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# Does the professional activity of older workers contribute to youth unemployment? A cross-section study of European countries

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Considering the most recent changes in the pension systems in Europe, this article aims to evaluate whether there is any relationship between the employment rates of older cohorts and the employment and unemployment rates in the youngest cohorts of a productive age. Its key finding is that there is no evidence that would indicate that the lower professional activity of older people is accompanied by higher employment and lower unemployment among young people. On the contrary, the study reveals that the higher the labour force participation among the elderly, the better the situation for young cohorts in the labour market. As demonstrated by the results of our empirical research, factors such as unfavourable demographics and the inefficiency of government policy aiming at stimulating the development of the labour market influence the prospects of young people entering this market.

**JEL Classifications:** J2, J6, H3

**Keywords:** Retirement, youth unemployment, labour market, cross-country analysis, pension system.

## Introduction

A tendency to raise the retirement age is common for many countries nowadays, and has its origins in the process of the aging of population on the one hand, and on the other in the longer life expectancy and ability to work of individuals. However, this idea usually faces significant public resistance. Both young and old are against a rise in the retirement age. The first group grounds its opposition in an argument that older workers block vacancies for young people, which means that economically active older people reduce the chances of young people in the labour market. The second group states that they will not be able to work until the end of the required period of professional activity, which is limited by a statutory retirement age. Considering the most recent changes in the pension systems in Europe, the purpose of this article is to evaluate whether there is any relationship between the employment rates of older cohorts and the employment and unemployment rates in the youngest cohorts of a productive age.

A literature review presenting the results of theoretical and empirical studies rather leads to the conclusion that higher retirement age and a higher activity rate of older people (in pre-retirement, retirement and post-retirement age) do not have a negative impact on employment of the youngest cohorts. Gruber et al. (2009) analysed the relationship between participation in the labour market of older and younger people on the basis of data from twelve countries. They highlight the fact that in some countries, particularly in Continental Europe, the policy of incentives for older cohorts to leave the labour market to make space for the youngest cohorts was chosen. Today, however, using the same reasoning, in the same countries those incentives introduced for early retirement are

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defended. The authors indicate the limitations of such an approach as a way of stimulating the development of the labour market by recalling the example of the inflow of women into the U.S. labour market in the years 1960-2007, when the rate of female participation in the labour supply increased from 34% to 46%, which was not accompanied by a decline in employment among men. The authors reached similar conclusions by analysing changes in employment rates among men and women in all investigated countries in the years 1983-2004 in Denmark, Japan, Great Britain, Belgium, Sweden, the United States, Canada, France, Germany, Spain and the Netherlands. These results contradict the idea that the vacancies occur only if they have been previously released. There is a question as to why women did not push men out of the labour market. Gruber et al. (2009) suggested that the answer is economic growth, resulting in an increase in the overall number of jobs available. The authors emphasized that they found no evidence to suggest that the increase in employment among older people has a negative impact on supply for the younger work force. On the contrary, these phenomena are positively correlated. However, assuming that the lack of competition in the labour market between old and young results from economic growth, there is a question whether during the period of economic crisis the above findings still hold true and whether the implications for policy makers have changed. Another argument in favour of not raising the retirement age was provided by Crettez and Le Maitre (2002). They stated that the optimal retirement age is an increasing function of the population growth rate if the elasticity of substitution of old agents' labour for young agents' labour is lower than one. An implication of the above statement for policy makers is that it is not so obvious that the retirement age should be raised taking into consideration population decline.

Most empirical studies do not support the idea that older people, remaining longer in the labour market, block vacancies for young, but frequently lead to opposite conclusions. Jousten et al. (2008), based on a regression analysis carried out for Belgium in the period 1983-2004, found that there is no reason to believe that a positive correlation exists between early retirement and employment among young people. Quite the opposite, there is an observable positive correlation between the employment rates among older and younger cohorts. Kalwij et al. (2010), using a dynamic model of labour demand, also suggested that changes in the employment of older workers have a small, but positive impact on the employment of younger workers. However, a few studies (e.g. Boldrin et al., 1999; Hammermesh and Grant, 1979; Hemmermesh, 1987) found no evidence of that positive correlation or negative correlation between the activity of older persons and unemployment among younger people, or it was concluded that it is difficult to assess whether any dependency exists between these variables.

Consequently, the hypothesis verified in this article is that there is no negative correlation between professional activity in older cohorts and employment in economically active younger cohorts, which means that younger and older workers do not compete in the labour market. It should be emphasized that the subject of this article is not the analysis of the factors influencing the employment and unemployment among young cohorts, but we confined our investigation solely to the occurrence of linkage between the rates of employment and unemployment in selected age groups. The empirical analyses presented were based on data from the Eurostat databases in the form of cross-sectional time series (panel data) for the 25 countries in the years 2005-2011.

### **Timing of retirement and social reforms in Europe**

The governments of many countries all over the world are undertaking efforts to raise statutory pension ages in order to deal with impending "pension time-bombs". Such policies are aimed at controlling state spending on pensions and providing a stronger incentive for workers to remain professionally active beyond official retirement ages (Barret and Mosca, 2013). The latter goal raises the question as to whether younger and older people compete for the same vacancies. We analysed the average effective retirement age as a proxy for the actual retirement age in a given country. This can be

perceived as a result of aggregate pension decisions arising from early retirement incentives, as well as decisions to leave the labour market at the time specified by the official retirement age and at an age higher than the statutory retirement age. In contrast to the official retirement age, this reflects the effects of state policy of a systemic nature, as well as other factors affecting the timing of retirement. Table 1 presents the OECD statistics on the average effective retirement age for men and women in 25 European countries. This is defined as the average age of all persons withdrawing from the labour force in a given period. The average is weighted by the proportion of age groups leaving the labour market. Since the 1970s, the average effective retirement age has been reduced gradually. Only in the last decade there has been a noticeable trend back to growth. On average, the effective retirement age for men has increased in the years 2000-2012 by 1.1 years, and for women by 1.5 years, but this is still far below the level of the 1970s.

