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How Do Older Workers Impact the Labour Market Position of Younger Workers in Post-Transition Economies?*

W jaki sposób starsi pracownicy wpływają na sytuację młodszych pracowników na rynku pracy w Polsce?

Abstract

We empirically investigate how population ageing influences the labour market position of workers in different age groups. In particular, we examine how an increased share of older workers affects the employment of younger individuals in a post-transition economy. The literature on substitution between the employment of older and younger workers is mostly limited to developed economies. We employ a panel model that controls for potential endogeneity using an instrumental variable approach. Our major conclusion is that there is no evidence that older workers are displacing younger workers. We contribute to the literature on the lump of labour theory in the context of population ageing by providing evidence from a post-transition economy.

Keywords:
older workers, youth employment, demographic change, Polish labour market

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Streszczenie

W przedstawianym artykule badamy, w jaki sposób starzenie się ludności może wpływać na sytuację na rynku pracy osób w różnych grupach wiekowych, w szczególności: jak wzrost udziału starszych pracowników może wpływać na zatrudnienie osób młodszych. Ponieważ dotychczasowa literatura na temat substytucji pomiędzy zatrudnianiem starszych i młodszych pracowników skupiała się na gospodarkach rozwiniętych, analizujemy dane z polskiego rynku pracy. W naszym podejściu badawczym wykorzystujemy model panelowy, kontrolując potencjalną endogeniczność przy użyciu podejścia opartego na zmiennych instrumentalnych. Mimo że nie znajdujemy bezpośrednich dowodów na poparcie tezy, że starsi pracownicy wypierają młodszych z rynku pracy, niniejszy artykuł wnosi wkład do literatury dotyczącej teorii *lump of labour*.

Słowa kluczowe:
starsi pracownicy, zatrudnienie młodych, zmiana demograficzna, rynek pracy w Polsce

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Introduction

Ongoing demographic changes in developed economies have a significant impact on the labour market. Perhaps the most prominent of these changes is population ageing, a well-documented and widely discussed process. Numerous factors, including declining fertility rates and increasing life expectancy, contribute to a constant decline in the share of working-age people. Population ageing is causing a shift in the age structure of the labour force, with an increasing proportion of older workers. In many sectors of ageing economies, older workers constitute a significant proportion of the labour force, a share projected to increase further in the coming years.

However, demographic profiles vary across countries. Many high-income, developed nations have experienced decades of low fertility rates alongside high and still rising life expectancies. In contrast, in many developing countries, including former transition economies in Central and Eastern Europe, fertility rates started to decline more recently, and life expectancies, while steadily increasing, remain lower.

In countries facing the pressure of population ageing, concerns are sometimes raised that increasing workforce participation among older individuals and their prolonged employment due to a delayed exit from the labour market may reduce entry-level job opportunities for younger workers. A key question is whether the growing proportion of older workers in the labour force and their delayed retirement could reduce job opportunities for younger workers, contributing to increased unemployment rates and stunted career paths. The possible employment trade-off between young and older workers has important policy implications. Therefore, it is crucial for economists and policymakers to properly understand the relationship between labour force participation for older and younger populations and to implement strategies that enhance the welfare of both individuals and the economy. These concerns are particularly pronounced in countries with high youth unemployment rates.

This paper investigates the "lump of labour" theory to assess whether increased labour force participation among older workers negatively affects the labour market activity of younger workers in an economy that has transitioned from a centrally planned system to a market-oriented one. We expect this theory to be fallacious for Poland, as it is in other developed countries. In particular, we aim to answer the following research questions: First, do older workers crowd out younger ones in Poland? Second, can older, experienced workers and younger, inexperienced workers be treated as substitutes? If so, to what extent?

For our analysis, we use a database from the Local Data Bank of Statistics Poland (GUS), the national statistics office. We use NUTS 2 units, as defined by the European Union's Eurostat statistics agency, as the basic regional classification for policy application. We employ a panel model and an instrumental variables (IV) technique.

