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Labour market inequalities across disability statuses, sex and age

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Abstract. The paper analyses basic issues relating to labour market discrimination experienced by persons with disabilities, which is reflected in the different levels of employment and unemployment of this group of people in relation to the entire population. Therefore, the aim of the study is to identify the inequality in the labour market with respect to the disability status, sex and age, and to assess the stability of this relation over time. The research covers the period from 2001 to 2018 and was based on the 2002 and 2011 Census and the Labour Force Survey (LFS) data. The examination of the inequalities in economic activity between people with disabilities and the entire population while taking into account both sex and age was based on the analysis of census data. The stability of this relation was verified on the basis of LFS data, which provide information on employment and unemployment among persons with disabilities in general or separately by sex or age. The constructed patterns were used to estimate the economic activity of people with disabilities in 2011. The paper used methods of demographic analysis, comparative statistics, time series, the verification of statistical hypotheses and statistical estimation.

Clear differences concern men aged 35–39 and women aged 40–49. The employment rate for men with disabilities is three times lower, and for women 2.5 times lower than among the whole population. The relationship between employment rates was essentially constant over the 2001–2018 period. An upward trend was observed in the case of the unemployment rate. 2008 saw a clear increase in the disproportion in relation to the trend. The unemployment rate among persons with disabilities compared to the entire population was higher for men by an average of 60% and by 50% for women.

Keywords: persons with disabilities, economic activity, employment, unemployment
JEL: J1, J2, J7

Nierówności na rynku pracy w zależności od statusu osoby z niepełnosprawnościami, płci i wieku

Streszczenie. Artykuł dotyczy podstawowych zagadnień dyskryminacji doświadczanej na rynku pracy przez osoby z niepełnosprawnościami, którą odzwierciedlają różnice w poziomie zatrudnienia i bezrobocia tych osób w stosunku do całej populacji. Celem badania jest identyfikacja nierówności na rynku pracy w zależności od statusu osoby z niepełnosprawnościami według płci i wieku oraz ocena stabilności tej relacji w czasie. Badanie obejmuje lata 2001–2018. Wykorzystano w nim dane pochodzące ze spisów ludności z 2002 r. i 2011 r. oraz z Bada-

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nia Aktywności Ekonomicznej Ludności (BAEL). Na podstawie danych spisowych badano nierówności w aktywności ekonomicznej osób z niepełnosprawnościami w stosunku do całej populacji z uwzględnieniem jednocześnie płci i wieku. Stabilność tej relacji zweryfikowano na podstawie danych BAEL, dostarczających informacji o zatrudnieniu i bezrobociu osób z niepełnosprawnościami ogółem bądź odrębnie według płci albo wieku. Skonstruowane wzorce posłużyły do oszacowania aktywności ekonomicznej osób z niepełnosprawnościami w 2011 r. Wykorzystano metody analizy demograficznej, statystyki porównawczej, szeregów czasowych, weryfikacji hipotez statystycznych oraz estymacji statystycznej.

Zaobserwowano wyraźne różnice w przypadku mężczyzn w wieku 35–39 lat i kobiet w wieku 40–49 lat. Wskaźnik zatrudnienia mężczyzn z niepełnosprawnościami był 3-krotnie, a kobiet – 2,5-krotnie niższy niż w populacji ogółem. Relacja między wskaźnikami zatrudnienia w latach 2001–2018 zasadniczo utrzymywała się na stałym poziomie. W przypadku stopy bezrobocia zaobserwowano trend rosnący. Wyraźny wzrost dysproporcji w stosunku do trendu odnotowano w 2008 r. Stopa bezrobocia wśród osób z niepełnosprawnościami w porównaniu z całą populacją była wyższa wśród mężczyzn średnio o 60%, a wśród kobiet – o 50%.

Słowa kluczowe: osoby z niepełnosprawnościami, aktywność ekonomiczna, zatrudnienie, bezrobocie

1. Introduction

People with disabilities account for 15% of the world's population and 20% of people living in poverty. In the European Union (EU-27), in 2018, about 24.5% of persons aged 16 and over declared having a disability (Grammenos, 2020). The share of people living with disabilities is rising particularly quickly in high-income countries, where national populations are growing older at unprecedented rates (Tiberti & Costa, 2020). 25% of the population in Poland is 60 and over, which places it among the fastest ageing countries in Europe. Although employment is essential for social inclusion, in every country people with disabilities tend to encounter greater barriers in the labour market and much lower employment rates (ERs) are observed among this group than among the general population (Benítez-Silva et al., 2010; Hanga et al., 2015; Organisation for Economic Co-operation and Development [OECD], 2010). According to the OECD (2010, 2018), Poland is one of the countries with the lowest ER of people with disabilities and with the largest difference in ERs between this group and the general population, along with Hungary and Ireland. Moreover, unemployment is typically twice as high among people with disabilities as among the rest of the working age population, even in times of economic growth. Poland is a country where the low ER among people with disabilities occurs along with higher unemployment risks. These problems have become of particular significance, which is caused by a sharp increase in the occurrence of disability with age, the lack of comparable and disaggregated data and the scarcity of research on disproportions of economic activity observed between people with disabilities and the whole

population (Mitra & Yap, 2021; OECD, 2010, 2018; OECD & EU, 2020; World Health Organisation [WHO], 2021; WHO & The World Bank, 2011).

This study aims to identify the inequality in the labour market with respect to the disability status, sex and age, and to assess the stability of this relation over time.