TABLE 1. AVERAGE EFFECTIVE AGE OF RETIREMENT

	Men					Women				
	1970	1980	1990	2000	2012	1970	1980	1990	2000	2012
Austria	66.8	64.8	62.7	60.3	61.9	64.2	62.6	60.8	58.9	59.4
Belgium	64.1	61.5	58.5	58.5	59.6	62.7	59.0	56.1	57.1	58.7
Cyprus	..	..	69.4	63.9	65.3 <sup>(1)</sup>	..	..	65.1	62.2	60.8 <sup>(1)</sup>
Denmark	68.3	65.5	65.4	63.4	63.4	66.0	64.3	61.9	59.8	61.9
Estonia	68.1	65.5	67.3	61.0	63.6	64.0	60.6	62.1	59.0	62.6
Finland	65.9	65.9	61.3	60.1	61.8	62.0	62.7	60.8	59.9	61.9
France	67.6	63.5	60.0	58.8	59.7	68.2	64.1	60.0	58.9	60.0
Germany	..	..	..	61.0	62.1	..	..	..	60.3	61.6
Greece	67.3	65.9	63.7	63.2	61.9	64.6	63.0	60.9	62.7	60.3
Hungary	69.3	65.2	63.2	58.3	60.9	68.2	61.8	59.0	55.8	59.6
Iceland	..	70.0	71.4	70.3	68.2	..	70.7	70.8	66.4	67.2
Ireland	73.1	68.2	64.0	65.2	64.6	74.6	70.0	63.8	66.0	62.6
Italy	65.0	61.9	61.8	60.2	61.1	61.7	61.6	59.2	58.8	60.5
Latvia	..	..	..	62.2	65.2 <sup>(1)</sup>	..	..	..	59.6	64.5 <sup>(1)</sup>
Lithuania	..	..	..	61.4	61.7 <sup>(1)</sup>	..	..	..	58.7	61.7 <sup>(1)</sup>
Malta	..	..	60.6	62.4	61.0 <sup>(1)</sup>	..	..	61.3	63.1	60.0 <sup>(1)</sup>
Netherlands	66.6	63.0	59.7	60.6	63.6	66.7	64.1	58.8	58.7	62.3
Norway	68.2	67.3	63.3	63.9	64.8	68.2	65.9	62.6	63.7	64.3
Poland	73.6	68.0	66.2	61.6	62.3	72.2	65.1	63.3	59.2	60.2
Portugal	73.1	69.0	65.6	65.1	68.4	72.5	67.9	64.3	62.5	66.4
Slovakia	..	..	..	59.4	60.9	..	..	..	55.9	58.7
Slovenia	..	..	..	61.1	62.9	..	..	..	56.2	60.6
Spain	69.4	64.8	62.9	61.7	62.3	69.0	66.6	64.9	61.9	63.2
Sweden	67.9	65.3	64.2	63.7	66.1	66.6	64.0	62.5	62.3	64.2
UK	67.7	66.0	62.8	62.4	63.7	65.7	62.6	60.7	60.9	63.2
Average	68.4	65.6	63.7	62.0	63.1	66.9	64.3	61.9	60.3	61.9

Source: OECD

Note: The average effective age of retirement is calculated as a weighted average of (net) withdrawals from the labor market at different ages over a 5-year period for workers initially aged 40 and over. (1) denotes data from 2011.

In the face of demographic changes and the reduction of the generosity of public pension systems, it seems that this trend will be reinforced. However, in most European countries, the effective retirement age remains far below the official age, which means that there is still much room for policy makers to provide incentives for older workers to continue their professional activity, and early retirement opportunities can be further reduced.

As previously mentioned, the legitimacy of policy incentives for early retirement is controversial. On the other hand, the situation where older people remain in the labour market longer is undoubtedly beneficial from the point of view of the efficiency of public pension systems but also raises questions about the impact on the demand for younger workers. In some countries, particularly in Continental Europe, a specific economic policy

was implemented aimed at stimulating jobs growth for young people through providing incentives for early retirement (see Gruber et al., 2009; Lefebvre, 2012). Especially from the 1970s to the 1990s, this was the predominant trend. The first signs of reversal of this tendency were evident in the mid-1990s, and changes were introduced a decade later, both in terms of raising the official retirement age, as well as reducing early exit incentives. Ebbinghaus and Hofäcker (2013) distinguished three types of determinants influencing the decisions of individuals regarding the timing of retirement: push factors, pull factors and retention factors. The first two types are part of a policy aimed at the early exit of older workers. The push factors affect adversely the number of jobs available for older people, as a result of - among other things - an actual or incorrectly perceived imbalance between the wages and productivity of older workers. Examples of factors that encourage retirement, namely pull factors, are incentives mainly of a financial nature that make retirement attractive (OECD, 2006). The third type of determinants (retention factors) is supposed to produce the opposite effect - to make older workers stay in the labour market and can be considered as a part of a policy promoting active aging (Walker and Maltby, 2012).