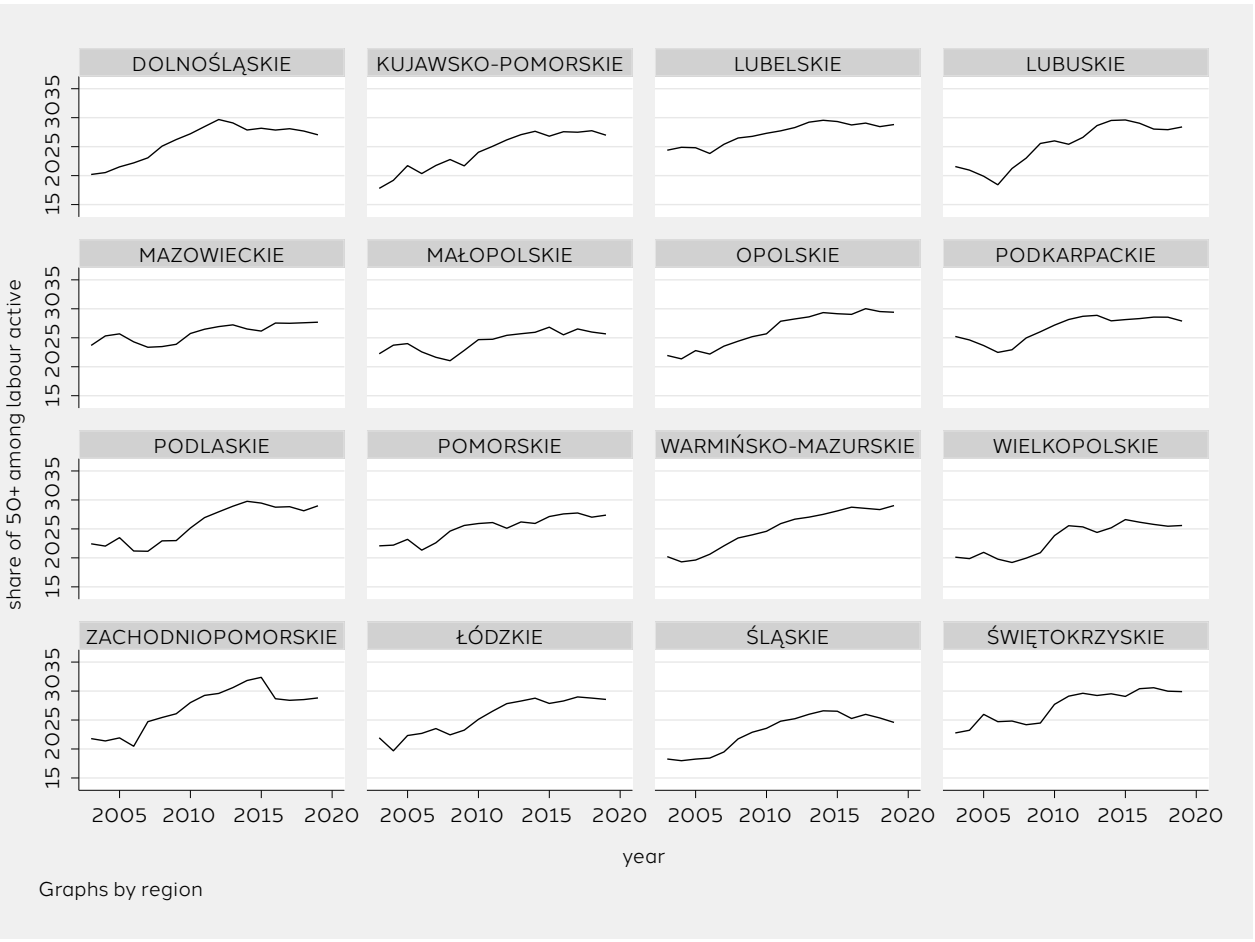
The remainder of this paper is organised as follows: Section 2 presents some stylised facts justifying the choice of Poland. Section 3 summarises the literature on the relationship between older and younger workers' employment. Section 4 outlines the empirical strategies and describes the data. Section 5 presents the results of the model. Finally, Section 6 concludes the paper, discussing limitations and policy implications.

The case of Poland

Poland stands as a remarkable example of economic progress since the 1990 s, undergoing substantial transformations, including improvements in labour market conditions. Despite some regional disparities, the country has maintained consistently low unemployment rates over the past decade. Poland's unemployment rate has remained below the EU average since 2012 and, in recent years, has been among the lowest in the bloc. In 2020, Poland had one of the lowest unemployment rates in the EU at 3.2%. Youth unemployment (ages 15–29) also remained below the EU average, standing at 3.6% in 2020 compared with the EU average of 7.2%.

Although youth unemployment appears to be less of a concern in Poland, the country is undergoing significant demographic changes. The proportion of people aged 65 and older was 18.2% in 2020, below the EU average of 20.6%. However, a different picture emerges when considering the rate of change. From 2010 to 2020, Poland experienced the fastest increase in this metric among all EU countries (38%, compared with the EU average of 18.2%). Population ageing in Poland is progressing more rapidly than in other EU countries, and projections indicate that Poland will soon be among the EU nations with the oldest populations. Observing labour market trends (Figures 1 and 2) reveals that the Polish labour market is undergoing gradual changes. In almost all NUTS-2 regions, the employment rates for both older and younger workers follow an upward trajectory, despite minor regional differences.

Figure 1. Labour activity of older workers by NUTS-2 region



Source: Authors' own computations based on Statistics Poland data.

