

## **The aging of labor resources in Poland: An analysis of consequences**

### **Abstract**

The aim of the analysis was to assess the influence of demographic processes on the labor market in Poland, with particular emphasis on their impact on the state of workforce resources. The article presents the influence of the aging process of labor resources on the lost production capacity of the working-age population. The assessment was based on the study of the degree of variation in the indicators of economic activity and employment due to age. Results were presented of the analysis of parameters characterizing the number of years of potentially healthy life lost due to chronic diseases in the working-age population. It was found that the intensity of observed phenomena related to the process of depopulation, in connection with the relatively low rate of economic activity and employability of people in the so-called late working age, leads to the accumulation of demographic and cohort effects resulting in a virtually unprecedented rate of contraction of the labor resources potential in Poland.

**Keywords:** aging of labor resources, labor market, lost productivity, YLL, YLD

JEL CODE: J11, J21

### **Introduction**

The key measure of the total supply of labor in the economy is the size of the labor force, that is, the part of the population that is currently employed or actively seeking employment. The size of the workforce resource is therefore essentially determined by the size of the working-age population and the economic activity rate defining the possibility and willingness of people of working age to undertake work or to actively seek it. The aging process of the population affects both these factors, on the one hand determining the size of the working age population, and on the other hand, as a result of shifting the median age, causing a slowdown (or even decrease) in the average level of economic activity in a given economy. This situation, observed in most developed market economies, necessitates undertaking measures aimed at increasing the supply of labor (including by extending

working life), as well as enforces a change in attitude towards the group of employees aged 50+.

The aim of the study was to assess the influence of demographic processes on the domestic labor market, with particular emphasis on their impact on the state of labor resources in Poland. The subject of the analysis covered the influence of the aging process of labor resources on the level of lost production capacity of the working-age population in the context of observed demographic processes. The assessment was based on the study of the degree of variation in the indicators of professional activity and employment due to age. Results were presented of the analysis of parameters characterizing the number of years of potentially healthy life lost due to chronic diseases in the working-age population. Based on statistical data from Eurostat and the World Health Organization (WHO), the intensity of the studied phenomenon in Poland was assessed against the background of average values observed in the European Union.

Formulating the goal and scope of research, based on literature review and other studies carried out so far, the following research assumptions were formulated:

- demographic processes and their long-term consequences are currently an important factor determining the productivity level of labor resources in developed market economies, which means that the problem of economic activity and employability of older employees should be considered one of the priorities for domestic economies and for individual companies,
- as far as domestic economies, there is a high degree of diversification of the scale of age dependency due to population aging, which makes it necessary to recognize the specificity of this phenomenon in relation to national conditions,
- as a result of the forecasted changes in the age structure of population, labor resources in Poland are one of the most vulnerable to the negative consequences of demographic changes from among EU countries,
- factors that increase the intensity of negative consequences of demographic processes in Poland are much lower than the EU-28 average of economic activity and employability of people aged 55+, additionally determined by a high risk of this group to lose good health, which is a significant barrier to the interest in taking up work.

The empirical part of the research was preceded by a review of the literature addressing the problem of the influence of age on the productivity of human resources analyzed in relation to developed economies.

## **Aging and productivity - a review of studies**

In the literature, much attention has been paid to the topic of population aging, assuming that this problem in the twenty-first century will prove to be an immanent feature of developed societies around the world (McQuaid 2007; Serban 2012; Murkowski 2017). As a consequence, attempts to assess the social and economic consequences of the fast pace of population aging have been the subject of research by authors such as: S. Biggs and J.L. Powell (2001), W. Sanderson and S. Scherbov (2007), and M.S. Tosun (2003). In terms of Poland's economy, this problem has been investigated by authors such as: J. Józwiak, I.E. Kotowska (2010); A. Rosner, M. Stanny (2008); E. Kryńska (2006). Population aging has also posed a number of political challenges in economic and social activity related to the growth of the elderly part of the population (Cook, Halsall 2018, Jakubowska 2016a, Richert-Kaźmierska 2017).