The success of such a policy of incentives, regardless of whether it encourages an early exit or remaining longer in the labour force, can be explained within the framework of the option value model. The study by Boeri and Ours (2008) was dedicated to the concept of option value, describing the decision to retire. The main thesis of the option model is that the individual continues to work, if the expected present value of remaining longer in the labour market is higher than the expected present value of immediate retirement (Stock and Wise, 1990). In line with these findings, Lacomba and Lagos (2009) found the linkages between the official retirement age preferred by workers, and the redistribution level in a pension system. At the macroeconomic level this issue was discussed by Disney (2006), who showed that public pension programmes, especially with respect to its generosity and redistribution level, may affect household saving rates, economic activity and employment rates.

## Competition between young and old workers

The issue raised in the article lies on the border between labour market economics and pension economics, and the main problem here seems to be the question as to whether younger and older workers compete with each other, namely, whether they are substitutes or complements. Subsequently, it allows the question of the impact of older people professional activity on the employment of younger workers to be answered. Kalwij et al. (2010) provided an overview of the previous empirical studies on the substitution of older and younger workers. The results are mixed, as some studies revealed substitutability, but to a different degree, while some suggest that older and younger workers are complementary.

Considering the hypothesis formulated in the first section of this article, it can be assumed that the commonly presented view that older people block vacancies for younger job seekers has little support in economic theory, because this substitution of the older workforce by the younger workforce means in fact that the number of jobs in the economy does not grow. This argument is usually politically motivated, but it is not scientifically justified. It is based on the idea of worksharing. According to this concept, in a given time, a specified amount of work required to produce a given quantity of goods can be shared between the employed and the unemployed. An exchange of jobs can be made between economically active older people who perceive positively their continuing to work and young unemployed people who have a negative attitude to leisure (Kapteyn et al., 2004). The problem of growth in the number of jobs, which is the basis of the thesis of competition in the labour market between the older and younger generations, can also be applied to three hypotheses: naive expectations, adaptive expectations and rational expectations (Branch, 2004; Chavas, 1999; Samuelson and Nordhaus, 2004; Snowdon et al., 1994). Such a thesis can therefore be established primarily on the naive expectation

that the economy is not growing, and its size in the next period will be the same as in the current period. This results in a constant number of jobs. Alternatively, it can be assumed - based on rational expectations - that the size of the economy varies over time, but its growth is not necessarily determined solely by the current and historical rate of increase. The intermediate solution - based on adaptive expectations - is an assumption that the forecast for the future size of the economy can be solely based on the historical data for GDP growth. Only naive expectations can be premises for the correctness of this thesis and these, providing that they are justified, can only be referred to short-term forecasting.

Another important factor, which challenges the argument that older people block workplaces for the young generation, is the imperfectly competitive labour market, reflected, among others, in the imperfect substitutability of older workers by younger ones, for instance as a result of differences in work experience. For this reason, the young are not able to replace the old at their workplaces instantaneously. The exchange is more like a chain process, i.e. experienced people leaving the labour market at retirement age are replaced by others who have experience in a similar position, they again by other people with similar skills. Thus, there is a movement of workers between companies, but all companies require people with experience, rather than high school graduates. This phenomenon is described as the vacancy chain (Blum et al., 1997).

Since connecting the entities representing the supply and demand sides in the labour market does not take place immediately but continues, mainly as a result of incomplete and asymmetric information and the presence of frictions in the labour market, the attempts have been undertaken to model (analyse) this phenomenon using matching models, based on the search and matching theory. The studies of Mortensen and Pissarides (1994) and Pissarides (2000) are considered to be the most recognized developments in this area. In these models, finding a job by the unemployed requires time and much effort and has a friction base. The aforementioned studies emphasized that young people exhibit characteristics that make the unemployment rate in their age group in Europe on average 2.5 times higher than in the older cohorts. Pissarides presented the following causes of this phenomenon:

*“Young workers are at an age when they are uncertain of their skills and their future prospects in the labour market. They need to experiment to discover their true potential. They should be able to take jobs, try them out and leave them if they find they cannot make the best use of their talents. The best labour markets are the ones that enable young workers to try different jobs and settle down to the one that they can do best. A good match with their employer and the job's needs is essential if the young worker is to find job satisfaction and lead a happy professional and social life. The two usually go together and reinforce each other”* (an address to the Senate by 2010 Nobel Economics prize winner, Christopher Pissarides, November 08, 2012).

Among other factors, higher unemployment in young cohorts is explained by their lower level of experience in the labour market and maturity, a relative lack of training, the common use of short-term contracts (which facilitate subsequent layoffs), greater sensitivity of youth unemployment rates to fluctuations in the economic cycle, less experience in seeking work, reduced mobility resulting from having fewer resources and a lack of, or reduced, financial commitments and support of family, which adversely affects the responsibility of young people (Martin, 2009). Ruiz-Quintanilla and Claes (1996) indicated other factors determining underemployment among young adults such as education, occupational group, perception of the labour market, and organizational socialization practices. However, in the case of south-eastern European countries it was observed that higher educational attainment does not necessarily reduce the risk of being unemployed in the youngest cohorts, in contrast to adults, where higher education does reduce the risk of being unemployed (Kolev and Saget, 2005). The negative influence of minimum wages on employment rates among young people is significant as well, but differs across countries (Neumark and Washer, 2004).

On the other hand, in the case of older workers, productivity is an important factor influencing their position in the labour market. Aging can, in fact, affect the productivity

in several ways (Boeri and Ours, 2008). People gain experience as they get older, their skills are growing and they are seen by employers as being more reliable than younger people. However, older employees typically generate higher costs due to their poorer health, and they are less flexible and have limited need for further education or practical training. However, the impact of the age on productivity is not always unequivocal - positive or negative. Thus, it is difficult to clearly assess whether there is a relationship between age and productivity, and hence whether there is an argument for the replacement of older people by younger ones. In the previous literature the results in this area are also not consistent (Boeri and Ours, 2008).