2. Labour market inequalities resulting from the disability status in light of previous research and analyses

International organisations undertake a variety of activities aiming for a greater and more meaningful inclusion of people with disabilities. These policies place a particular emphasis on providing equal opportunities and the equal treatment of all in the workplace. Several of the targets outlined in the Sustainable Development Goals (SDGs) are based on the 'leaving no one behind' motto, which clearly refers to persons with disabilities or other vulnerable groups (United Nations [UN], 2015). The Equal Employment Opportunity principle established in the framework of the 2010–2020 European Disability Strategy (Communication from The Commission..., 2010) is EU's major priority, which embodies its plans to combat any form of disability-based discrimination (Council Directive..., 2000). The EU has also ratified the United Nations Convention on the Rights of Persons with Disabilities (UN CRPD; UN, 2006). The efforts to improve the work-related situation of those with disabilities can be illustrated by the activities of the European Disability Forum,[1] undertaken in line with the motto 'Nothing about us without us'. The EU anti-discrimination policy imposes upon employers the provision of reasonable accommodation to candidates or employees with disabilities. Issues associated with sheltered or supported employment, quota schemes and the implementation of recommendations concerning disability are discussed in different papers and documents (Hanga et al., 2015; International Labour Organization [ILO], 2019; McAnaney & Wynne, 2017; OECD, 2010; OECD & EU, 2020; Wilken et al., 2014). Phillips (2012) analysed the situation in new EU member states and showed that the implementation of reforms enabling equal employment and equal pay proved very difficult due to the labour markets' low absorptive capacity, employers' negative attitudes and insufficient education and training provided to employees with disabilities. Despite the considerable progress in anti-discrimination legislation, the lack of political will and insufficient financing limit the promotion of the rights of people with disabilities.

[1] http://www.edf-feph.org/.

The basic issues relating to labour market discrimination against people with disabilities include limited access to education and the disability pay gap (Benito et al., 2016; Jones, 2008; OECD, 2010) or, more recently, measures which the term disability confidence encompasses. Disability confidence refers to cultural changes aimed at eliminating barriers, overcoming social reluctance and building a capacity for the inclusion of people with disabilities in the workforce from the point of view of both employers and employees (Deuchert & Kauer, 2017; Lindsay et al., 2019). Another important and complex problem is the relationship between health and employment, and disability with absenteeism (Folguera-I-Bellmunt et al., 2018; García-Serrano & Malo, 2014). The growing number of working age people who receive disability benefits leads governments to impose stricter eligibility requirements and the obligation of participating in back-to-work schemes. On the other hand, receiving disability benefits significantly reduces the probability of an individual to seek employment (Mussida & Sciulli, 2016). Nevertheless, any improvement in health, including mental health, is crucially dependent upon access to work and financial security (Curnock et al., 2016).

The presence of various obstacles of a sensory and functional nature in daily activities significantly limits the probability of becoming employed (Brucker et al., 2016). However, relatively little is known about working people with disabilities in comparison to those who are not employed in terms of their demographic characteristics, use of services and support or their career paths. Such insights would facilitate the decision-making process when designing programmes aiming to help employees with disabilities to remain in the labour market, increase their wages and become less dependent on government support (Ben-Shalom & Wittenburg, 2015). It is widely acknowledged that education is one of the basic factors which enable people with disabilities to find employment. A study of the effectiveness of educational programmes for workers with disabilities in Norway revealed that the ER among participants of such programmes was around 8 p.p. higher than among the non-participants (Aakvik, 2003). The results of studies based on data from the American Community Survey (ACS) also confirm that persons with disabilities with higher education have better job opportunities (Sevak et al., 2015).

In 2016 people with disabilities accounted for 19.5% of the workforce in the USA (Office of Disability Employment Policy, n.d.). Inequality in the labour market was reflected in the fact that the unemployment rate (UR) among this group (7.3%) was more than twice as high as the rate for the whole population (3.5%) (Bureau of Labour Statistics [BLS], 2020). Eurostat data indicate that people who encounter

health-related work obstacles or limitations in daily activities account for 8.0% of the workforce in the 28 EU countries. Labour market inequality is manifested by a clearly larger share of people with disabilities in the UR, which stood at 17.4% in 2011, compared to 9.7% for the economically active population (in 2011 the EU LFS included an ad hoc module on the employment of people with disabilities[2]). Mussida and Sciulli (2016) in their research on the effects of disability on employment probabilities in Central and Eastern European countries found that a past disability significantly and negatively affects current employment opportunities. Depending on the disability status, the negative effect ranged between 2.7% for Poland up to 4.3% for Hungary; however, when considering strong disability, the negative impact grew from 4.9% for Romania and increased up to 9.3% for Hungary, 10.6% for Poland and 14.7% for Lithuania.

Using survey data from the 2018 EU Statistics on Income and Living Conditions (EU-SILC), Eurostat provided the following information for EU-27: 50.8% of people with disabilities were employed compared to 75.0% of persons without disabilities, which altogether resulted in a 70.7% ER among all persons aged 20–64. According to the EU-SILC estimations, the ER among people with disabilities was very low in Greece (31.0%), Croatia (34.3%) and Bulgaria (35.4%). A relatively high ER was observed in Denmark (60.9%), Latvia (61.1%) and Estonia (64.3%). At the EU-27 level, the employment rate of people with disabilities was 23.7 p.p. lower compared to people without disabilities. The highest differences could be found in Ireland (40.0 p.p.), Bulgaria (38.0 p.p.), Poland (33.5 p.p.) and Croatia (32.7 p.p.), while the lowest in Italy (14.9 p.p.), France (15.7 p.p.), Slovenia (17.3 p.p.), Finland (17.8 p.p.) and Denmark (18.2 p.p.). However, it should be stressed here that the EU-SILC information related only on persons who received disability benefits.

According to the Polish Ministry of Family, Labour and Social Policy, in 2017 there were 3.1 million people aged 16 and above holding disability certificates, out of whom 1.68 million were people of working age (7.7% of the potential labour force). The economic activity rate (EAR) of the working age population with disabilities was 28.9%, the ER – 26.3% and the UR – 9.3%. In comparison, the respective rates for people without disabilities were as follows: 79.8%, 75.9% and 4.9%, which indicates considerable differences. It should be added here that similarly to EU-SILC, LFS data refered only to those holding disability certificates and did not include those who self-reported their limitations in basic activities resulting from disability or chronic illness but did not have an official document confirming their condition.

[2] https://ec.europa.eu/eurostat/data/database.