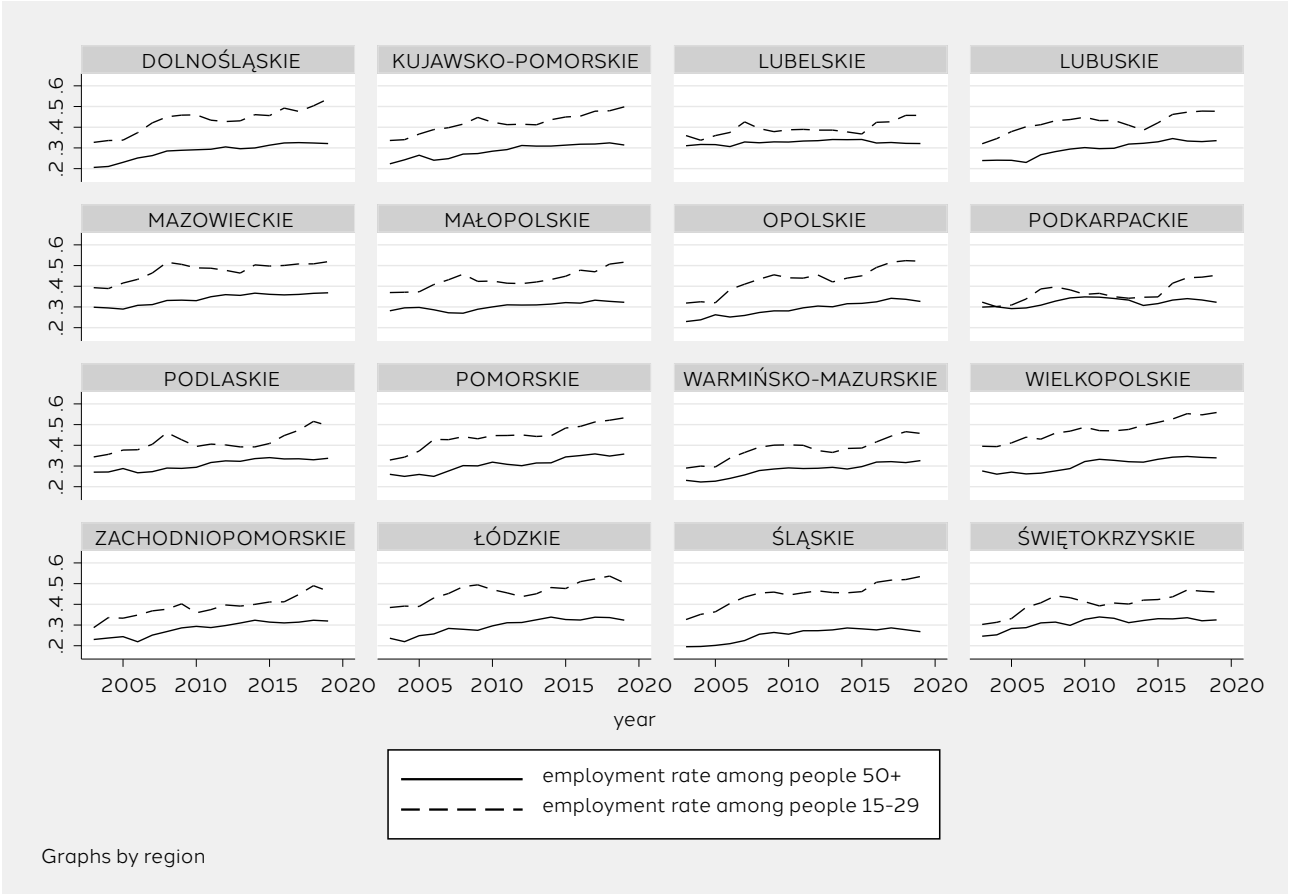
Numerous empirical studies have examined the correlation between older and younger individuals' labour force participation (see, e.g., **Gruber, Wise [2010]**). However, to the best of our knowledge, Poland – the largest post-transition economy in Eastern Europe – has not yet been analysed in this context, particularly at the regional level.

Poland is a particularly relevant case for this analysis for two main reasons. First, its population is ageing more rapidly than in most other nations. Poland has faced notable demographic shifts, including an ageing population and migration trends. These demographic factors play a crucial role in shaping labour market outcomes and are essential for understanding the broader economic landscape. Poland's age pyramid remains shaped by historical events, with distinct peaks and troughs reflecting the demographic impact of the world wars. Fig. 1 presents the share of people aged 50 years and above (henceforth, the "older age group") among the

labour-active population in Polish NUTS-2 regions[1] (voivodships). In most regions, this share has increased over the last 20 years. Alongside changes in the age structure of the labour force, there have also been shifts in older workers' labour market activity patterns. As depicted in Fig. 2, the employment rate of people aged 50 and older has increased in most Polish NUTS-2 regions over the past two decades. Poland is confronted not only with a rising employment rate among older people, but also with a growing proportion of older workers active in the labour market. For our analysis, it is essential to recognise that Poland is not only experiencing an upward trend in the employment rate of the older cohort, but also seeing similar changes in the employment rate of the younger cohort (aged 15–29 years). Although the employment rate of younger individuals has been visibly higher than that of older individuals across all regions, both groups appear to follow a similar upward trend in most regions.

Another factor in favour of Poland as an economy of interest is the early exit age from the labour market, especially for women, and the low activity rates, especially among older people. Moreover, activity rates remain low even though the unemployment reduction has been largely driven by employment growth. Although labour force participation rates among older cohorts have increased significantly since the mid-2000 s, leading to higher employment rates, they remain low compared to most developed countries.

Figure 2. Employment rate among young and old workers



Source: Authors' own computations based on Statistics Poland data.

One reason for Poland's low activity rate is the relatively high share of older workers in temporary jobs or self-employment compared to the OECD average, coupled with a low incidence of part-time work. To promote longer working lives, the OECD recommends several measures to reduce significant employment dis-

[1] Even though Mazowieckie, the capital region, has been divided into two statistical regions since 2018 – namely, Capital NUTS91 and Regional NUTS92 – for consistency over time, we treat them as a single unit.

parities based on gender, age, and education [**OECD, 2015**]. Specifically, the **OECD** [**2018**] highlights that Poland's limited use of flexible, part-time employment arrangements may pose challenges for older workers. These recommendations urge research on labour market participation across different cohorts, among other areas of study.

Until now, Poland has typically been included in broader panel studies rather than being analysed in isolation. However, these studies do not fully account for the unique characteristics of demographic ageing in Poland, especially given that the country is projected to experience a more pronounced ageing rate in the coming years compared to many other European nations. According to Eurostat population projections, the percentage of people aged 65 and over in Poland is expected to increase at a faster pace than in some other developed countries. This trend makes the issue of population ageing particularly critical, necessitating focused attention and tailored policy responses.

Relationship between employment rates in different age groups – what does the literature say?