The synthesis of microeconomic theory of production and the subsequent implications for the relationship between unemployment and productivity is presented by Mouhammed (2011). According to this theory, if labor productivity increases by given wage rate, the demand for labor increases. Productivity growth causes an even greater increase in GDP, which again encourages employers to increase employment in order to meet the expected demand. The increase in demand for labor impacts the growth of wages, but if productivity increases more, unemployment decreases. Faster productivity growth determines the growth of employment, which results from the desire of companies to maximize their profits, because under this condition, an increase in production, requiring employment growth, causes an increase in profit. Hiring every additional worker is cost-effective from the point of view of the company. This increase in labor productivity may be due to better use of available resources, new technologies, higher quality of work, which could result from, among others, education and training.

The problem of the interaction between the pension scheme, retirement decisions and the labour market can be considered from many perspectives. We will perceive the pension system primarily on the macroeconomic scale as a tool of current GDP division between the working generation and the generation of retirees (Góra, 2008). The definition on a microeconomic scale is complementary, and states that the pension system is a tool for the allocation of income or consumption smoothing over the life of the individual (Barr, 1993; Barr and Diamond, 2006; Blake, 2006; Góra, 2008). The first definition very clearly explains the origin of both the wages of the younger generation and the capital of the older generation, which are the two factors of production included in the Diamond-Samuelson OLG model (Diamond, 1965; Samuelson, 1958). The second definition can be considered as some kind of disaggregation from the level of GDP division to the level of an individual, who makes decisions about the distribution of current income between consumption and savings in order to smooth consumption over the life cycle. However, this is not just about how much to consume and how much to save, but also about when to stop saving, or when to exit the labour market (to become a member of the older generation according to the OLG model). De La Croix et al. (2013) introduced labour frictions and early retirement decisions in the OLG setup and found that social security changes strongly impact labour supply. Many other researchers such as Batyra et al. (2008), Blake (2006), Buyse et al. (2012), D'Autume (2003), Hansen and Lonstrup (2009), Jaag (2009), and Kulish et al. (2010) employed OLG models to assess the impact of the pension system and retirement age on the labour market.

As mentioned above, the hypothesis tested in this article refers to the competition between the younger and older age cohorts for the same jobs. Discussion of this hypothesis raises the following questions related to this subject:

1. Is the number of jobs in the economy fluctuating or constant? In the first case, young and old do not necessarily compete for the same jobs, in the second one the relation between younger and older is a zero-sum game and young people find jobs, provided that the older ones quit theirs.
2. Does a higher retirement age mean higher unemployment in the youngest economically active cohorts?
3. Considering the pension system as a tool for the division of current GDP between the working generation and the generation of retirees, is the structure of the distribution

correlated with employment and unemployment in the younger cohorts? Assuming that the state pension expenditures relative to GDP are a simplified measure of the tax wedge, which has a negative impact on the economy and the labour market, is the claim that this structure of GDP division impacts the chances of young people on the labour market justified?

Summarizing the theory of economics, particularly with regard to imperfect labour markets, it should be noted that young people are unlikely to compete with older ones for the same jobs. There are many specific factors that significantly determine the employment rates among youths. However, the employment rates in older cohorts are more resistant to these factors. Although there is a movement of persons into the labour market - elders leaving it and younger ones entering it - numerous factors can be specified, including experience and qualities resulting directly from age, which increase significantly the time it takes to replace those approaching retirement age with young people in the labour market. These are the arguments for the correctness of the hypothesis formulated in the introduction.

## Data and model

Our research was carried out using data obtained from the Eurostat statistical database. To verify the main hypothesis, the analysis covered 25 European countries: Austria, Belgium, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. We used the cross-sectional time series (panel data) of selected socio-economic indicators in the years 2005-2011. The examination procedure aimed at verifying the hypothesis formulated in the article, according to the three separate schemes, which have a positive impact on the robustness of the results. In Schemes I and II we evaluated only the relationship between the employment rate of the population aged 15-24, or the unemployment rate in the population under 25 and employment rates in the populations of those aged 55-64 and 65 and over. However, in Scheme III, in addition to employment rates in the populations of those aged 55-64 and 65 and over, we also introduced control variables as explanatory variables, justified by economic theory and studies by other authors.

In Scheme I the following models were built based on cross-sectional data for each year separately:

$$E_{(15-24)i} = \alpha_0 + \alpha_1 E_{(55-64)i} + \alpha_2 E_{(>65)i} + \varepsilon_i \quad (1)$$

$$U_{(<25)i} = \alpha_0 + \alpha_1 E_{(55-64)i} + \alpha_2 E_{(>65)i} + \varepsilon_i \quad (2)$$

In Scheme II we verified additional models with the identical variables but estimated for panel data:

$$E_{(15-24)it} = \alpha_0 + \alpha_1 E_{(55-64)it} + \alpha_2 E_{(>65)it} + v_{it} \quad (3)$$

$$U_{(<25)it} = \alpha_0 + \alpha_1 E_{(55-64)it} + \alpha_2 E_{(>65)it} + v_{it} \quad (4)$$

In Scheme III the following models were estimated:



$$E_{(15-24)it}^{(1or2)} = \alpha_0 + \alpha_1 E_{(55-64)it} + \alpha_2 E_{(>65)it} + \alpha_3 ODR_{it} + \alpha_4 GDP\_g_{it} + \alpha_5 GDP\_pc_{it} + \alpha_6 LP_{it} + \alpha_7 PELM_{it} + \alpha_8 E \& T_{it} + \alpha_9 Edu_{it} + \alpha_{10} RR_{it} + v_{it} \quad (5)$$

$$U_{(<25)it}^{(1or2)} = \alpha_0 + \alpha_1 E_{(55-64)it} + \alpha_2 E_{(>65)it} + \alpha_3 ODR_{it} + \alpha_4 GDP\_g_{it} + \alpha_5 GDP\_pc_{it} + \alpha_6 LP_{it} + \alpha_7 PELM_{it} + \alpha_8 E \& T_{it} + \alpha_9 Edu_{it} + \alpha_{10} RR_{it} + v_{it} \quad (6)$$