The literature assumes that the individual level of economic activity of a person varies depending on their sex and life cycle. Changes in the willingness to take up work and the demographic structure of the population affect the total level of economic activity in a given country and, in principle, a cohort effect and a demographic effect can be observed (Brown, Guttmann 2018). The cohort effect, consisting in a change in the duration of the economic activity rate for various demographic groups, is correlated with an increase in the willingness of women at a given age to find employment, or a decreasing trend among young people to enter the labor market as their access to higher education increases. On the other hand, the demographic effect is the result of a shift in the age structure of the workforce with a sustained, stable level of economic activity of various age groups<sup>1</sup>.

The models presented in the literature analyzing the impact of demographic changes (population size, change in the population) on economic growth most often ignore the consequences of population aging, assuming the heterogeneity of the entire population. As a result, the questions asked about the differences in the level of economic activity and productivity of younger and older populations in the labor market do not find sufficient answers in the literature, and the presented research results point to the multidimensionality of the links between the aging process and the level of productivity. The relationship between

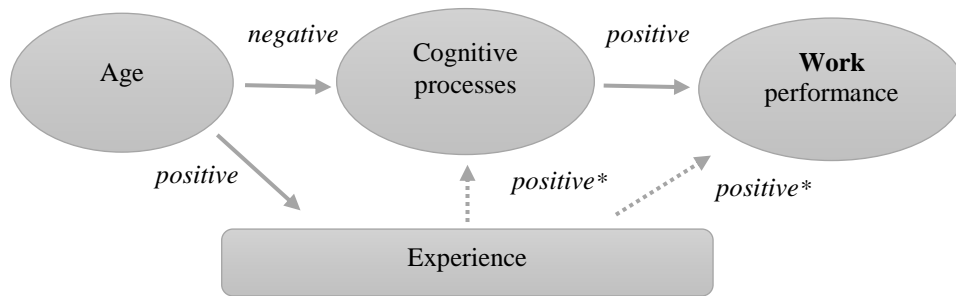
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<sup>1</sup>However, the broader macroeconomic consequences of these events are uncertain, as demographic changes can affect both potential and actual production. The low growth trend of labor supply will reduce the growth of potential output and will negatively affect the labor market. With an initial balance in other markets, this may put pressure on wages and inflation. However, there may be compensation for changes in the demand for labor, if, for example, the older population consumes less or a shortage of work force forces companies to implement innovations to improve labor productivity (increase potential output). A shortage of workforce may also result in the society opening up to increased migration, which would then increase labor supply (Brown, Guttmann 2018).

the type of work performed and the need to have physical strength, cognitive abilities or professional experience (Garibaldi, Martins, van Ours 2010; Jurek 2012, pp. 138-139) is indicated as key. In so much as it can be assumed that the experience growing with age will positively affect work productivity, the already decreasing resource of physical strength and health of an aging employee is likely to reduce their performance. The issue of deteriorating health along with the employee's age is associated with an increasing risk of chronic diseases, which often results in premature death or prolonged disability (Jakubowska 2017). As results of different studies indicate, disability and health limitations significantly determine the productivity of human capital both in relation to the possibility of its effective use in the labor market as well as the income likely to be achieved by this capital (Jakubowska 2016b).

The results of research on the influence of age on cognitive skills suggest, however, that in the case of work in which learning and problem-solving is important, the performance of an average worker over 50 years of age will, on average, decrease (Van Ours, Stoeldraijer 2010; Skirbekk 2004, pp. 133-153). It is assumed that, in this type of work, the curve of individual productivity depending on age is best described by the square function in the form of an inverted letter U. Some authors assume, however, that after a certain age, the employee's performance will stabilize at a certain level and remain unchanged until their retirement (Martins et al. 2005). The literature also emphasizes the fact that experience, work efficiency and aging together create a specific mechanism of interaction, and the positive effects of professional experience may be directed to basic cognitive processes or work performance (see Fig. 1). J.E. Ilmarinen (2001) explains that maintaining both these interactions at the same time is possible and explains why work efficiency does not necessarily have to diminish with age, as long as appropriate working conditions are maintained.

**Figure 1. The relationship between age, experience and work performance**



*\*uncertain interaction*

Source: own study based on (Ilmarinen 2001).

