem of professional and educational inactivity among young people.

The importance of youth education, VET systems and internships in the workplace are highlighted in the research conclusions presented by Chen (2004), Marques&Hoerisch (2019), Brzinsky-Fay (2017), Antosova (2010).

In his research Chen (2004) shows that technological changes, including higher level of ICT infrastructure, usually improve the professional activity indicators, including those of young people. The importance of changes in employment structure for the situation on the youth labour market is also emphasized in the research by Brad, Marelli&Signorelli (2014).

It is worth continuing the research to assess the impact of macroeconomic factors on the level of youth unemployment. This knowledge will allow taking more effective actions to improve their situation on the labour market. High youth unemployment results in negative effects not only for them, but is also a burden for the entire society. The untapped potential of knowledge and skills presented by young people can be a significant barrier to the socio-economic development of countries and regions.

The purpose of the study is to assess the relation between the situation of young people and the selected macroeconomic factors. The analysis covered the macroeconomic factors affecting directly the level of economic development and the situation on the labour market, such as GDP, the labour market structure associated with its innovation, the expenditure on research and development and the high level of human capital, as well as the ones related to the acquisition and development of skills required on the labour market (the tendency to continue learning and participate in long-life learning). The assessment was conducted using the data panel covering 28 EU countries in the years 2004-2017.

The Background Information and Methodology of The Research

The analysis of the correlation between the situation of youth on the domestic labour markets and the macroeconomic factors was initiated by identifying measures of these phenomena. Ultimately five thematic groups of measures were defined, which characterised (see Table 1):

1. The difficult situation of youth on the labour market (*NEET, UNY*).
2. The level of economic development (*GDP*).
3. The involvement of human capital and knowledge capital *(LLL, EL, RDex, HRST*).
4. Labour costs (*LCpp*).
5. General situation on the labour market (*UNt, Long*).

Table1: The set of indicators characterizing the macroeconomic factors and the situation of young people on the domestic labour markets (Eurostat data)

Measures of the difficult situation of youth on the labour market	
NEET	Young people (15-29 years) neither in employment nor in education and training (*NEET* rates) [yth_empl_150]
UNY	Unemployment rates of youth (15-24 years) (%) [lfst_r_lfu3rt]
Measures of the economy and human capital characteristics	
GDP	Gross domestic product at current market prices [nama_10r_3gdp] Purchasing power standard (PPS) per inhabitant
LCpp	Labour cost for *LCI* (compensation of employees plus taxes minus subsidies) in industry, construction and services (excluding public administration, defence, compulsory social security) as the share of non-wage costs (%)
HRST	Persons employed in science and technology [hrst_st_ncat] From 15 to 74 years Percentage of active population
LLL	Participation rate in education and training (last 4 weeks) (20-64 years) [trng_lfse_04]
EL	Early leavers from education and training (18-24 years) (%) [edat_lfse_14]
RDex	Intramural R&D expenditure (GERD) [rd_e_gerdfund] PPS per inhabitant at constant 2005 prices
Measures of the labour market characteristics	
UNt	Unemployment rates total (20-64 years) (%) [lfst_r_lfu3rt]
Long	Long-term unemployment (12 months and more) [lfst_r_lfu2ltu] Percentage of active population

Source: authors' compilation

The selection of indicators was determined by the substantive premises resulting from the general knowledge of economics, the theory of development and the existing research, and also the factors arising from the estimation conditions related to e.g. undesirable strong correlation of the regressors.

The assessment of correlations between the selected macroeconomic factors and the situation of young people in individual countries was conducted by applying the linear panel models using 3 specifications of macroeconomic variables. Each of them covers the key factors for the characteristics of a different area of the domestic economies. The detailed model specifications for each of the variables characterizing youth on the labour market (*NEET*, *UNY*) were defined as follows:

1. Taking into account the general economic and labour market situation including the educational capital – in this specification the main emphasis was on the level of economic development of the country (*GDP*), the quality of human capital and the willingness to upgrade qualifications (*EL*, *LLL*) and, additionally, the situation of youth was referred directly to the labour market situation (*UNt*):

$$NEET_{it} = a_1\ UNt_{it} + a_2 GDP_{it} + a_3 EL_{it} + a_4 LLL_{it} + a_i + a_t + \varepsilon_{it} \quad (1)$$

$$UNY_{it} = b_1\ UNt_{it} + b_2 GDP_{it} + b_3 EL_{it} + b_4 LLL_{it} + b_i + b_t + \varepsilon_{it} \quad (2)$$