As stated in the Introduction, one of the objectives of this study is to empirically test the lump of labour theory in a country that has undergone an economic transition from a centrally planned economy to a market-oriented one. Although, as **Boeri et al.** [**2022**] accurately state, the lump of labour concept can be shown to be fallacious on the basis of any undergraduate economics textbook, we believe that understanding it is important for grasping the economic justification behind the introduction of early retirement programmes in many European countries. An **OECD** [**2021**] report states that recent pension reforms have focused on adjusting retirement ages, extending early retirement options, and modifying benefits and contributions in earning-related schemes, including encouraging the combination of work and pensions. The theoretical foundation of the lump of labour theory rests on the assumption that there is almost perfect substitutability between younger and older workers. According to this view, younger workers would only enter the labour market after older workers exit and make room for them. This claim is based on two main assumptions: first, that a fixed amount of work must be performed in the economy, and, second, that workers of different age groups are substitutable.

However, a number of theoretical and empirical studies have cast doubt on this theory by challenging both the claim of a fixed amount of work in an economy and the assumption of perfect substitutability between worker groups. Regarding the first assumption, **Bishop** [**2004**] asserted that the lump of labour theory is one of the most well-known economic fallacies. Many researchers contend that, because the labour market is dynamic, there is no upper limit to the number of jobs in an economy. In their work, **Eichhorst et al.** [**2014**] conclude that despite a widespread belief in a lump of labour, it has no empirical support. Other studies reinforce their findings that there is little to no empirical evidence of a trade-off between the employment of older and younger workers (see, e.g., **Gruber, Wise,** [**2010**]; **Van Dalen, Henkens** [**2002**]).

As for the second assumption, existing studies from various countries and panels of economies show little evidence of substitution between young and older workers. For example, **Card and Lemieux** [**2001**] found that employees of different ages are imperfect substitutes. Similarly, **Ben Salem et al.** [**2010**] argued that young and older workers may be imperfectly substitutable in the labour market. In addition, the job-finding rates of young and older workers are not comparable. Young workers face low hiring rate primarily due to their lack of experience, whereas older workers struggle to find jobs because they are closer to retirement, making them less attractive to employers. Consequently, younger workers often lack the experience required to successfully fill positions requiring professional expertise.

Although research on the relationship between the labour force participation of young and older workers remains relatively limited, existing theoretical and empirical studies indicate that higher employment rates among older people do not negatively impact youth employment. **Ben Salem et al.** [**2010**] used simple ordinary

least square (OLS) regressions to examine the labour force participation of older workers. They argued that the correlation between youth labour market outcomes and the labour force participation of older workers provides more support for a positive relationship between young and old workers in the labour market. An increased participation rate for older workers correlates with higher employment among young workers and a decrease in youth unemployment. However, they acknowledged the limitations of their study.

A series of studies have examined whether the labour force participation of older individuals crowds out employment opportunities for younger workers in 12 developed countries [**Gruber, Wise, 2010**]. Country-by-country analyses found no evidence of a trade-off between employment opportunities for younger and older workers. Instead, the overall findings suggest that a higher proportion of older adults in the labour force is associated with increased youth employment and decreased youth unemployment. Based on a regression analysis conducted for Belgium between 1983 and 2004, **Jousten et al.** [**2008**] found a positive correlation between the employment rates of older and younger cohorts. Meanwhile, **Kalwij et al.** [**2010**], using a dynamic model of labour demand, concluded that changes in the employment of older workers have a small but positive effect on the employment of younger workers. They specifically examined the extent to which the employment of people aged 55–64 affects the employment of people aged 16–24, finding no empirical support for the assumption that younger and older workers are substitutes.

Eichhorst et al. [**2014**] analysed labour market dynamics at the NUTS2 level to determine whether sustainability exists between older and younger workers in various EU regions. In particular, they examined the correlation between the labour force exit rate of workers aged 55–64 and the unemployment rate for several groups of young individuals aged 21–30 (using different specifications based on gender and education level). They found that generally, no statistically significant correlation exists between these variables.

Particularly relevant to this study is the work of **Munnell and Wu** [**2012**], who used a state-level regression and the instrumental variables (IV) approach to investigate whether increased employment among older individuals reduces job opportunities or wages for young workers in the United States or China. They found no consistent evidence supporting such a trade-off.

While there is extensive literature on employment rates in different age groups in former transition countries of Central and Eastern Europe, research specifically examining the relationship between the employment rates of different age groups in these countries is scarce. To the best of our knowledge, while studies have analysed whether substitution occurs between older and younger workers in Western countries (e.g. **Jousten et al.** [**2011**] for Belgium, **Ben Salem et al.** [**2010**] for France, **Gruber, Milligan** [**2010**] for the United States), little attention has been given to CEE countries. This study aims to fill this gap.

Data and method

In our empirical study, we used data from the Local Data Bank of Statistics Poland (GUS), the national statistics office. We examined cross-sectional time series (panel data) of selected socio-economic indicators from 2003 to 2019. The period was chosen based on data availability. Considering that Poland's entry into the European Union in 2004 could have significantly impacted the economy, we also present results for the 2005–2019 subperiod as a robustness check. The final year of our analysis is 2019 to exclude labour market disruptions caused by the COVID-19 pandemic.

We collected annual data at the NUTS-2 (voivodship) level, obtaining a moderate, balanced panel with 272 observations from 16 voivodships over 17 years. We categorised the population into two age groups: younger and older. The younger age group is defined as those aged 15 to 29 (both years included), whereas the older age group is defined as those aged 50 or older. Defining the older age group as 50 and above is consistent with many labour market studies, which often use this threshold due to a notable decline in labour market participation rates starting at this age in many countries.