3. Research method

3.1. Research period and methods of analysis

The study covers the period from 2001 to 2018 and focuses particularly on two periods of the 2002 and 2011 censuses. The analysis was based on data from both consecutive population censuses. Data for the intercensal period come from the LFS, which provides information about the economic activity of people classified as having a disability in the legal sense.

The study applied methods of demographic analysis, statistical comparisons, correlation and time series, statistical testing and estimation. The demographic analysis was conducted in order to identify sex- and age-specific patterns of the economic activity of people with disabilities. The patterns were constructed as a sequence of age-specific ratios of the economic activity of people with disabilities to the whole population, separately for each sex. The availability of relevant data allowed the construction of sex- and age-specific patterns of economic activity only for the 2002 census. Due to the limited scope of the data, it was not possible to determine such patterns for 2011. Therefore, the stability of the 2002 relationship was studied over time using LFS data with time series methods and statistical testing. Subsequently, the patterns were used to estimate economic activity characteristics of people with disabilities by sex and age for the 2011 census survey. A comparison of the estimates resulting from the Horvitz-Thompson (HT) and multiplier method (MM) is provided.

Inequalities in the labour market encountered by people with disabilities were identified through the analysis of the differences concerning such labour market characteristics as the EAR, ER and UR. Each of these characteristics was estimated by age, separately for each sex. The EAR is defined as the percentage of the economically active population of a given category. The ER is the percentage of the employed of a given category. The UR is calculated as the share of the unemployed in the total number of the economically active population of a given category. The economically inactive population consists of all persons who were neither employed nor unemployed during the studied period. The inactivity rate is the proportion of the population that is not in the labour force.

3.2. Disability definition and data

The definition and measurement of disability have been discussed in numerous studies, both describing the Polish reality (Antczak et al., 2018; Dehnel & Klimanek, 2016; Gołata & Dehnel, 2021) and focusing on international comparability,

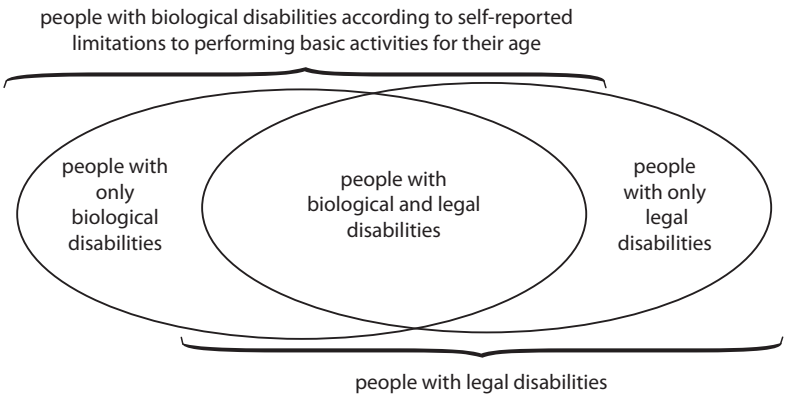
particularly the work of the Washington Group on Disability Statistics or the recommendations of Eurostat (Altman, 2016; Loeb, 2016; Mitra & Yap, 2021; Van Oyen et al., 2018). Statistical data should reflect the diversity of people with disabilities and the various aspects of their lives, such as access to education, employment and health services. Despite the efforts made to produce statistics on disability, national statistical offices rarely disaggregate the data by disability status and use a variety of measures, which limits their international comparability.

Mitra and Yap (2021) examined survey and census questionnaires from 2009 to 2018. Disability-related questions were found in 136 out of 180 (76%) countries under review. The share of countries whose censuses or survey questionnaires included questions on difficulties experienced in day-to-day functioning was 47%, while 16% had databases containing such information. Only 33 countries followed the approach proposed by the Washington Group, although this is a concise and internationally tested tool. Poland did not belong to this group.

For this reason, the statistical definition of disability used in Polish censuses (Główny Urząd Statystyczny [GUS], 2003, 2013) was adopted in this article. The censuses identified an individual as having a disability if they can present a relevant document issued by an authorised body (in the legal sense) or, in the absence of such a document, a statement based on self-reported limitations inhibiting and/or preventing the performance of basic activities appropriate for their age (GUS, 2003, 2012, 2013, 2016). Thus, in the Polish censuses, the occurrence of disability was estimated according to two criteria: formal (legal) and based on an individual's assessment of the limitations to doing activities typical for a specific age, referred to by Statistics Poland as 'in the biological sense' (GUS, b.r.). These two groups overlap, as a person declaring limitations to performing basic activities may or may not have an official confirmation. In its publications, Statistics Poland presents data for categories reflecting two different types of disability according to the decomposition presented in the figure below.

As regards the category defined in legal terms, according to the Act on Vocational and Social Rehabilitation and Employment of Persons with Disabilities (Pol. Ustawa o rehabilitacji zawodowej i społecznej oraz zatrudnianiu osób niepełnosprawnych), there are three degrees of disability: complete, serious and moderate. At present, disability is officially assessed by the Social Insurance Institution (Pol. Zakład Ubezpieczeń Społecznych – ZUS) as the basis for receiving disability allowances and by poviat (district) and voivodship (provincial) disability evaluation boards for other purposes (Antczak et al., 2018; Dehnel & Klimanek, 2016). Regarding self-reported limitations to performing basic activities, there are also three degrees of activity limitations: complete, serious and moderate.

Figure 1. Decomposition of people with disabilities in Poland according to official statistics



Source: author's work based on Dehnel and Klimanek (2016) and GUS (2003).