2. Focusing on labour costs, unemployment situation and educational capital – the second specification was extended by the aspects related directly to the labour market, i.e., the importance of labour costs in non-wage costs (*LCpp*) simultaneously taking into account the educational capital characterised by the early school leavers (*EL*) and including unemployment again, this time paying attention to the difficult situation on the labour market expressed by the percentage of people seeking work for a long time (*Long*):

$$NEET_{it} = a_1 Long_{it} + a_2 LCpp_{it} + a_3 EL_{it} + a_i + a_t + \varepsilon_{it} \quad (3)$$

$$UNY_{it} = b_1 Long_{iit} + b_2 LCpp_{it} + b_3 EL_{it} + b_i + b_t + \varepsilon_{it} \quad (4)$$

3. Analysing labour costs and innovation of the domestic markets including educational capital – the specification is entirely focused on the economy and its strengths, i.e. on: the importance of labour costs (*LCpp*), human capital in science and technology (*HRST*), willingness to upgrade qualifications (*LLL*) and expenditure on research and development (*RDex*):

$$NEET_{it} = a_1 LCpp_{it} + a_3\ HRST_{it} + a_4 LLL_{it} + a_5 RDex_{it} + a_i + a_t + \varepsilon_{it} \quad (5)$$

$$UNY_{it} = b_1 LCpp_{iit} + b_3\ HRST_{it} + b_4 LLL_{it} + b_5 RDex_{it} + b_i + b_t + \varepsilon_{it} \quad (6)$$

where: $NEET_{it}$ /UNY_{it} is the observation on the dependent variable for cross-sectional countries i in year t, a_i/b_i represet the unobservable individual specific effects for i-th country in the specification *NEET* or *UNY*, a_t/b_t stand for the unobservable time effects for t-th year and ε_{it} is the remainder stochastic disturbance term specific to country i in year t.

In order to estimate models (1)-(6), the fixed effect model and the LSDV method (least squares with dummy variable) was applied. Fixed effect model is an appropriate specification as the interference is conditional on the particular country. Each time two-way error component regression model was used taking into account a_i/b_i the unobservable individual specific effects for i-th country and a_t/b_t the unobservable time effects for t-th year (Baltagi, 2008). It allowed covering differences in the individual country policy, the level of its development, implemented solutions on the labour market and other phenomena not covered by the model.

The assessment of a given factor importance for the situation of young people was carried out using the classical parameter significance test (Student t-test). In each case, the statistically insignificant variables (p value <0,1) were removed from the model in accordance with the posteriori elimination procedure. To compare the quality of new specifications with the original model, the information criteria were used based on the likelihood function corrected for the number of estimated parameters and the number of observations, i.e., the Akaike information criterion (AIC). Their lower values indicate a better model.

To explain how much of the variability of youth situation, in the period of 2004-2017, can be explained by its correlation with the macroeconomic factors, the coefficient of determination (R^2) was used. In the case of panel models, LSDV R^2 is computed using both the measure of the

individual/time effects and the values of named regressors. R^2 is calculated only based on the coefficients of the regressors.

The estimation correctness of the model parameters depends on the degree of meeting the assumption of the adopted estimation method. Test *F* was applied to assess the significance of the individual effects α_i in *NEET* mode and b_i in *UNY* models (Greene, 2003). Introducing the set of individual effects α_i stands for the country-specific macroeconomic conditions resulting from a particular economic development level, social policy and its tools implemented on the market, cultural patterns, migration background as well as other factors not covered by the model structure. The Wald chi-squared test of the total significance of 0-1 variables for time units with the null hypothesis indicating "No time effects" was used to assess the significance of including time effects α_t/b_t.

Durbin-Watson (*DW*) test statistics (Baltagi, 2008) was used to examine the autocorrelation in fixed effects panel models, defined as the serial correlation strictly in the time dimension of a panel dataset. In order to correct standard errors for model misspecification standard errors robust to autocorrelation and heteroscedasticity were used (Arellano, 2003). It should be noted that the robust approach is not always effective (King, Roberts, 2014).

As a result of the observed problems with autocorrelation of the random component over time, an attempt was made of its respecification by changing the model from "fixed" into a "between" one. Fixed-effects models are designed to study the causes of changes within a country, while the between models focus on the changes among counties. In the case of the recorded problems with autocorrelation over time, they can be limited by reducing the time series to one observation and thus modelling inter-group variability resulting from the differences between countries. However, it should be noted that by doing so the focus of our analysis is shifted from variation in the panel to differences between panels (countries). In the case of "between" estimator, R^2 value was given for each model showing how much of the variance between separate panel units was explained.
All calculations were prepared in GRETL program (Cottrell, Lucchetti, 2018).