To conduct this study, we estimated a simple panel linear regression model. Since the time dimension is larger than the panel dimension we were unable to include year fixed effect in the model specification. However, we account for variance heterogeneity and cluster variances at the regional level. The model takes the following general form:

$$YEMPL_{i,t} = \beta_0 + \beta_1 OEMPL_{i,t} + \beta_2 \boldsymbol{X}_{i,t} + \varepsilon_{i,t}$$

where $YEMPL_{i,t}$ is a measure of employment in the cohort aged 15–29 in region i and year t; $OEMPL_{i,t}$ is a measure of employment in the cohort aged 50 and above in region i and year t; $\boldsymbol{X}_{i,t}$ is a matrix of control factors for region i and year t; and $\varepsilon_{i,t}$ is a stochastic term.

The dependent variable is employment in the young cohort. We define age-specific employment rates as the ratio of employed individuals in a given age group to the population of that age group. We consider different measures for this indicator: (1) the region-year share of employed people aged 15–29, $youemp_{i,t}$, and (2) the yearly change in the region-year share of employed people aged 15–29, $d\_youemp_{i,t}$. This procedure was necessary because the region-year share of 15-to-29-year-olds in the labour force was non-stationary.

Although most studies use youth employment rates, some adopt different approaches to variable selection. For example, **Kalwij et al. [2010]** define employment rates relative to the entire population aged 15–64 rather than within each respective age group. In turn, **Ben Salem et al. [2010]** examine the correlation between youth labour market outcomes and the labour force participation of older workers, whereas **Eichhorst et al. [2014]** analyse the correlation between the labour force exit rate of workers aged 55–64 and the unemployment rate of young people aged 21–30, disaggregated by gender, education and other criteria. Thus, as a measure of the dependent variable, we consider the region-year employment rate among 15-to-29-year-olds $youempsh_{i,t}$, which is the most prevalent method in the literature.

The key independent variable, $OEMPL_{i,t}$, measures region-year employment among older workers. For the region-year proportion of 15-to-29-year-olds in the labour force as the key dependent variable, we use the region-year proportion of people aged 50 and above in the employment ($oldemp_{i,t}$) as the independent variable. When the yearly change in the region-year share of 15–29-year-olds in employment is the dependent variable, we use the yearly change in the region-year share of older workers in employment $d\_oldemp_{i,t}$ as the main independent variable. Lastly, when the region-year employment rate of 15–29-year-olds is used as the dependent variable, we use the region-year employment rate of people aged 50 and above ($oldempsh_{i,t}$) as the independent variable. Therefore, we consider three distinct specifications for the panel linear regression model.

The vector $\boldsymbol{X}_{i,t}$ includes a set of region-specific explanatory (control) variables that account for differences in labour market conditions. Several macroeconomic indicators are used as control variables, in line with economic theory and previous research. As our objective is not to analyse the factors influencing youth employment rates but rather to assess the relationship between employment levels across age groups, we selected this specific set of explanatory variables. The estimated models examine only the potential relationship between these variables. All but one of the explanatory variables are region-specific and time-varying:

- $gdp_{i,t}$: per capita gross regional product
- $unemp_{i,t}$: regional average unemployment rate
- $service_{i,t}$: share of workers in services at the regional level
- $cpi_{i,t}$: consumer price index at the regional level
- $odr_{i,t}$: old-age dependency ratio at the regional level
- $retired_t$: months of raised retirement age
- $inter_{i,t}$: interaction of the old age dependency ratio and months of raised retirement age

A relatively rich set of control variables with region-specific values makes it unnecessary to include region-specific fixed effects in the model specification. Each control variable has significant economic relevance: $gdp_{i,t}$ reflects regional economic performance, controlling for employment growth driven by higher production; the regional unemployment rate $unemp_{i,t}$ represents the pool of available workers, accounting for differences

in opportunities to employ additional older workers; $service_{i,t}$ captures the concentration of workers in services, a sector with relatively low-paid jobs and significant employment opportunities for older workers; the regional consumer price index $cpi_{i,t}$ represents purchasing power, whose growth is expected to correlate with higher employment among older workers.

Chybalski and Marcinkiewicz [2014] stated in their work that, regardless of whether a causal relationship exists between the employment rates of older and younger cohorts, unfavourable demographic trends, such as a high proportion of older people in the population, have a negative impact on the position of young people in the labour market. Following this reasoning, we add the variable $odr_{i,t}$ to the model. This variable represents the old-age dependency ratio, defined as the ratio of those aged 65 and older to those of working age (aged 15–64 years).

The variable $retired_t$ was introduced because we argue that changes in the statutory retirement age have a direct impact on the employment of older people. According to **Staubli and Zweimüller [2013]**, an increase in the minimum retirement age leads to a significant increase in employment rates and has considerable spillover effects on the unemployment rate. To account for this, we measure this variable as the number of months from the introduction of the retirement age reform until its reversal. The reform, implemented in 2013, gradually increased the statutory retirement age by four months each year, targeting 67 years for men by 2020 and for women by 2040. However, this reform was repealed in October 2017, reducing the retirement age to 60 for women and 65 for men. To better approximate the effect of an increased statutory retirement age, we also include the interaction of months of increased retirement age with old-age dependency ratio: ($inter_{i,t}$).

In certain specifications, as discussed later, we incorporate an instrumental variable into the model. The goal is to find an instrument that is correlated with the employment of older people (instrument relevance) but has no direct impact on the employment of younger people (exclusion restriction). As an instrument for the employment rate of older workers, we use the region-year-age-specific mortality rate of individuals aged 50 and above. This follows the approach of **Munnel and Wu [2012]**, who also used this variable as an analytical tool. Using regional variables as instruments in panel data analyses is a common practise. **Wooldridge [2002]** noted that economists frequently utilise regional variations in prices or taxes as instruments for endogenous explanatory variables in equations at the individual level. In our case, we assume that the regional mortality rate meets the criteria for an instrument.