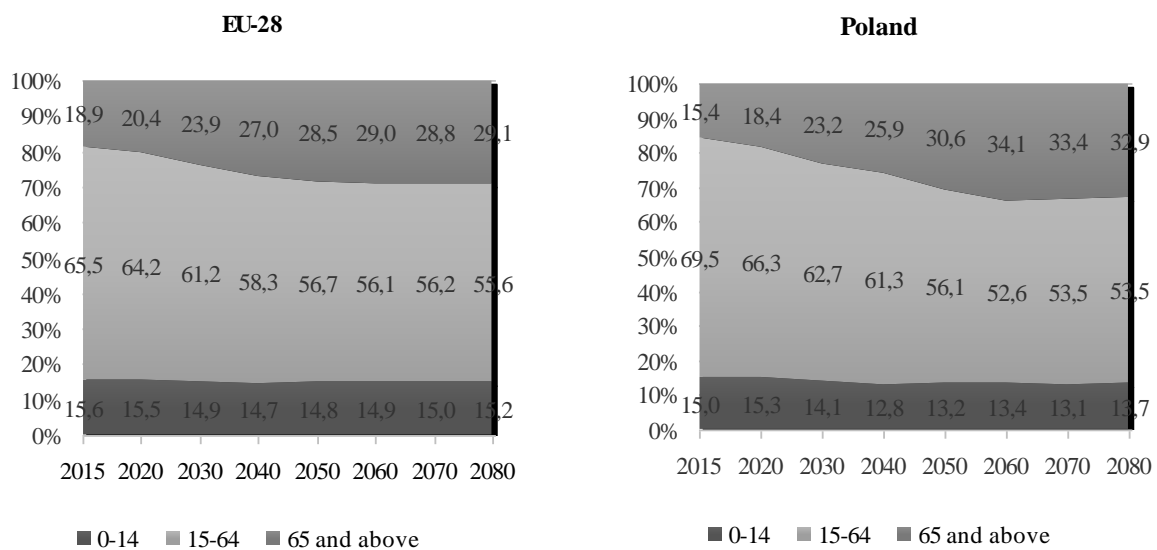
As a result of the lack of clarity in the assessment of the influence of employee age on employee productivity, the literature shows significant discrepancies in the opinions presented on the potential consequences of aging labor resources in the context of the possibility of achieving economic growth. K. Prettnner (2013) argues that population aging favors a long-term growth occurring as part of an endogenous growth, which depends on the relative relationship between fertility and mortality rates. K. Choi and S. Shin (2015), presenting the model simulating the impact of the aging population on the country's economic growth, show that population aging causes a decline in labor supply and an increase in share capital, and consequently, a significant weakening of the growth potential. It should be noted that the presented result is, however, relatively sensitive to the intergenerational transmission of human capital. A different view is held by K. Futagami and T. Nakajima (2001), who argue that population aging should not necessarily be considered an inhibitor of growth. The negative picture of the influence of the aging process on public finance in Poland was rejected only by X. Chojnicki and P.E. Rabesandratana (2017), who used generational accounting tools to estimate that the right level of education and improvement in adult survival rates can trigger the type of productivity which could significantly reduce the anticipated dependency of the aging population.

### **Aging of labor resources in Poland - selected characteristics**

The aging process of labor resources observed around the world also largely concerns the Polish economy. The specificity of demographic trends and the scale of their influence on the labor market in Poland indicate a strong need to implement corrective measures for both size and age structure of the labor force. Projections regarding the change in the population

structure in Poland developed by Eurostat for the coming decades indicate a marked demographic effect resulting in a significant increase in the share of post-working age population (65 years and more). The share of this age group in the total population is expected to grow from 15.4% to 32.9% between 2015 and 2080 (Eurostat, 2017). This increase turns out to be higher by over 7 percentage points (p.p.) than the average value estimated for this period for the EU-28 area (see Fig. 2).