Where  $E_{(15-24)it}$ ,  $E_{(55-64)it}$  and  $E_{(>65)it}$  - employment rates for different age groups in country  $i$  in year  $t$ ;  $U_{(<25)it}$  - unemployment rate for the population aged under 25;  $ODR_{it}$  - old-age dependency ratio;  $GDP\_g_{it}$  - GDP growth (%);  $GDP\_pc_{it}$  - real GDP per capita (in Euros per inhabitant);  $LP_{it}$  - labour productivity per person employed (EU27=100) based on PPS per person employed;  $PELM_{it}$  - public expenditure on labour market policies (% GDP);  $E \& T_{it}$  - participation in education and training by those aged 55-64 (%);  $Edu_{it}$  - variable representing persons with upper secondary or tertiary education attainment by age 20-24;  $RR_{it}$  - aggregated replacement ratio;  $\varepsilon_i$  - random component in the model based on cross-sectional data;  $v_{it}$  - total random component in the model based on panel data covering pure random error as well as fixed effects (referring to country  $i$ ) or random effects.

Because of gaps in the data, in Scheme III models were estimated twice - each with two different data sets. Firstly (models with a subscript equal to 1), a set covering 16 countries (we eliminated Belgium, Cyprus, Greece, Iceland, Ireland, Norway, Lithuania, Malta and the United Kingdom) and all eight control variables were used. The second stage (models with a subscript equal to 2) involved a set including 23 countries (Greece and Lithuania eliminated) and 7 control variables (without variable  $PELM_{it}$ ).

In total, 60 models were estimated, including 42 for the cross-sectional and 18 for panel data. The test for the variance of the intercept in groups, the Breusch-Pagan test and the Hausman test were applied at the stage of verification of the models based on panel data and selection the form of the model: with fixed effects (FE) and random effects (RE) (see Ajmani, 2009). The decision to reject the null hypothesis for each test was taken at the significance level 0.05. The choice of such dependent and explanatory variables resulted directly from the research hypothesis. Indicators  $E_{(15-24)}$  and  $U_{(<25)}$  are complementary and describe the situation of the youngest cohorts in the labour market. However, indicators  $E_{(55-64)}$  and  $E_{(>65)}$ , also being complementary in nature, refer to the economic activity in pre-retirement and retirement cohorts. Three research schemes, i.e. the estimation of models based on cross-sectional data for each year separately and then the estimation of models based on panel data, with and without control variables, were aimed at improving the reliability of inference. The results of the three schemes should lead to similar conclusions.

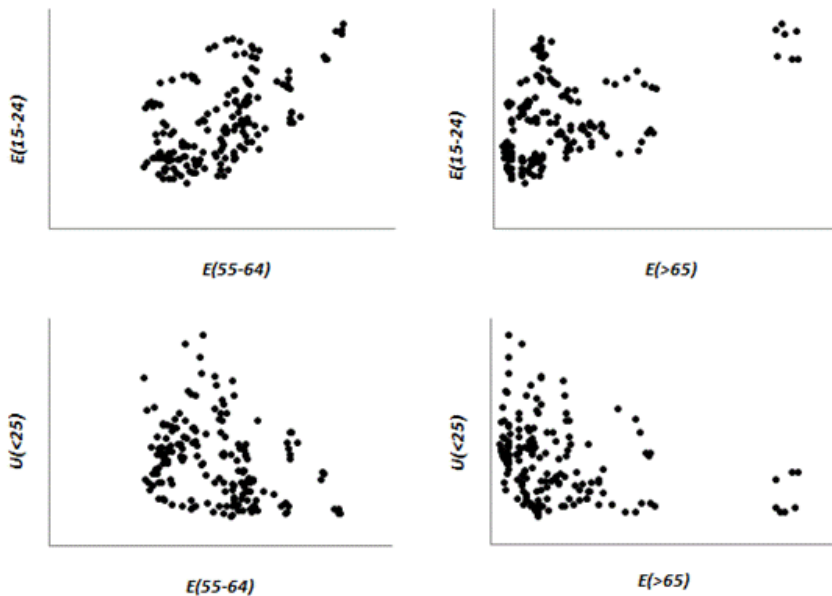
As noted previously, it is not our intention to analyse the factors influencing employment and unemployment among young cohorts, but to assess the relationship between levels of employment and unemployment in selected age groups. Hence, this specific set of explanatory variables was chosen and the estimated regression models only examine the possible relationships between the variables. Our research can be regarded as an extension of the study by Gruber et al. (2009) which was based on similar variables, but conducted only for 12 countries: Belgium, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, Spain, Sweden, the United Kingdom and the United States.

## Results

Estimation of models was preceded by preparation of four scatter charts based on the cross-sectional data for the following pairs of variables:  $E_{(15-24)}$  and  $E_{(55-64)}$ ,  $E_{(15-24)}$  and  $E_{(>65)}$ , as well as  $U_{(<25)}$  and  $E_{(55-64)}$ ,  $U_{(<25)}$  and  $E_{(>65)}$ .