The 'with only legal disabilities' category raises certain doubts as to the grounds on which an authorised administrative body issues a disability statement to a person who did not declare any limitations in performing basic activities. One of Statistics Poland's publications (GUS, 2013, p. 51) contains the following information:

> A very important piece of information, expanding the knowledge about people with legal disabilities, was their subjective assessment of their ability to perform basic life activities. It is important, because the legal judgement (even of the highest degree) does not always reflect the existing limitations in everyday functioning.[3]

Problems referring to the measurement of disabilities and their international comparability are very extensive and require detailed explanation (Gołata & Dehnel, 2021). It is, therefore, worth presenting the exact wording of the question used in Polish censuses (GUS, 2011):

> Do you have a limited ability to perform normal activities (schooling, work, housekeeping, self-care) lasting 6 months or longer due to health problems (disability or chronic disease)?
> - yes, completely;
> - yes, seriously limited;
> - yes, moderately limited;
> - no, I have no limitations;
> - I do not want to answer this question.[4]

[3] Author's translation.
[4] Author's translation.

In comparison to the 2002 census, the definition used in the 2011 census included an additional information that the duration of the experienced limitation should last at least 6 months. The number of degrees of activity limitations was extended from 'complete' and 'serious' in 2002 to 'complete', 'serious' and 'moderate' in 2011.

When analysing the data from the two censuses, it is necessary to take into account the different methods of census administration. The 2002 census followed a traditional approach which involved interviewing all households in the country, while the 2011 one used administrative registers and interviewed only 20% of the overall population (GUS, 2003, 2013). In the course of the census, information was collected on a voluntary basis, which was justified by the sensitive nature of the question and the provision of the Polish Constitution, which prohibits imposing upon anyone the obligation to reveal information about their health. The changes in conducting censuses had a considerable influence on the availability of information about people with disabilities, particularly in cross-classification domains determined by basic demographic, social and economic variables, not to mention territorial division. The 2011 census results provide information only about the economic activity of people with disabilities by disability status, sex and place of residence (urban or rural), but not age.

4. Inequalities in the economic activity of people with disabilities in Poland

First, let us summarise the scope of the available information on the economic activity of people with disabilities (Table 1). According to the 2011 census estimates, the number of people with disabilities was lower by 744.6 thousand compared to the 2002 census. Consequently, the percentage of people with disabilities in 2011 was lower by 3 p.p. than nine years earlier, despite the intensifying aging process of the population. This was one of the reasons why the 2011 census estimates were criticised, especially as regards disability (Slany, 2014). The estimated number of people with disabilities not only decreased the percentage of this subpopulation, but also changed its structure by labour market status. The share of persons with disabilities in the economically active population declined from 6.0% to 5.4%. The decrease was larger in the population of people in work and amounted to 1.2 p.p., while in the economically inactive population by as much as 5.6 p.p. Regarding the situation of people with disabilities in the labour market, one can note a certain improvement reflected in the higher EAR and ER – by 1.1 p.p. Moreover, despite the larger share of persons with disabilities in the group of the unemployed, the UR in this subpopulation decreased from 20.4% to 19.2%.

Table 1. Basic characteristics of economic activity, based on 2002 and 2011 population censuses

Specification	WP		D		$\frac{D}{WP}\cdot 100\%$	
	2002	2011	2002	2011	2002	2011
			Population 15+			
Total number of persons	**31,288,428**	**32,679,614**	**5,272,505**	**4,527,926**	**16.9**	**13.9**
of which:						
Economically active	16,776,498	17,100,695	1,011,056	919,874	6.0	5.4
employed	13,218,344	15,050,641	804,629	742,912	6.1	4.9
unemployed	3,558,154	2,050,054	206,427	176,962	5.8	8.6
Economically inactive	13,456,155	1,390,468	4,233,159	3,608,051	31.5	25.9
			Rate in %			
EAR	53.6	52.3	19.2	20.3	35.8	38.8
ER	42.2	48.5	15.3	16.4	36.3	33.8
UR	21.2	12.0	20.4	19.2	96.2	160.0
IR	43.0	42.6	80.3	79.7	186.7	187.1

Note. WP – whole population, D – people with disabilities, EAR – economic activity rate, ER – employment rate, UR – unemployment rate, IR – inactivity rate.

Source: GUS (2003, 2013).

The lower estimated number of people with disabilities in 2011 compared to the 2002 census, especially when broken down by category of disability, can be reflected in the values of the basic characteristics of the labour market. It should therefore be noted that the relationship between the levels of activity and employment rates for the whole population and the population of people with disabilities did not change considerably (Table 1). In 2011, the EAR for people with disabilities accounted for 38.8% of the rate for the whole population and this relationship is similar to that observed in the 2002 census, when the EAR among people with disabilities accounted for 35.8% of its total value. As regards the ER among people with disabilities, its share in the ER in the whole population fell from 36.3% in 2002 to 33.8% in the 2011 census. There was a notable change with respect to the UR among people with disabilities: while in 2002 it was almost the same as for the whole population, in the 2011 census it was higher by over 7 p.p.

4.1. Inequalities by disability category

In 2011, the economic activity and employment rates for people with disabilities were higher than in 2002, while the UR was lower (Table 2). However, this relationship varied depending on the category of disability. There was a clear

difference of about 10 p.p. in the activity rates between the sexes: in 2011 EAR for men was 25.2% and 16.2% for women. The highest level of EAR of nearly 30% could be observed among people with disabilities only in the legal sense. This subpopulation included persons who had a valid disability certificate but did not report any limitations in basic activities for their age (GUS, 2013, p. 51). According to the 2002 census, over 1.6 million people belonged to this category, while in 2011, almost 480 thousand. Given the definition used by Statistics Poland, it is surprising that the number of people with a complete degree of disability (only legal) totalled 60.5 thousand, while nearly 175 thousand were those with a serious degree. In contrast, 41% of the people with a moderate degree of disability were economically active.