The descriptive statistics for the data are presented in Table 1. The average employment rate of young people in each region is 42.5%, ranging from 28.8% to 55.9%. The older age group has an average employment rate of 29.9%, with a smaller variance.

Table 1. Summary statistics

Variable	Obs	Mean	SD	Min	Max
Proportion of people aged 50 and above in employment	272	25.5	3.1	17.8	32.4
Proportion of people aged under 30 in employment	272	20.9	2.4	15.9	27.7
Employment rate of people aged 50 and above	272	0.3	0.0	0.2	0.4
Employment rate of people aged under 30	272	0.4	0.1	0.3	0.6
Share of workers in services	272	55.0	5.4	42.0	67.6
GDP	272	91.1	21.4	67.8	162.1
Unemployment rate	272	10.3	5.2	2.1	26.0
Months of raised retirement age	272	2.4	4.8	0.0	16.0
Consumer price index	272	122.6	12.3	101.0	139.9
Old-age dependency ratio	272	20.9	3.3	16.1	30.7
Mortality rate	272	912.2	97.6	722.8	1187.6
Mortality rate aged 50 and above	272	2640.6	163.0	2327.9	3204.0

Source: Authors' own computation based on Local Data Bank.

We used the Levin–Lin–Chu unit root test to address the issue of data stationarity (Table 2). This test is best suited to our data, as it does not require the number of panels to be close to infinity. The results indicate that all but two series are stationary. For the non-stationary series (employment rate among people aged 50 and older and mortality rate of people aged 50 and older per 100,000), we use their first differences. All series in first differences are stationary.

We follow the standard panel data model procedure and perform the Hausman test to distinguish between random and fixed effects. We choose a fixed effects estimator since the results of the Hausman test indicate no discernible difference between random and fixed effects estimators. The fixed effect estimator does not require restrictive assumptions to achieve consistency. In addition, selecting the random effect estimator seems implausible given the assumption that unobserved heterogeneity across voivodships is small.

Table 2. Stationarity test results

Variable	Panels	Delta	p-value
Proportion of people aged under 30 in employment	16	−6.39	0.000
Yearly change in region-year share of people aged under 30 in employment	16	−4.48	0.000
Employment rate of people aged under 30	16	−4.69	0.000
Proportion of people aged 50 and above in employment	16	−0.48	0.314
Yearly change in region-year share of people aged 50 and above	16	−5.06	0.000
Employment rate of people aged 50 and above	16	−3.44	0.000
Share of workers in services	16	−4.60	0.000
GDP	16	−3.34	0.000
Unemployment rate	16	−11.10	0.000
Months of raised retirement age	16	−1.85	0.032
Consumer price index	16	−6.85	0.000
Old-age dependency ratio	16	−5.42	0.000
Morality rate	16	−1.82	0.035
Mortality rate aged 50 and above	16	0.41	0.658

Source: Authors' own computation based on Local Data Bank.

In the empirical model, we obtain three specifications, each with a different dependent variable. In the first specification, we use the region-year share of 15-to-29-year-olds in employment, $youemp_{i,t}$, as the dependent variable. A potential endogeneity problem arises because the employment of older workers (our main independent variable) may be influenced by the employment of young workers (our preferred dependent variable). More precisely, if unobserved factors simultaneously impact the employment of both younger and older workers, an endogeneity problem occurs. In such a case, the simple OLS method (Model 1) would be biased. To address this, we employed the OLS model with an instrumental variable (Model 2).

In Specification 2, we employ the yearly change in the region-year share of people aged 15–29 years in employment, $d\_youemp_{i,t}$. Again, in this specification, a change in the region-year share of young people may influence a change in the region-year share of older workers, leading to a potential endogeneity problem. Similarly, we estimate the OLS model (Model 3) and the IV model (Model 4). As mentioned earlier, this choice is dictated by the non-stationarity of the $oldemp_{i,t}$ variable.

In specification 3, we consider the region-year employment rate among people aged 15–29 years, $youempsh_{i,t}$, as the dependent variable (Model 5). This is the most commonly used approach in the literature. In this specification we employ a simple OLS model, as using an IV model is not necessary. There is no reason to expect that the results of the standard OLS regression estimates would be biased by endogeneity.

Results

The results for all models during the 2003–2019 period are presented in Table 3. By using different models, we aim to address the non-stationarity and endogeneity issues that may affect the validity of our initial findings. This iterative process helps refine our approach and improve the robustness of our conclusions. We begin with Model 1, a simple panel OLS model. We then extend it by estimating a panel IV model (Model 2). In both the panel OLS and panel IV models, the coefficients for the variable $oldemp_{i,t}$ are not statistically significant and cannot be interpreted due to non-stationarity. Given these non-significant results and the challenge posed by the non-stationarity of $oldemp_{i,t}$, we reconsider our modelling approach. For this reason, we turn to Specification 2, introducing changes in the region-year share of 15-to-29-year-olds in employment ($d\_youemp_{i,t}$) as the dependent variable. In Model 3, the coefficient for the variable $d\_oldemp_{i,t}$ indicates that the relationship between changes in the employment rate of older individuals and changes in the employment rate of younger individuals is negative and statistically significant at the 1% level. This remains our preferred model, as it addresses the limitations of non-stationarity and explores the dynamic relationship between the employment rates of different age groups more comprehensively.