Preliminary analysis of all the plots presented in Figure 1 indicates that there is no noticeable relationship - a higher employment rate in the population of those aged 55-64 and over 65 is not accompanied by a lower employment rate in the 15-24 age group or a higher unemployment rate in the age group under 25 years. In all the charts that include the value of the employment rate of the population aged 65 years and over on the horizontal axis, seven observations clearly stand out. They all represent one country - Iceland, which has an extremely high percentage of economically active population in the 65+ age group. While in the group of investigated countries the average value of the indicator in the given period amounted to 6.5 - 7.5%, in Iceland it was 32 - 35%. Taking into account this significant difference between Iceland and the rest of the group of countries, in the course of estimation we examined whether these observations may affect the inference. It appeared that the interpretation of the parameters obtained in the models estimated including Iceland is consistent with the interpretation of the parameters when Iceland was excluded from the data set.

FIGURE 1. CORRELATION BETWEEN EMPLOYMENT RATES IN THE OLDEST COHORTS AND EMPLOYMENT AND UNEMPLOYMENT IN THE YOUNGEST COHORTS (BASED ON THE 25 EU COUNTRIES)



Source: Eurostat.

The results of the estimation of models including all 25 countries are presented in Table 2 and Table 3. The main findings of our empirical research are in favour of the hypothesis formulated in this study. The signs of parameters next to the variables characterizing the economic activity of people aged 55-64, as well as 65 and over, in models evaluated using cross-sectional data are consistent with the signs of parameter estimates in models for

panel data with or without controls (Table 4). This means that on the basis of three types of models the same conclusions about hypothesis being verified can be drawn. Greater than zero and statically significant parameter estimates next to at least one of the variables  $E_{(55-64)}$  and  $E_{(>65)}$ , in models explaining  $E_{(15-24)}$  in Scheme I and II, indicate that a higher proportion of economically active population in the age groups 55-64 and 65 and over corresponds with a higher employment rate in the 15-24 age group.

TABLE 2. REGRESSION RESULTS FOR CROSS-SECTIONAL DATA (SCHEME I)

Year	Dependent variable	$E_{55-64}$	$E_{>65}$	F-Stat
2005	$E_{(15-24)}$	0.505** (0.237)	0.229 (0.487)	5.859***
	$E_{(15-24)}$	0.582*** (0.169)	-	11.901***
	$E_{(15-24)}$	-	0.944** (0.379)	6.202**
	$U_{(<25)}$	-0.254* (0.123)	-0.046 (0.253)	4.579**
	$U_{(<25)}$	-0.27*** (0.087)	-	9.526***
	$U_{(<25)}$	-	-0.407** (0.196)	4.290**
2006	$E_{(15-24)}$	0.562** (0.238)	0.162 (0.495)	6.686***
	$E_{(15-24)}$	0.616*** (0.166)	-	13.802***
	$E_{(15-24)}$	-	0.983** (0.386)	6.482**
	$U_{(<25)}$	-0.231 (0.118)	-0.04* (0.245)	4.273**
	$U_{(<25)}$	-0.245*** (0.082)	-	8.896***
	$U_{(<25)}$	-	-0.378** (0.185)	4.171**
2007	$E_{(15-24)}$	0.552** (0.249)	0.217 (0.507)	6.587***
	$E_{(15-24)}$	0.628*** (0.171)	-	13.471***
	$E_{(15-24)}$	-	1.019*** (0.383)	7.066***
	$U_{(<25)}$	-0.168 (0.102)	-0.086 (0.207)	3.972**
	$U_{(<25)}$	-0.198*** (0.070)	-	8.058***
	$U_{(<25)}$	-	-0.330** (0.150)	4.855**
2008	$E_{(15-24)}$	0.576** (0.254)	0.180 (0.487)	6.701***
	$E_{(15-24)}$	0.644*** (0.173)	-	13.782***
	$E_{(15-24)}$	-	0.973** (0.368)	6.983**
	$U_{(<25)}$	-0.991 (0.107)	-0.166 (0.205)	2.432
	$U_{(<25)}$	-0.153** (0.074)	-	4.279**
	$U_{(<25)}$	-	-0.291** (0.142)	4.191**
2009	$E_{(15-24)}$	0.493* (0.265)	0.247 (0.494)	4.770**
	$E_{(15-24)}$	0.584*** (0.189)	-	9.603***
	$E_{(15-24)}$	-	0.881** (0.376)	5.507**
	$U_{(<25)}$	-0.010 (0.176)	-0.278 (0.328)	0.752
	$U_{(<25)}$	-0.113 (0.126)	-	0.799
	$U_{(<25)}$	-	-0.290 (0.232)	1.569
2010	$E_{(15-24)}$	0.556** (0.273)	0.241 (0.472)	11.757***
	$E_{(15-24)}$	0.654*** (0.191)	-	5.820**
	$E_{(15-24)}$	-	0.919** (0.358)	6.575**
	$U_{(<25)}$	-0.100 (0.221)	-0.256 (0.382)	1.025
	$U_{(<25)}$	-0.199 (0.155)	-	1.643
	$U_{(<25)}$	-	-0.371 (0.267)	1.933
2011	$E_{(15-24)}$	0.589** (0.273)	0.282 (0.518)	6.368***
	$E_{(15-24)}$	0.692*** (0.193)	-	12.832***
	$E_{(15-24)}$	-	1.059** (0.401)	6.967**
	$U_{(<25)}$	-0.192 (0.229)	-0.206 (0.435)	1.423
	$U_{(<25)}$	-0.267 (0.162)	-	2.715
	$U_{(<25)}$	-	-0.459 (0.311)	2.175

Note: In parentheses parameter estimation errors are given. The asterisks denote corresponding significance levels: \* statistically significant at the .10 level; \*\* at the .05 level; \*\*\* at the .01 level.