**Figure 2. Forecasted age structure of the population of Poland and the EU-28 area in 2015-2080 (%)**

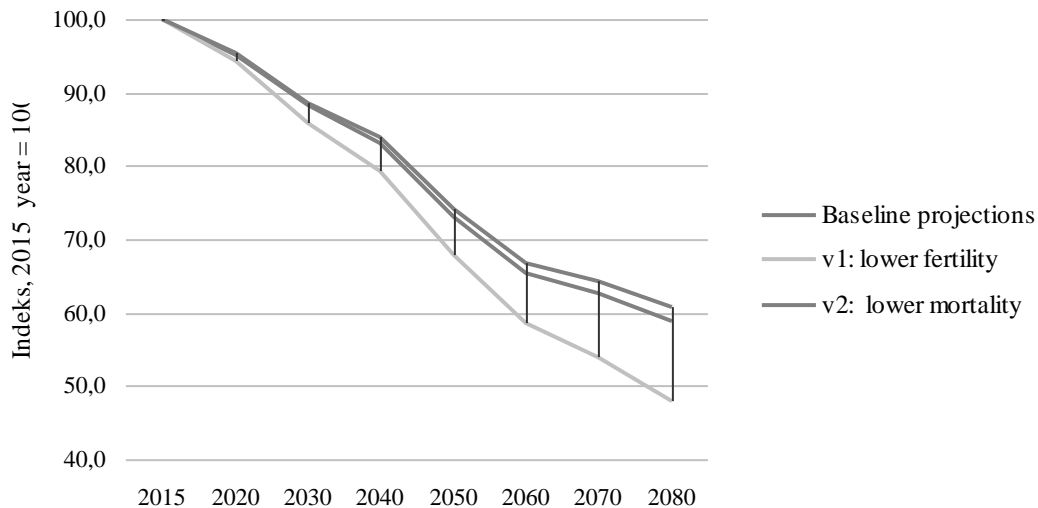


Source: own study based on Eurostat data, available at: <http://ec.europa.eu/eurostat/data/database> (retrieved 15.12.2017).

Taking advantage of the above forecasts concerning the share of the number of people aged 15-64 in the total population and the estimated population size of Poland (base case), the size of the potential labor resource was simulated in relation to the level observed in 2015 (see Fig. 3). In line with this, the estimated potential of the labor resource in the examined 15-64 age group at the end of the forecast period (2080) constituted 58.8% of the value observed in 2015. In addition, in light of Eurostat's analysis of sensitivity of the forecasted population to the basic variables (fertility and mortality rates), a similar estimation was made for the most pessimistic (v.1 - lower fertility) and the most optimistic (v.2 - lower mortality) scenario of the prognosis. As suggested by the results obtained (see Fig. 3), in both these cases, a significant decline in the working-age population (15-64 years) is inevitably forecasted in the development of Poland's demographic situation. In the optimistic scenario (lower mortality),

the potential of labor resources in 2080 will reach the level of 60.8% of the value from 2015, while in the pessimistic scenario (lower fertility) it will only be 47.9% of the base value.

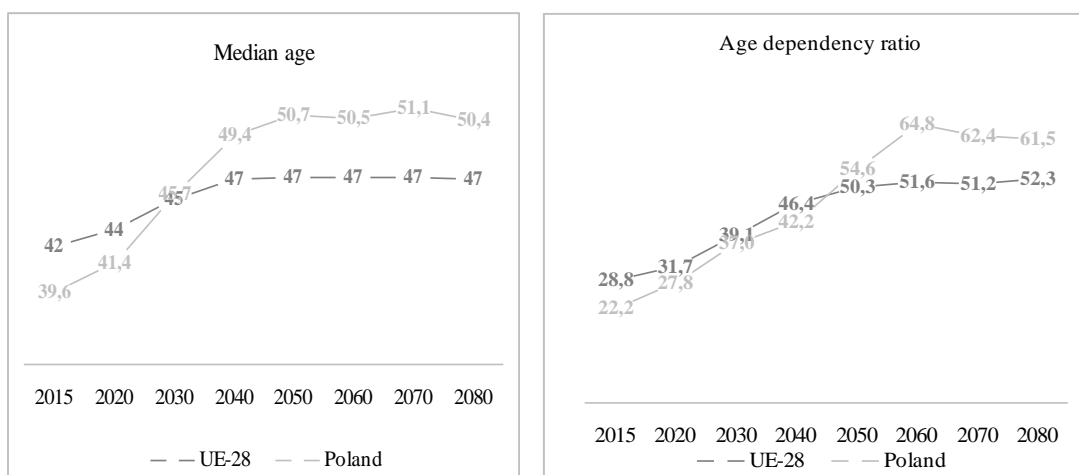
**Figure 3. Index of people aged 15-64, Poland, 2015 = 100**



Source: own study based on Eurostat data, available at: <http://ec.europa.eu/eurostat/data/database> (retrieved 15.12.2017).