Table 2. Economic activity by category and degree of disability, based on the 2011 population census

Category of disability	Total			Men			Women		
	EAR	ER	UR	EAR	ER	UR	EAR	ER	UR
	in %								
Disabilities, in total	**20.3**	**16.4**	**19.2**	**25.2**	**20.4**	**19.1**	**16.2**	**13.1**	**19.4**
In the legal sense[a]	19.8	16.1	18.7	23.0	18.8	18.1	16.9	13.6	19.5
In the legal sense with self-reported limitations to performing basic activities	18.1	14.6	19.3	21.2	17.2	18.7	15.1	12.0	20.2
degree: complete	4.2	3.7	13.6	5.5	4.8	13.5	3.1	2.7	13.8
serious	20.3	16.7	17.8	23.1	19.1	17.6	17.5	14.3	18.1
moderate	33.4	26.1	22.1	37.4	29.5	21.0	29.3	22.4	23.5
undefined	18.8	16.0	15.2	22.6	19.3	14.7	14.8	12.4	16.1
Exclusively in the legal sense[b]	29.8	24.9	16.7	33.1	27.8	16.0	26.8	22.1	17.5
degree: complete	7.9	6.7	14.8	9.9	8.6	13.2	6.2	5.1	16.9
serious	26.7	22.6	15.5	29.3	24.8	15.4	24.4	20.6	15.6
moderate	40.7	33.5	17.7	44.3	36.9	16.6	37.2	30.2	19.0
undefined	23.8	20.3	14.8	28.0	23.5	16.1	19.1	16.7	12.7
Exclusively based on self-reported limitations to performing basic activities[b]	21.3	17.0	20.2	30.7	24.3	20.9	15.2	12.3	19.2
degree: complete	4.3	3.6	16.6	7.7	6.4	17.4	2.3	1.9	15.1
serious	12.1	9.7	20.3	19.0	14.7	22.5	8.0	6.6	17.2
moderate	25.8	20.6	20.2	36.2	28.7	20.7	19.0	15.3	19.6

a Legal sense and according to self-reported limitations to performing basic activities and exclusively legal.
b Aged 16+.

Note. As in Table 1.

Source: GUS (2013).

The activity rate of people with disabilities in the legal sense (19.8%), legal with self-reported limitations (18.1%), and exclusively based on self-reported limitations (21.3%) was at a similar level in 2011 (Table 2). The ER was slightly higher among people with disabilities based exclusively on self-reported limitations – 17.0%, compared to 16.1% for legal and 14.6% for both legal with self-reported limitations. The UR was a little higher for those with disabilities based exclusively on self-reported limitations – 20.2%. The variation in the level of economic activity depending on the degree of activity limitations is quite evident, and what may have been expected. In the group of people with complete activity limitations, the level of economic activity and employment was relatively low for each category of the following disabilities: legal and with self-reported limitations, exclusively legal, and exclusively based on self-reported limitations. The highest EAR of 7.9% (9.9% for men and 6.2% for women) could be observed in the group of people with disabilities exclusively in the legal sense. As the degree of disability decreased, the level of EAR increased to 33.4% for people with disabilities in the legal sense with self-reported limitations (37.4% for men and 29.3% for women). The lowest values of EAR and ER (2.3% and 1.9%, respectively) could be observed among women with disabilities based on self-reported activity limitations in the complete degree. In the following analysis, a distinction between the indicated degree of disability and the level of activity limitations is not made due to the lack of comparability between the two censuses.

4.2. Inequalities in the economic activity between people with disabilities and the whole population

In order to examine the variation in the economic activity of people with disabilities, specific sex and age patterns were constructed. A detailed analysis of the EAR of people with disabilities confirmed its lower (by 65%) level in relation to the whole population. This relationship remained the same when data were analysed by sex: EAR for men with disabilities was 59% lower than for men in general, and for women lower by as much as 70% (Table 3). Two things are worth noting when age is taken into account: the similar shape of the curves representing patterns for people with disabilities to those for the whole population, and the declining with age disparity between patterns for people with disabilities and the whole population (Figures 4 and 5, p. 15–16). The latter results from the natural tendency for disability to occur more often as people age. Additionally, low retirement age and eligibility to disability pensions cause convergence. Above the age of 60, a growing disparity was observed again.

Table 3. Economic activity of people with disabilities by age and sex, based on the 2002 population census

Age groups	EAR(D)		ER(D)		UR(D)		EAR(D)/EAR(WP)		ER(D)/ER(WP)		UR(D)/UR(WP)	
	in %											
	men	women	men	women	men	women	men	women	men	women	men	women
Total	**15.2**	**10.4**	**12.1**	**8.0**	**20.0**	**23.1**	**0.41**	**0.30**	**0.54**	**0.52**	**1.31**	**1.31**
15–19	8.9	6.1	4.2	2.7	53.2	55.7	0.60	0.55	0.53	0.52	1.14	1.06
20–24	39.6	31.2	21.0	16.1	46.8	48.5	0.57	0.53	0.52	0.47	1.15	1.15
25–29	46.0	38.8	30.8	25.8	33.2	33.6	0.52	0.51	0.45	0.45	1.52	1.33
30–34	44.6	37.0	32.2	25.9	27.9	30.1	0.50	0.47	0.43	0.42	1.68	1.40
35–39	42.5	37.2	31.1	26.8	26.8	27.9	0.49	0.46	0.42	0.41	1.67	1.42
40–44	41.0	36.4	30.2	26.3	26.4	27.6	0.48	0.45	0.43	0.40	1.55	1.49
45–49	39.0	32.6	29.8	24.4	23.6	25.1	0.49	0.44	0.45	0.40	1.37	1.48
50–54	34.1	25.5	27.5	20.6	19.4	18.9	0.50	0.45	0.49	0.43	1.20	1.39
55–59	28.4	17.5	24.4	15.4	14.1	11.7	0.57	0.61	0.57	0.59	1.07	1.28
60–64	20.3	9.9	18.6	9.3	8.3	6.2	0.74	0.74	0.74	0.73	1.00	1.19
65–69	11.8	5.9	11.3	5.6	4.1	4.8	0.75	0.74	0.75	0.73	1.17	1.18
70–74	7.0	3.3	6.8	3.2	2.7	4.0	0.69	0.68	0.69	0.67	1.18	1.36
75+	3.1	1.3	3.1	1.3	.	.	0.67	0.66	0.67	0.66	.	.

Note. As in Table 1. (.) – data not available.