TABLE 3. REGRESSION RESULTS FOR PANEL DATA (SCHEME II)

Dependent variable	$E_{55-64}$	$E_{>65}$	FE/RE
$E_{(15-24)}$	0.385*** (0.115)	0.299 (0.270)	RE
$E_{(15-24)}$	0.456*** (0.096)	-	RE
$E_{(15-24)}$	-	0.781*** (0.237)	RE
$U_{(<25)}$	-0.506** (0.206)	-0.882 (0.540)	FE
$U_{(<25)}$	-0.660*** (0.184)	-	FE
$U_{(<25)}$	-	-1.489*** (0.488)	FE

Note: In parentheses parameter estimation errors are given. The asterisks denote corresponding significance levels: \* statistically significant at the .10 level; \*\* at the .05 level; \*\*\* at the .01 level. The last column contains information about the specification of the model. RE denotes random effects and FE denotes fixed effects.

The statistical significance of at least one of these parameters also appeared in some models explaining  $E_{(15-24)}$  in Scheme III. Less than zero and statically significant parameter estimates next to one of the variables  $E_{(55-64)}$  and  $E_{(>65)}$  in models where  $U_{(>25)}$  is regressed, indicate that a higher proportion of economically active population in the age groups 55-64 and 65 and over corresponds with a lower unemployment rate in the 15-24 age group. What is worth emphasizing is that the statistical significance of at least one of these parameters also appeared in almost all models with controls estimated for the unemployment rate in the group under 25. In none of the 60 models were there any significant parameter estimates which would be inconsistent with the above mentioned conclusions, in other words, no model suggests that greater activity in the age groups 55-64 and 65 and over corresponds with a lower employment rate in the age group 15-24 or a higher unemployment rate in the under 25 age group. The analysis of cross-sectional data from the years 2008-2011 revealed additionally that even during the economic crisis, there was no negative correlation between the employment rate of older cohorts and the employment rate of younger cohorts, and a positive correlation between the employment rate of older cohorts and the unemployment rate in younger cohorts. Analysis of the significance of the estimated parameters of models for the cross-sectional data indicates that in the subsequent years there was a noticeable decreasing negative correlation between the employment rate in the age groups 55-64 and 65 and over and the unemployment rate in the age group under 25. However, the positive correlation between the employment rate in the age groups 55-64 and 65 and over and the employment rate in the 15-24 age group did not decline. In models with two variables, the parameter standing by the variable  $E_{(55-64)}$  was statistically significant more often than by the variable  $E_{(>65)}$ . This may suggest that the magnitude of (un)employment among young people is strongly associated with the level of employment in a group of people approaching retirement age rather than the level of employment in the group of people of retirement age and older.

TABLE 4. RESULTS OF THE ESTIMATION OF MODELS FOR PANEL DATA WITH CONTROLS (SCHEME III)

Dependent variable	$E_{55-64}$	$E_{>65}$	ODR	GDP_g	GDP_pc	LP	PELM	E&T	Edu	RR	FE/RE
$E_{(15-24)}^{(1)}$	0,131 (0,093)	0,129 (0,252)	-1,430*** (0,274)	-0,044 (0,044)	1,479*** (0,212)	-0,274*** (0,074)	-3,470*** (0,550)	0,241 (0,177)	-0,206** (0,092)	-5,765 (4,752)	RE
$E_{(15-24)}^{(2)}$	0,129 (0,107)	0,287 (0,219)	-1,988*** (0,325)	0,068 (0,049)	2,401*** (0,262)	-0,315*** (0,064)	-	0,655*** (0,173)	0,025 (0,058)	-6,840 (5,218)	FE
$E_{(15-24)}^{(1)}$	0,153** (0,076)	-	-1,437*** (0,266)	-0,039 (0,043)	1,495*** (0,206)	-0,284*** (0,072)	-3,452*** (0,547)	0,246 (0,172)	-0,226*** (0,085)	-6,514 (4,609)	RE
$E_{(15-24)}^{(2)}$	0,195** (0,095)	-	-2,012*** (0,325)	0,075 (0,049)	2,328*** (0,257)	-0,329*** (0,064)	-	0,638*** (0,173)	0,018 (0,058)	-7,292 (5,221)	FE
$E_{(15-24)}^{(1)}$	-	0,331 (0,208)	-1,247*** (0,238)	-0,063 (0,043)	1,630*** (0,188)	-0,282*** (0,075)	-3,418*** (0,552)	0,183 (0,171)	-0,189** (0,090)	-6,055 (4,808)	RE

TABLE 4. RESULTS OF THE ESTIMATION OF MODELS FOR PANEL DATA WITH CONTROLS (SCHEME III)