The effect of forecasted demographic trends is a significant increase in the median age of the population in Poland. The level of this indicator grows from less than 40 years in 2015 to over 50 years in 2080 (see Fig. 4). Despite the anticipated improvement in the situation in 2070, the increase in the median age of the population in Poland is characterized by much higher dynamics than the average observed in the EU. Depopulation processes in Poland will also prompt a rapid increase in the age dependency ratio. In the forecast period between 2015 and 2080, the ratio determining the share of people aged 65 and over relative to the population aged 15-64 increases from 22.2 to 61.5, which means that in the next 50 years the dependency of the post-working age population on the working-age population will almost triple. As a result of the forecasted demographic changes, Poland will come from a country with one of the lowest age dependency ratios in the EU-28 in 2015 to a country with one of the highest dependency ratios in the working-age population in 2080, well ahead of the EU average in this respect.

**Figure 4. Median age and age dependency ratio in 2015-2080 (forecast), Poland and EU-28**

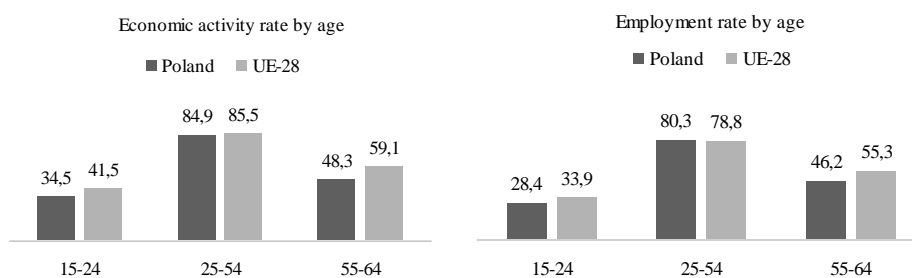


Source: own study based on Eurostat data, available at: <http://ec.europa.eu/eurostat/data/database> (retrieved 15.12.2017).

### Economic activity and employability in an aging population

The problem of the aging working-age population in Poland also turns out to be low (much lower than the EU average). Meanwhile, the level of economic activity of people aged 55 and above translates into a much lower level of employability of this group compared to the average values observed in the EU (see Figure 5).

**Figure 5. Economic activity rate and employment rate by age, Poland and EU-28 (2016)**



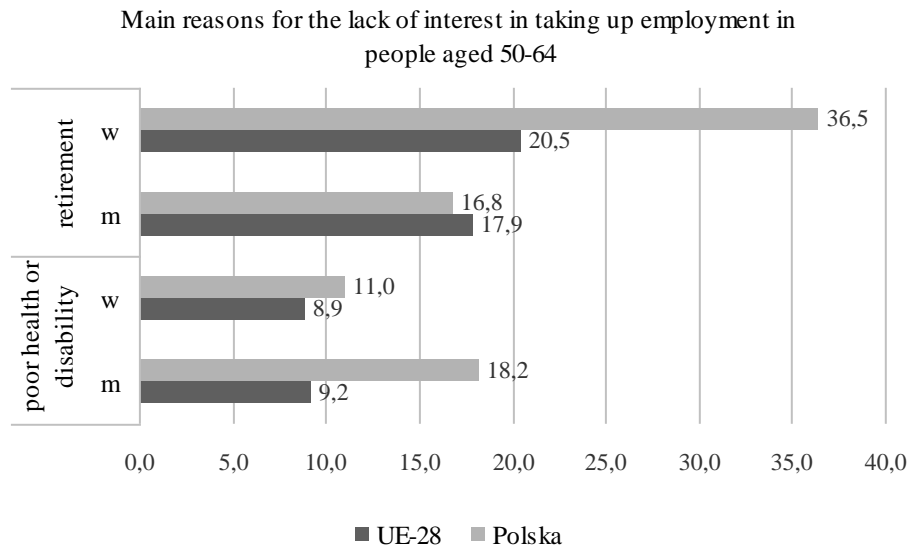
Source: own study based on Eurostat data, available at: <http://ec.europa.eu/eurostat/data/database> (retrieved 15.12.2017).