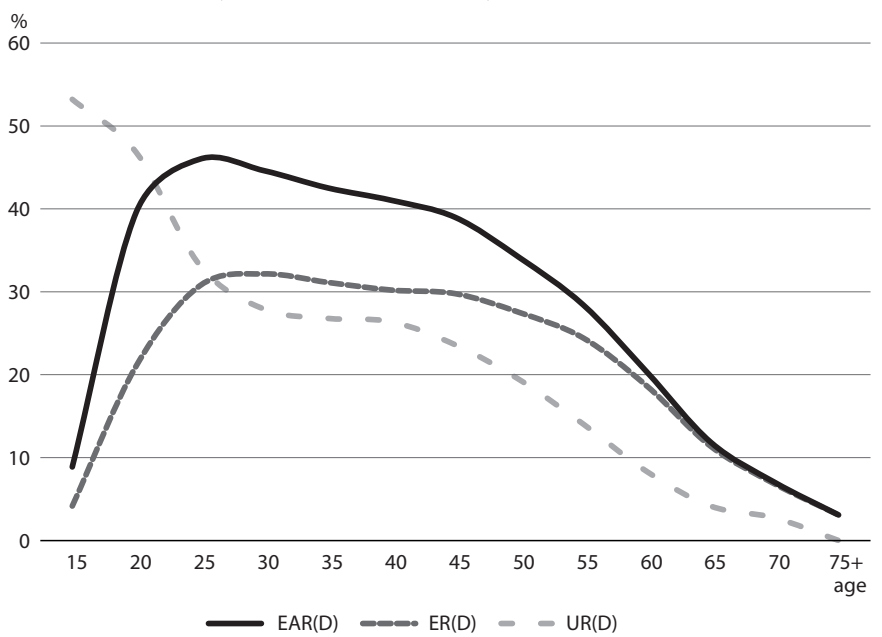
Source: author's estimates based on GUS (2003).

At the time of life when the level of economic activity is at its highest (the 25–29 age group), age-specific EARs for both men (46.0%) and women (38.8%) with disabilities constituted about half of the values for the whole population (52.0% and 51.0%, respectively), as Figures 2–5 (p. 14–16) illustrate. For women, this disproportion was more pronounced and in each age group the corresponding EARs were lower by a few percentage points, reaching the lowest level of 44.0% in the age group of 45–49-year-olds. Even larger disproportions could be observed for ERs, whose values for people with disabilities were even lower (40% of those for the whole population). The greatest differences were recorded for age groups characterised by the highest level of EARs; however, they declined after the age of 50. The distributions of ERs for people with disabilities were unimodal and moderately right-skewed (Figures 2 and 3). The highest ER for men with disabilities (32.2%) was observed in the age group of 30 to 34-year-olds and the highest level of 26.8% was recorded for women aged 35–39. The distributions of UR by age were extremely right-skewed and demonstrated that the youngest population with disabilities faced major problems with finding a job: 53.2% men and 55.7% women. Almost half of all the 20 to 24-year-old people with disabilities were unemployed. In older age groups, URs gradually declined.

The ratios characterising the economic activity of men with disabilities in relation to the whole population of men, as well as women with disabilities in relation to the

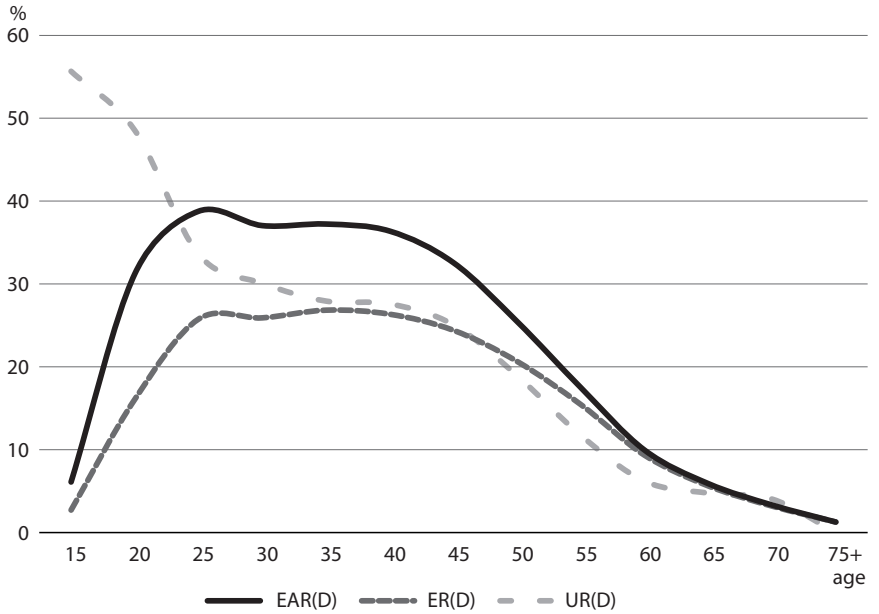
whole population of women (Figures 4 and 5) showed an underrepresentation in employment and overrepresentation in unemployment. The curves illustrating the EAR and ER were below the parity level which signified an equal level of employment (i.e. ratio = 1). The differences were considerable in the youngest age group and became sharper at an older age when the EAR normally tends to be at its highest, until the age of 50. The disproportion decreased for the following 10 years but at the age of 60 it still remained more than 20 p.p. below the parity level and declined again for the older age groups. The relationship described above was similar for both sexes. On the other hand, unemployment among people with disabilities was higher than that observed for the entire population. As age increased, the disproportion in the UR for men grew rapidly: in the 30–39 age group, the UR for men with disabilities was nearly 70% higher than for all men. This disparity declined at a much slower pace until around the age of 60 and it disappeared when the UR for the two groups reached the same level. However, for the older age groups, the difference grew again until it reached about 20%. For women, the disproportion in the UR started at a similar level for the youngest, only to reach nearly 50% around the age of 50. For women over 50, it declined to about 20% and rose again to 40% in the oldest age group.