Given the potential bias from the endogeneity of the $oldemp_{i,t}$ variable in Model 3, we introduce a panel instrumental variable (IV) approach in Model 4, using the mortality rate of the older population as an instrument. However, unlike in Model 3, the findings from Model 4 indicate that the relationship between changes in the share of employment of younger and older workers is not statistically significant. As this model includes first-difference variables, interpretation remains difficult. The lack of statistical significance in this model suggests that a direct relationship may not exist between changes in the employment share of younger and older workers when accounting for potential endogeneity.

Table 3. Model results

Variable	Model 1	Model 2 (with IV specification)	Model 3	Model 4 (with IV specification)	Model 5
Dependent variable					
	Proportion of people aged under 30 in employment	Proportion of people aged under 30 in employment	Yearly change in the region-year share of people aged under 30 in employment	Yearly change in the region-year share of people aged under 30 in employment	Employment rate of people aged under 30
Main independent variable					
Proportion of people aged 50 and above in employment	−0.222*	0.436			
Yearly change in the region-year share of people aged 50 and above in employment			−0.317***	3.894	
Employment rate of people aged 50 and above					0.176
Control variables					
GDP	−0.153**	−0.069	−0.082	0.120	0.001
Unemployment rate	−0.205***	−0.188***	−0.033	0.241	−0.007***
Share of workers in services	0.090	0.255*	0.078*	0.049	0.001
Consumer price indicator	−0.059*	−0.169*	−0.082**	−0.073	0.000
Old age dependency ratio	−0.481***	−0.407***	0.080***	1.144	0.003***
Months of raised retirement age	−0.047***	−0.093*	0.036**	0.167	−0.001**
Interaction	−0.021	−0.077	0.007	−0.112	0.000
Constant	55.384***	34.436	4.441	−31.577	0.240*

Variable	Model 1	Model 2 (with IV specification)	Model 3	Model 4 (with IV specification)	Model 5
N	272	272	256	256	272
r2_within	0.790		0.304		0.893
r2_between	0.107		0.281		0.890
r2_overall	0.079	0.018	0.188	0.035	0.808
joint significance	F = 76.18	Wald chi2 = 1984	F = 74.26	Wald chi2 = 19.10	F = 99.97
p-value	0.000	0.000	0.000	0.014	0.000
F test (1st stage)		224.62		39.84	
p-value		0.000		0.000	

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Source: Authors' own computation based on data from Local Data Bank.

We now turn to Model 5. In this model, the dependent variable $youempsh_{i,t}$ is defined as the employment rate of the younger cohort, specifically young people employed within their age group. Consequently, the main independent variable, $oldempsh_{i,t}$ is the employment rate of the older cohort.

In this specification, we use a simple panel model, meaning that endogeneity is not an issue. Again, we do not find a statistically significant relationship between the employment rates of older and younger workers. Consistent with the findings of **Munnell and Wu [2012]**, our results provide no evidence supporting the lump of labour theory.

The parameter estimates for the variable *retired*, while very small, are statistically significant. This suggests that an increased retirement age may cause a slight decline in the employment rate of the younger age group. However, this effect is very small. Most other controls have coefficients in the expected direction, though mostly insignificant.

We performed a robustness check by estimating similar models over a shorter time period (2005-2019), excluding the year 2004, which marked Poland's accession to the European Union and may have caused labour market turbulence. The results remained largely consistent with our original findings.[2] The only notable difference was the change in the significance of the coefficient for the variable $oldemp_{i,t}$ in Model 1. When analysing the shorter time period, it became insignificant, indicating that labour market changes following EU accession might have had a temporary impact on the employment dynamics between the older and younger cohorts.

Conclusions and policy implications

Population ageing poses challenges to labour markets in developed countries. Public and media discussions often raise concerns that postponing the retirement age could decrease employment rates among younger workers. As stated in the Introduction, this concern is rooted in the "lump of labour" fallacy, which assumes a fixed number of jobs. It tends to be heightened in periods or countries with high youth unemployment. Although economists have largely debunked the "lump of labour" fallacy, public perception often continues to reflect this concern. Studies such as those by **Gruber and Wise [2010]** highlight that while there is no fixed number of jobs, labour market rigidities and economic conditions can impact different age groups differently. Also, research conducted during the European debt crisis found that countries with higher youth unemployment rates expressed significant concerns about older workers delaying retirement. Some studies suggested that, in these contexts, labour market entry for younger individuals could be adversely affected by the continued employment of older workers [**Chauvel, 2010**; **Scarpetta et al., 2010**]. Empirical evidence from countries with high youth unemployment, such as Spain and Italy during the 2008 financial crisis, supports the concern that postponed retirement can lead to increased competition for jobs among younger workers.

[2] The results are available upon request.

Studies by **Bertoni and Brunello** [**2014**] and **Boeri and Garibaldi** [**2007**] show a correlation between delayed retirement and higher youth unemployment in these contexts.

Our study, motivated by these concerns, investigates whether the increased employment rate of older workers negatively impacts youth employment. We use panel data from Polish NUTS-2 regions to analyse the employment rates of older workers (50 years and above) and younger workers (15–29 years old).

Our findings reveal that an increase in the employment rate of older individuals does not decrease the employment rate of younger individuals; rather, the effect appears to be positive. This is consistent with **Böheim and Nice** [**2019**], who found that policies enhancing employability for one group can create positive spill-over effects for others, leading to an overall increase in employability. Through various specifications, we observed no significant relationship between the employment rates of older and younger workers in most models. However, an increase in the retirement age showed a minimal negative impact on youth employment. Our findings align with the majority of empirical research, indicating no statistically significant correlation between the labour market activities of older and younger workers, thereby refuting the employment substitution hypothesis.