The Results of Econometric Modelling of *NEET* And Youth Unemployment Rate Models

The results of model estimations in accordance with (1), (3) and (5) specifications are presented in Table 2, whereas the following (2), (4) and (6) specifications are shown in Table 3. Summing up the quality of the obtained models, it should be noted that:

- in all specifications, the presence of individual and time effects improved the quality of the models; at the same time this result can be treated as the confirmation of the relevance of period-specific and country-specific characteristics influencing the situation of young people on the labour market;
- high level of the analysed phenomena explanation was obtained, taking into account both the variability inside the panel (LSDV R^2 ranged from 0,8 to 0,97) and between the panels (R^2 from 0,37 to 0,93);
- the highest level of *NEET/UNY* variability explanation was achieved in (1)-(4) models which cover the situation on the labour market (unemployment), whereas the lowest in the specifications based only on the factors related to strengths of the economy, innovation and labour costs (5) and (6); this result indicates a strong correlation between the situation of young people and the overall situation on the labour market presented in terms of unemployment;
- for the majority of variables the statistically significant parameters were obtained for the level of at least $p = 0,05$;

- the elimination of no statistically significant variables from the model had little influence on the value of parameters (compared to full specification); at the same time, the information criteria for two models increased slightly, suggesting a small deterioration, while for the another two models declined – the changes in the information criteria values were very small.

- autocorrelation problems in panel time units were recorded in all specifications, the smallest problems were observed for the specifications (1)-(4) taking into account unemployment. It was attempted to solve the problem of autocorrelation by adjusting model specifications, including the dynamics of *NEET* and *UNY* phenomena and macro factors, and also by attempting estimations in the subgroups of countries with a certain level of development, ultimately also using two sub-periods (before and after the 2008 crisis). Unfortunately, the attempts to eliminate autocorrelation completely did not bring satisfactory results. They allowed confirming the correctness of the achieved estimates and the conclusions based on them.

Table 2: *NEET* (LSDV) (HAC robust standard error) models

	Model 1		**Model 2**	**Model 3**
	(all)	(significant)	(all; significant)	(all; significant)
UNt	0,64***	0,667***		
LONG			0,882***	
GDP	-7,6e-05			
LCPP			0,2***	0,347***
RDEX				-0,01***
LLL	-0,129***	-0,136***		-0,197**
HRST				-0,346**
EL	0,197***	0,197***	0,228***	
R^2_LSDV **R^2_within**	0,963 0,82	0,963 0,817	0,943 0,72	0,874 0,384
AIC	1158,2	1162,	1330,1	1641,1
RHO1/DW	0,508/0,783	0,518/0,771	0,539/0,78	0,71/0,477

*Statistically significant at the level of: ***0,01; **0,05; *0,1.*
Source: authors' estimations

Table 3: *UNY* (LSDV) (HAC robust standard error) models

	Model 1		**Model 2**		**Model 3**	
	(all)	(significant)	(all)	(significant)	(all)	(significant)
UNt	1,9***	1,913***				
LONG			2,523***	2,551***		
GDP	2,65e-05					
LCPP			0,192*		0,741**	0,735**
RDEX					-0,032***	-0,031***
LLL	-0,104**				-0,137	
HRST					-1,1**	-1,11**
EL	-0,086		-0,055			
R^2_LSDV **R^2_within**	0,971 0,932	0,971 0,930	0,938 0,852	0,937 0,85	0,763 0,435	0,762 0,433
AIC	1586,8	1591,0	1889,6	1890,9	2417,7	2417,1
RHO1 /DW	0,54 /0,741	0,557 /0,721	0,582 /0,737	0,588 /0,73	0,764 /0,379	0,764 /0,378

Source: authors' estimations

To strengthen the conclusions resulting from the estimations (1)-(6) using the LSDV approach, the results of these models estimations using "between" estimator focused on the differences between macroeconomic factors in individual countries were presented in Table 4.

Most of the estimated "between" models were characterised by a good explanation level of the youth situation through the indicated macroeconomic factors. In particular, it referred to the *NEET* and *UNY* models when they covered unemployment-related factors in their structure (models 1-4). In these models, the coefficient of determination ranged from 66% to 78%. The lowest level of explanation was obtained for *UNY* (5-6) models which, in their structure, included only the factors related to innovation and human capital. In this case, the level of explanation was approx. 30%. Nevertheless, it should be noted that the situation of young people is determined by many factors, and taking into account the correlations with the economy type alone is a narrow approach, limited to the selected market characteristics. Therefore, the achieved explanation level of the differences in the situation of young people on the national labour markets should be considered satisfactory also in this case.