Figure 2. Economic activity of men with disabilities by age, 2002 population census



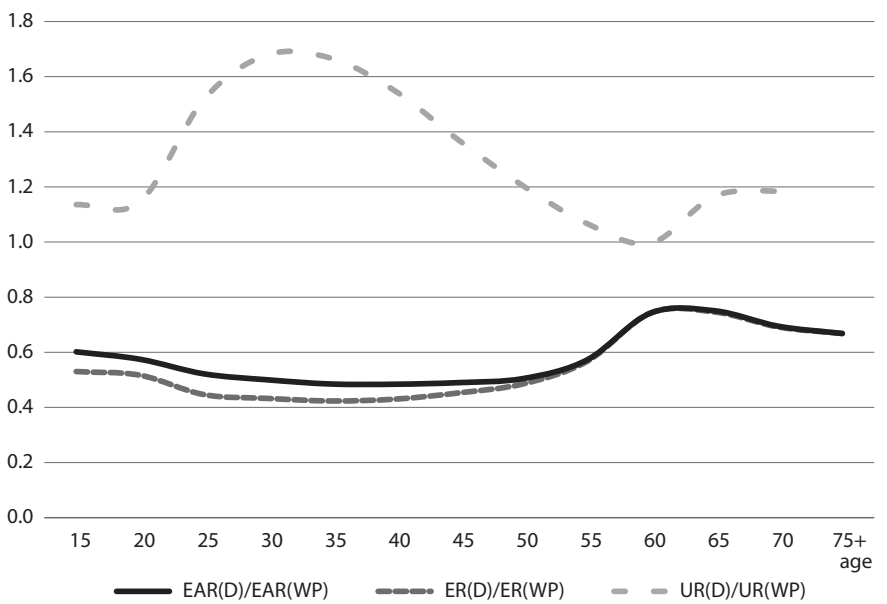
Note. As in Table 1.
Source: author's estimates based on GUS (2003).

Figure 3. Economic activity of women with disabilities by age, 2002 population census



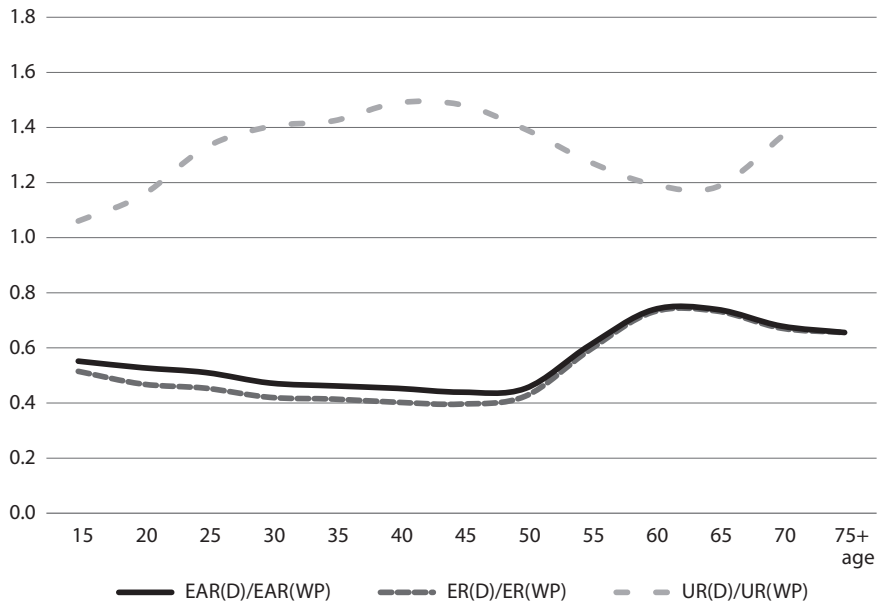
Note. As in Table 1.
Source: author's estimates based on GUS (2003).

Figure 4. Relationship between the economic activity of men with disabilities and all men, 2002 population census



Note. As in Table 1.
Source: author's estimates based on GUS (2003).

Figure 5. Relationship between the economic activity of women with disabilities and all women, 2002 population census



Note. As in Table 1.
Source: author's estimates based on GUS (2003).

The above analysis of labour market characteristics for people with disabilities by sex and age can only be conducted using data from a decennial census. Given the change in the way the 2011 census was conducted, data on disability, in addition to administrative registers, were also available from a sample survey carried out during the census. Since participation in the survey was voluntary and the sample size was only 20%, the obtained data were insufficient for the results by sex and age to be reliable. For this reason, an attempt was made to use LFS data to determine the stability of the analysed relationship and the legitimacy of using the constructed pattern of economic activity of people with disabilities by sex and age in relation to the 2011 census data.

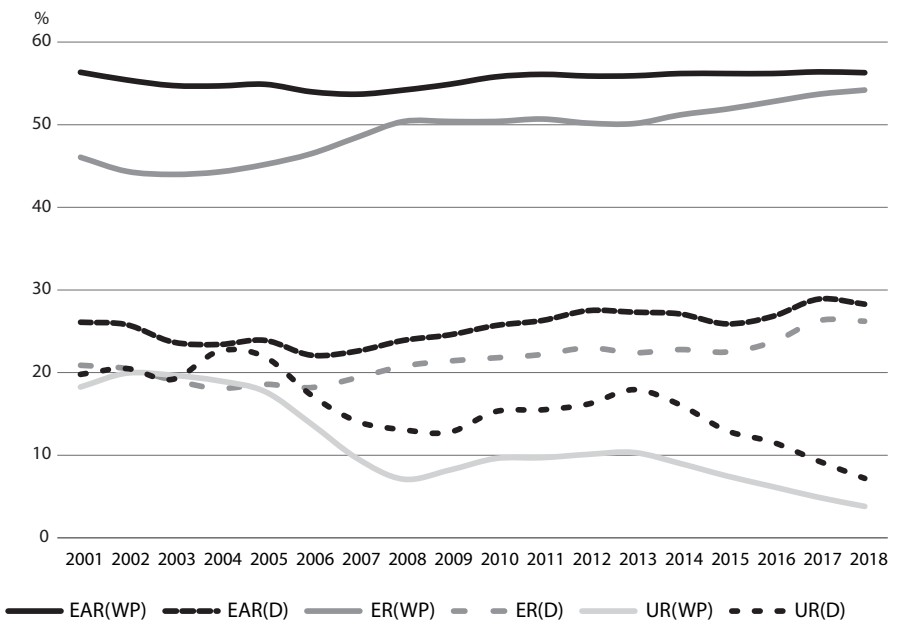
4.3. Inequalities in the economic activity of people with disabilities in relation to the whole population over time