These results are important for research on the relationship between employment across different age cohorts. Although the Polish labour market differs significantly in its characteristics from most other developed economies on a macroeconomic scale, our results are consistent with findings from other economies. The OECD encourages Poland to implement strategies to support longer working lives, emphasising the importance of keeping older individuals active in the labour market [**OECD, 2021**].

Our research contributes to the literature on employment dynamics in Eastern European countries that have transitioned from a centrally planned to a market economy. **Böheim and Nice** [**2019**] highlighted the limited understanding of how the employment rates of young and older workers respond during economic transitions. They suggested that human capital acquired before a transitional phase may be less valuable than that acquired afterward and that older workers may accumulate more of it than younger ones. By 2003, Poland had largely stabilised from its transition, making it an ideal case study.

In conclusion, we find no evidence that younger workers are being displaced by older workers. On the contrary, the employment rates of younger and older workers tend to move in the same direction. This is consistent with economic theory and empirical studies from other countries (see **Gruber, Wise,** [**2010**]; **Van Dalen, Henkens** [**2002**]).

Our research on the "lump of labour" theory also contributes to discussions on the impact of immigration on the employment of the local labour force. Although immigration is not addressed in this research article, it is currently one of the most hotly contested political issues. The "lump of labour" theory is frequently cited as an argument against immigration in public discourse. Most arguments against immigration are based on the notion that immigrants will replace native workers, resulting in higher native unemployment and lower wages. We believe that our research can contribute to the discussion on the potential impact of immigration on the labour markets of host countries.

We acknowledge potential limitations in our analysis that future research could address. Conducting similar studies on NUTS-2 regions in other EU countries could provide valuable comparative insights, though obtaining long-term regional data might be challenging. We think that Poland's experience can serve as a benchmark for other countries that have undergone similar transitions. By examining Poland's labour market evolution, we can draw lessons and identify best practices applicable to other economies in Central and Eastern Europe and beyond.

References

Ben Salem M., Blanchet D., Bozio A., Roger M. [2010], Labor force participation by the elderly and employment of the young. The case of France, in: Gruber J., Wise D.A. (eds.), *Social Security Programs and Retirement Around the World: The Relationship to Youth Employment*, The University of Chicago Press, Chicago–London.

Bertoni, M., Brunello, G. [2014], *Pappa ante portas: The retired husband syndrome in japan*, IZA Discussion Papers No. 8350.

Bishop M. [2004], *Essential Economics*, The Economist/Profile Books, London.

Boeri T., Garibaldi P., Moen E.R. [2022], In medio stat victis: Labor Demand Effects of an Increase in the Retirement Age, *Journal of Population Economics*, 35: 519–556.

Böheim R., Nice T. [2019], The effect of early retirement schemes on youth employment, *IZA World of Labor*, 70: 1–11.

Card D., Lemieux T. [2001], Can falling supply explain the rising return to college for younger men? A cohort-based analysis, *Quarterly Journal of Economics*, 116: 705–746.

Chauvel L. [2010], The Long-Term Destabilization of Youth, Scarring Effects, and the Future of the Welfare Regime in Post-Trente Glorieuses France, *French Politics, Culture & Society*, 28: 74–96.

Chybalski F., Marcinkiewicz E. [2014], Does the professional activity of older workers contribute to youth unemployment? A cross-section study of European countries, *Business and Economic Horizons*, 10: 238–245.

Eichhorst W., Boeri T., De Coen A., Galasso V., Kendzia M.J., Steiber N. [2014], How to combine the entry of young people in the labour market with the retention of older workers?, *IZA Journal of European Labor Studies*, 3.

Gruber J., Milligan K. [2010], Do Elderly Workers Substitute for Younger Workers in the United States?, in: Gruber J., Wise D.A. (eds.), *Social Security Programs and Retirement Around the World: The Relationship to Youth Employment*, The University of Chicago Press, Chicago–London.

Gruber J., Wise D.A., [2010], *Social Security Programs and Retirement Around the World: The Relationship to Youth Employment*, The University of Chicago Press, Chicago Illinois and London.

Jousten A., Lefèbvre M., Perelman S., Pestieau P. [2008], *The effects on early retirement on youth unemployment: the case of Belgium*, IMF Working Paper WP/08/30, International Monetary Fund, Washington.

Kalwij A., Kapteyn A., De Vos K. [2010], Retirement of older workers and employment of the young, *De Economist*, 158: 341–359.

Munnell A.H., Wu A.Y. [2012], *Will delayed retirement by the baby boomers lead to higher unemployment among younger workers?*, Boston College Center for Retirement Research Working Paper 2012–12, Boston College, Massachusetts.

OECD [2015], *Working Better with Age*.

OECD [2018], *Key Policies to Promote Longer Working Lives in Poland*.

OECD [2021a], *Regional Economic Inactivity Trends in Poland*.

OECD [2021b], *Pensions at a Glance 2021: OECD and G20 Indicators*.

Scarpetta S., Sonnet A., Manfredi T. [2010], *Rising Youth Unemployment During The Crisis: How to Prevent Negative Long-term Consequences on a Generation?*, OECD Social, Employment and Migration Working Papers 106, OECD Publishing.

Staubli S., Zweimüller J. [2013], Does raising the early retirement age increase employment of older workers?, *Journal of Public Economics*, 108: 17–32.

Van Dalen H.P., Henkens K. [2002], Early-retirement reform: Can it and will it work?, *Ageing & Society*, 22: 209–231.

Wooldridge J. [2002], *Econometric Analysis of Cross Section and Panel Data*, MIT Press, Cambridge–London.