An analysis of the reasons for the lack of interest in taking up employment among people aged 55-64 indicates that it is primarily due to poor health or disability (18.2% of men and 11.0% of women), or retirement (36.5% of women and 16.8% of men) (Eurostat, 2017). However, while early retirement can be conditioned by the state's social policy, it is particularly worrying that a large economic inactivation of the population aged 55-64



resulting from poor health (see Fig. 6) seems to be significant. In the case of men in this age group, poor health is the reason for the withdrawal from the labor market almost twice as much of the population as it is in the EU.

**Figure 6. Main reasons for the lack of interest in taking up employment in people aged 50-64, Poland and EU (% of the total population, w - women, m - men, 2016)**

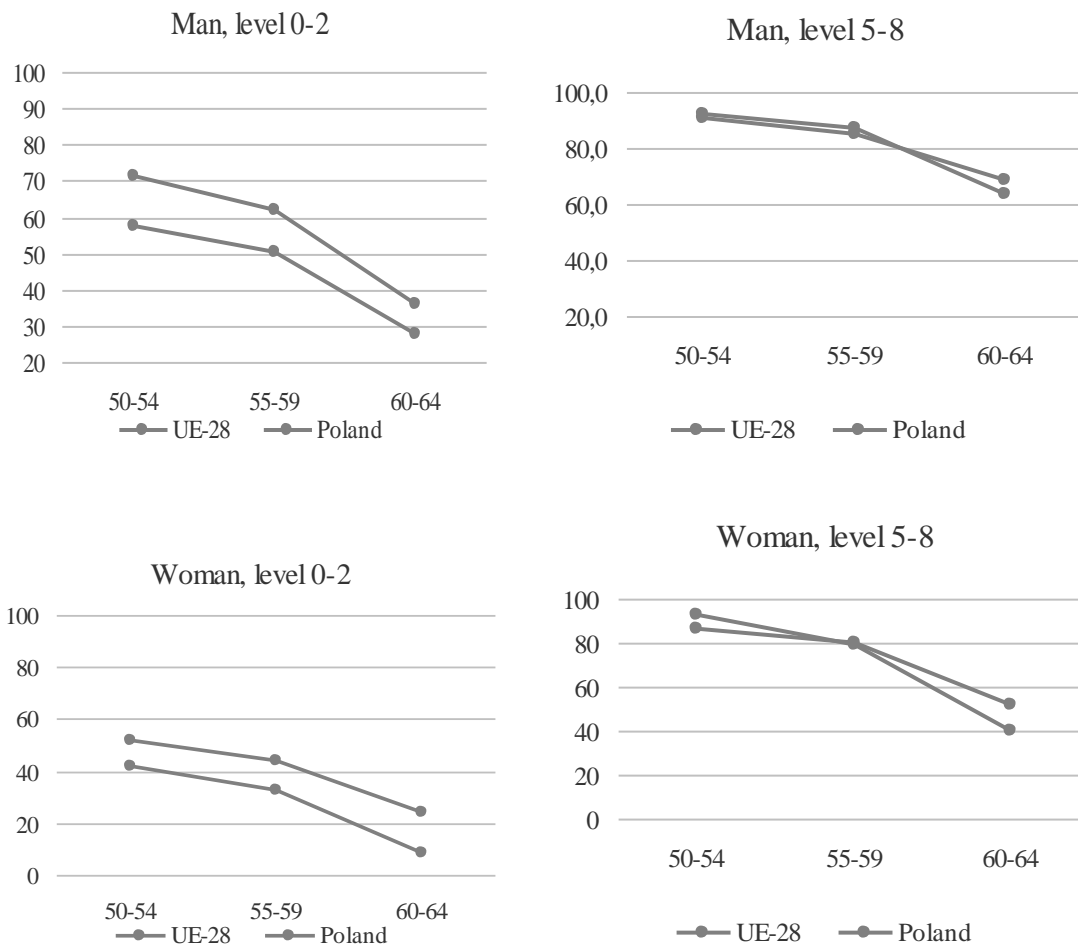


Source: own study based on Eurostat data, available at: <http://ec.europa.eu/eurostat/data/database> (retrieved 15.12.2017).