Dependent variable	$E_{55-64}$	$E_{>65}$	ODR	GDP_g	GDP_pc	LP	PELM	E&T	Edu	RR	FE/RE
$E_{(15-24)^{(2)}}$	-	0,412** (0,193)	-1,822*** (0,294)	0,052 (0,047)	2,579*** (0,217)	-0,314*** (0,064)	-	0,642*** (0,172)	0,019 (0,058)	-7,309 (5,212)	FE
$U_{(<25)^{(1)}}$	-0,688*** (0,218)	-0,063 (0,546)	1,945*** (0,669)	-0,238*** (0,090)	0,348 (0,703)	0,322** (0,153)	8,058*** (1,316)	0,105 (0,426)	0,051 (0,207)	8,672 (9,613)	FE
$U_{(<25)^{(2)}}$	-0,396** (0,181)	-0,774** (0,370)	2,245*** (0,548)	-0,365*** (0,083)	-2,078*** (0,443)	0,428*** (0,109)	-	-0,503* (0,292)	-0,052 (0,098)	14,027 (8,812)	FE
$U_{(<25)^{(1)}}$	-0,704*** (0,171)	-	1,965*** (0,642)	-0,241*** (0,086)	0,357 (0,694)	0,326** (0,147)	8,062*** (1,308)	0,092 (0,410)	0,058 (0,198)	8,957 (9,243)	FE
$U_{(<25)^{(2)}}$	-0,575*** (0,162)	-	2,309*** (0,554)	-0,383*** (0,083)	-1,882*** (0,439)	0,468*** (0,108)	-	0,458 (0,295)	-0,032 (0,099)	15,244* (8,906)	FE
$U_{(<25)^{(1)}}$	-	-0,472 (0,330)	0,817** (0,327)	-0,142 (0,086)	-1,710*** (0,275)	0,326** (0,128)	6,404*** (1,006)	0,580** (0,245)	0,084 (0,122)	14,338 (8,664)	RE
$U_{(<25)^{(2)}}$	-	-1,155*** (0,331)	1,732*** (0,502)	-0,314*** (0,080)	-2,627*** (0,370)	0,427*** (0,110)	-	-0,463 (0,296)	-0,031 (0,099)	15,470* (8,914)	FE

Note: In parentheses parameter estimation errors and the corresponding significance levels are given: \* statistically significant at the .10 level; \*\* at the .05 level; \*\*\* at the .01 level. The last column contains information about the specification of the model, RE denotes random effects and FE denotes fixed effects.

Analysis of the estimates of models with control variables, presented in Table 4, suggests that regardless of whether there is a causal relationship between the employment rates of older cohorts and the rate of employment or unemployment in younger cohorts, unfavourable demographics, reflected in a high proportion of elderly people in the population, negatively affect the situation of young people in the labour market. The parameter standing at the variable *ODR* was in fact negative and statistically significant in all models for the employment rate of the population aged 15-24, and positive and statistically significant in all models for the unemployment rate under 25. All models with control variables showed a significant negative correlation between labour productivity and the employment rates of younger cohorts and a significant positive correlation with unemployment. At the same time it was noted that according to Eurostat data, in the analysed period in most countries, labour productivity grew more slowly than wages, which, according to the previously described theory, may be a prerequisite for the absence of a positive impact of productivity on employment. The results indicate that there is a negative relationship between public expenditure on the labour market and the employment rate and a positive relationship with the rate of unemployment in young cohorts. This finding suggests the inefficiency of these expenditures, and thus ineffective government policy in stimulating the development of the labour market. This is consistent with the views of Hayek for example, who believed that the main cause of unemployment is too expansive monetary and fiscal policy of the state, impacting negatively the optimal allocation of resources (Mouhammed, 2011). This conclusion also corresponds with the results provided by Abrams (1999), who stated that increase in government size causes expenditure and tax effects that raise the unemployment rate. Also Standing (2011) concluded that most labour market interventions have suffered from high fiscal cost, chronic inefficiency in misuse of resources and in reaching the targeted group of people for whom actions are intended. The other aspect of the labour market interventions identified in the literature, is the lack of a well-defined youth-unemployment policy model at the EU level, even though youth unemployment is one of the most important socio-economic problems, which the European institutions have been trying to solve through the adoption of many initiatives over the last decade (Lahusen et al., 2013).

The factor that has a positive impact on the situation of young people in the labour market (by means of a drop in the unemployment rate) was GDP growth. Higher employment rates and lower unemployment rates among young people were also accompanied by higher real GDP per capita. Rarely are the parameters standing by the

control variables such as  $E\&T$  and  $Edu$  significant. Usually, the parameter standing at variable  $RR$  is also statistically insignificant, but the sign of this parameter is the same for all models for the employment rate and for all models for the unemployment rate and suggests that the generosity of pension systems is not conducive to improving the situation of young people in the labour market.

## Conclusion

In this article we attempted to verify the following hypothesis: there is no negative relationship between professional activity in older cohorts and level of employment (unemployment) in the youngest economically active cohorts, which means the lack of competition in the labour market between the younger and older population for the same jobs. Preliminary findings, based on correlation charts of tested variables, as well as further results obtained using models estimated for cross-sectional and panel data, are an argument for the correctness of this hypothesis. In the course of the study we found no evidence that would indicate that the lower professional activity of older people is accompanied by higher employment and lower unemployment among young people. On the contrary, the study revealed that the higher the labour force participation among the elderly, the better the situation for young cohorts in the labour market. The conclusions reached in the study confirmed, but also generalized, the results of previous studies by Gruber et al. (2009) and Jousten et al. (2008) conducted, however, for a limited number of countries. Additionally, our study brings some further findings, that contribute to the discussion on tackling youth unemployment. The problem for young people entering the labour market is not economically active population approaching retirement age, but particularly unfavourable demographics, resulting, among other things, in higher tax burdens, such as pension contributions in systems based on the pay-as-you-go model, and hence higher labour costs, but also ineffective government policies aimed at boosting the labour market. We also confirmed the hypothesis resulting from the microeconomic theory of production which states that if productivity increases lower than wages, unemployment increases.

These findings can be considered as a challenge to the legitimacy of economic policy intended to encourage older people to leave the labour market (for example through early retirement) in order to produce more workplaces for young people. They are in fact quite opposite and tend to support pension reforms involving the increase in effective retirement age.

Such studies, as described in this article, are usually carried out on the basis of cross-sectional time series, hence we see various possibilities to develop our research in the future. In our view, a similar analysis conducted independently for selected countries on the basis of time series could also be very valuable. However the availability of sufficiently long-term series may be a problem in this case, but the results of such studies would verify our findings, and help to draw more specific conclusions.

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