Table 4: *NEET* and *UNY* (between) (only statistically significant factors) models

	Model 1		**Model 2**		**Model 3**	
	NEET	*UNY*	*NEET*	*UNY*	*NEET*	*UNY*
UNt	0,55***	2,07***				
LONG			0,892***	2,732***		
LLL	-0,34***		-0,28***		-0,26**	
HRST					-0,381***	-0,675***
R^2	0,665	0,777	0,663	0,668	0,695	0,324
R^2 adjusted	0,638	0,769	0,636	0,656	0,671	0,298
AIC	137,9	153,2	138,0	164,3	135,3	184,3

Source: authors' estimations

The reduction of variables in the models (to those statistically significant) resulted in a slight improvement of the AIC information criteria value. Similarly to the LSDV models, the parameters of the other variables did not change, which is confirms high quality of the models.

Conclusions of the Econometric Analysis

The developed models allowed confirming the importance of economic determinants for the situation of young people on the national labour markets, including those related to the involvement of human capital in the region, the education and the research potential. The most important conclusions include a strong correlation between the youth situation and the changes as well as the situation on the labour market. The situation of young people is closely correlated with the current level of unemployment, including the long-term one.

Having considered different groups of young people, such as *NEET* or *UNY* both similarities and differences between their situation on the national labour markets can be observed. The most important similarities and differences are presented below.

1. the youth situation on the labour market, measured by the absence of activity (*NEET*, *UNY*), is strongly correlated with the general situation on the labour market related to the scale of unemployment (*UNt*) and the time of being unemployed (Long). The models which take into account unemployment directly allow best explanation of the differences in the situation of youth on the labour market. The situation of young people worsens along with the deterioration of the situation on the labour market, and the worsening of such situation on the labour market by 1 percentage point is manifested by the deterioration of *NEET* indicators by approx. 0,667

percentage point, whereas *UNY* indicators by as much as 2,551 percentage points (ceteris paribus);

2. changes in the *NEET* level can be explained by more macro-factors than the changes in the youth unemployment rate (*UNY*); which suggests the occurrence of a certain behaviour model among young people in the process of making employment decisions correlated with economic conditions;

3. macroeconomic situation improvement (model 3) has a stronger impact on reducing the youth unemployment rate than the *NEET* phenomenon, for example an increase in the importance of labour costs by 1 percentage point results in the *NEET* decline by 0,347 percentage point, whereas the *UNY* phenomenon by 0,739 point (ceteris paribus),

4. lower unemployment rate among young people and lower *NEET* rate was recorded in the economies characterized by higher involvement in knowledge and research-based economy, which is characteristic for (and correlated with) better developed economies; and also in the countries with lower share of labour cost for *LCI* in industry, construction and services in relation to non-wage costs,

5. in the case of *NEET* phenomenon, in addition to the aforementioned factors, the reduction of young people's problems is significantly influenced by more factors, in particular higher participation in education and training (*LLL*) and the tendency to continue education (reducing the percentage of early leavers *EL*), as well as other economic factors (also important for *UNY* rate), such as higher involvement in knowledge and research-based economy, and lower share of labour cost for *LCI* in industry, construction and services in relation to non-wage costs. The statistically significant positive estimates of *EL* variable, showing the share of early leavers, remains in line with the suggestions presented by the authors of the ILO Report highlighting that the length of studies has a positive effect on young people's entry into the labour market (ILO, 2017), in our case on the *NEET* phenomenon. It can also be related to the situation that in the event of difficulties with entering the labour market many young people choose to continue learning (Anlezark, 2011), which reduces the number of inactive people.

The assessment of the relationship between the macro-environment and the situation of young people in the cross-section of countries, based on the "between" estimator, partly overlaps with the LSDV estimates based on the combined variability of the analysed factors (changes over time in 28 countries). Similarly to the LSDV estimator, the differences in the situation of youth are largely due to the overall level of unemployment (*UNt*) and the situation on the labour market (Long), with changes in unemployment having a greater impact on the unemployment rate of young people than the *NEET*. In the countries characterized by higher interest in upgrading qualifications in education and training (*LLL*) and human capital in science and technology (*HRST*), the activity of young people on the labour market is higher (*NEET*).

Conclusion

Referring the obtained results to other studies (presented at the beginning of this paper), it is worth emphasizing the positive impact of knowledge-based economy development and strengthening the quality of human capital for improving the labour market situation of young people.

Both the expenditure on research and development, as well as upgrading qualifications and increasing the quality of capital enhance the reduction of the *NEET* phenomenon and unemployment rate among young people.

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