### **Education as a determinant of employment of people aged 50+**

An analysis of the specificity of employment in the group of older employees indicates that the key factor determining the willingness and ability to find a job is the level of education. An analysis of the distribution of the employment rate in the population aged 50-64 by age shows that the differences in employability of people with the highest (5-8) and the lowest (0-2) level of education reach over 40 p.p. in the case of men (aged 60-64) 50 p.p. in the case of women (aged 50-54). At the same time, it should be noted that in the case of people aged 50-64 with higher education, the level of employability in Poland is close to the average values observed in the EU. In the case of the least-educated people, the average employment rate in this age group is lower by over 11 p.p. for men and by over 10 p.p. for women, compared to the average values in the EU(see Fig. 7).

**Figure 7. Employment rate of people by age and education, 2016 (%), population aged 50-64**



Source: own study based on Eurostat data, available at: <http://ec.europa.eu/eurostat/data/database> (retrieved 15.12.2017).

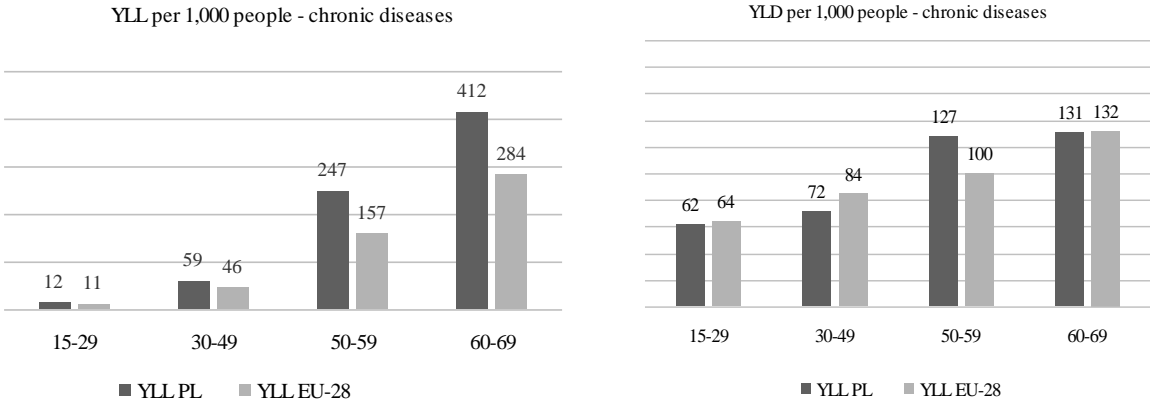
### Age as a risk factor for health

Both in the literature and in the presented research results, another key factor, next to education, determining the level of activity of older people in the labor market is health and physical fitness. The above-mentioned results of research on the reasons for the lack of interest in taking up work among people in the 55+ age group indicate that, in Poland, it is health that determines the interest in seeking employment by people from this age group. WHO data on the number of years lost due to disability and years lost due to premature death in the working-age population confirm the particularly unfavorable situation of Poland. High labor costs, as compared to the EU average, stemming from the consequences of ill health, are particularly noticeable in relation to the long-term effects of chronic diseases, which according to the latest estimates, constitute currently about 90% of all diseases occurring in

the population of highly developed countries (WHO, 2013). According to the estimates, the long-term consequences of these diseases are responsible for about 87% of years lost due to disability and 80% of years lost due to premature death in the working-age population.

An analysis of WHO data on the effects of chronic diseases clearly shows that the dependency of long-term work over time increases with long-term consequences expressed by the number of years of life lost (YLL) or the disability-adjusted life year (YLD). These trends are characteristic for all populations of EU countries, but in the case of Poland, the age dependency ratio due to chronic diseases in the group of people aged 50+ is much higher than the average values observed in the EU. This is particularly evident in the case of the estimated number of years lost due to diseases of chronic life (premature death). The YLL index estimated for 2015 for Poland per 1,000 people in a given age group is higher than the EU-28 average by over 57% in the group of people aged 50-59 and by over 45% in the group aged 60-69. Unfavorable effects of chronic diseases on labor resources can also be observed in the YLD index. This ratio, calculated per 1,000 people aged 50-59, is more than 27% higher for Poland than the average observed in the EU (see Fig. 8).

**Figure 8. Number of years of life lost (YLL) and disability-adjusted life year (YLD) as a result of chronic diseases, Poland and EU-28, 2015**



Source: own study based on WHO data, available at: [http://www.who.int/healthinfo/global\\_burden\\_disease/estimates/en/index2.html](http://www.who.int/healthinfo/global_burden_disease/estimates/en/index2.html)(retrieved 15.12.2017).

**Conclusions**

The review of theoretical concepts and results of research conducted in the area of age impact on productivity of labor resources indicate that, despite the existing stereotypes, it is impossible to unequivocally confirm the negative influence of an increase in the median age of the working-age population on the economic growth of a given economy. It turns out that,

when maintaining appropriate boundary conditions, it becomes possible to use the experience that grows with age to achieve better results. In the case of the Polish labor market, however, it is necessary to increase the level of involvement of older employees in the search for or willingness to keep a job. This process requires strengthening in the economy the impact of factors such as: improving health results and extending the average life expectancy in good health, changing workplace culture, supporting older workers in maintaining their economic activity, creating jobs with lower requirements in terms of physical fitness, and last but not least, improving the stability of the pension system and therefore allowing to take advantage of the benefits springing from longer employment.

The analysis of demographic trends taking place over the last few decades in Poland makes it possible to claim that the Polish economy is one of the European economies which will be most affected by the negative consequences of changes in terms of age structure and population. The intensity of observed phenomena related to the process of depopulation, in connection with a relatively low rate of economic activity and employability of people in the so-called late working age, causes the accumulation of demographic and cohort effects resulting in a virtually unprecedented rate of contraction of the labor resources potential along with the dynamically growing level of age dependency.

The main contribution of the presented study is the identification of the main determinants conditioning the possibility of curbing negative effects of the aging process of the labor force in Poland, which include the level of education and health status in the working-age population. The high dependency of the population aged 50+ due to long-term consequences of chronic diseases, as shown in the conducted analysis, creates serious barriers in stimulating the economic activity of the older part of the population in light of the solutions currently applied in the pension system in Poland. Despite the relatively high level of education of older people in Poland (according to 2016 Eurostat data, 14.1% of Polish citizens aged 55-64 had only primary education, against 31.2% for the EU) positively affecting the scale of engagement in the labor market of people aged 50+, in global terms, the employment rate of older people (55-64 years old) in 2016 was by over 9 p.p. lower in Poland than the average observed in the EU.

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## Starzenie się zasobów pracy w Polsce – analiza konsekwencji

### Abstrakt

Celem analizy była ocena wpływu procesów demograficznych na rynek pracy w Polsce, ze szczególnym uwzględnieniem ich oddziaływania na stan zasobów siły roboczej. W artykule przedstawiono wpływ procesu starzenia się zasobów pracy na utracone możliwości produkcyjne populacji w wieku produkcyjnym. Ocenę tę oparto o badanie zróżnicowania w poziomie wskaźników aktywności zawodowej oraz zatrudnienia ze względu na wiek. Zaprezentowano wyniki analizy parametrów charakteryzujących liczbę utraconych potencjalnych lat zdrowego życia z powodu chorób przewlekłych w populacji osób w wieku produkcyjnym. Stwierdzono, że natężenie obserwowanych zjawisk związanych z procesem depopulacji w połączeniu ze stosunkowo niskim wskaźnikiem aktywności ekonomicznej oraz zatrudnialności osób w tzw. późnym wieku produkcyjnym powoduje kumulację efektów demograficznych i kohortowych skutkującą praktycznie niespotykanym na skalę europejską tempem kurczenia się potencjału zasobów pracy w Polsce.

**Słowa kluczowe:** starzenie się zasobów pracy, rynek pracy, utracona produktywność, YLL, YLD