LFS provides information about people with disabilities according to the legal criterion, i.e. it includes those who have obtained a certificate stating the degree of disability or inability to work. This means that the LFS results cover only part of the population of people with disabilities. However, the survey is conducted on

a quarterly basis, which means that despite its incomparability with the 2002 census, it allows the examination of the stability of the relationship between the economic activity of people with disabilities and the entire population over time. Therefore, LFS data covering the years 2001–2018 were used to examine how this relation varied in time. In particular, the analysis focused on trend functions for mid-year values of the EAR, ER and UR and on estimating trends for the ratios describing the relationship between the respective labour market characteristics in the two populations (Figures 6 and 7).

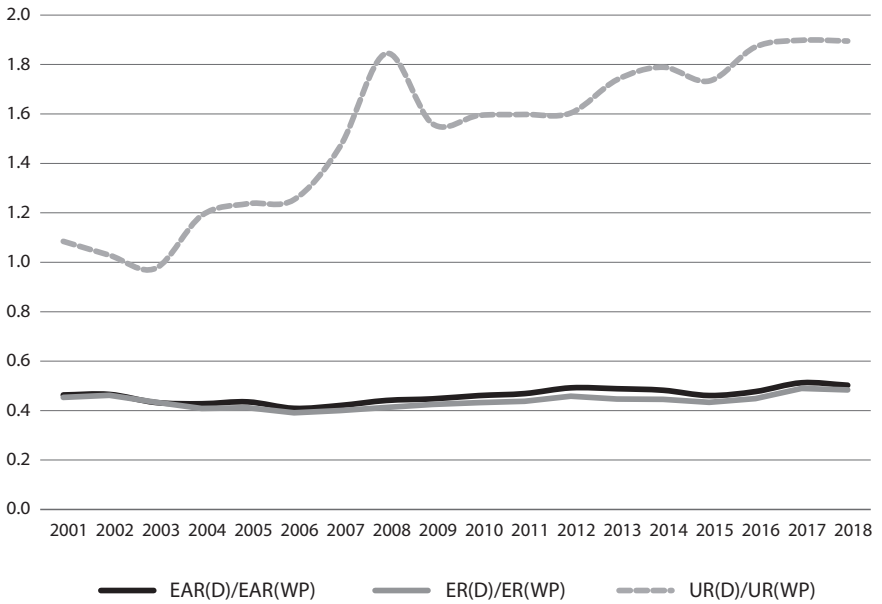
When analysing the trend function of the EARs for the whole population, it becomes evident that they were more or less the same over the entire period – around the level of 56.4% (Figure 6). There was a slight decline at the time of the economic crisis of 2008, after which the rate returned to its previous level. The EARs for people with disabilities were nearly 30 p.p. lower in comparison with the values for the whole population. The disproportion between the two rates remained the same throughout the studied period, except the time of the economic crisis, when the decline was a bit noticeable, yet followed by a more visible improvement in the subsequent years. After reaching 27.5% in 2017, the EAR returned to its initial level of 26.0%.

Figure 6. Economic activity of people with disabilities and for the whole population, LFS 2001–2018



Note. As in Table 1.
Source: author's estimates based on the 2001–2018 LFS.

Figure 7. Relationship between the economic activity of people with disabilities and the whole population, LFS 2001–2018



Note. As in Table 1.
Source: author's estimates based on the 2001–2018 LFS.

Trends in the UR for the whole population and people with disabilities were different in the years 2001–2018. Unlike the level of EAR and ER, the UR among persons with disabilities was higher than in the whole population. Moreover, this disproportion varied throughout the studied period. Starting from 2004, the disparity in URs between people with disabilities and the whole population widened until 2009, when it reached the level of 85% (Figure 7). Then the disproportion decreased to 56% in 2010. However, in the subsequent years this falling trend reversed and the disparity between the respective UR started to grow again. This clearly suggests that the examined relationship was particularly sensitive to changes in the economic situation, which was also confirmed by the research conducted by the European Commission (Grammenos, 2020).

4.4. Stability over time of the relationship between the economic activity of people with disabilities and the whole population

The observations above prompted an attempt to verify statistically the hypothesis assuming the unchanging relationship between economic activity and employment rates for people with disabilities and their corresponding values for the whole population. Since the relationship observed in the 2002 census was used to predict

the corresponding value in 2011, the verification is limited to the period of 2002–2011. In Figure 7, the two lines (solid and dashed) showing the relationship between the values of the labour market characteristics for people with disabilities and the whole population are almost parallel to the x axis and remain more or less at the level of 0.4. A null hypothesis was therefore put forward about the absence of a trend, which was tested for the slope being insignificantly different from zero, which can be written as: $H_0: \alpha_1 = 0$ against $H_1: \alpha_1 \neq 0$.

The t-test statistics were calculated from the target sample, yielding $t = 0.98$ for the relationship between the respective EARs, and $t = -0.33$ for the respective ERs. Assuming that $df = 8$ and significance level $\alpha = 0.05$, the critical value of $t(0.05; 8) = 2.31$. The t-test statistics do not exceed the critical value, which gives no basis for rejecting the null hypothesis, which, in turn, confirms the stability of the relationship in question.

The results presented above are sufficient to conclude that the observed pattern of economic activity relating to the ER is stable. In contrast, the value of the relationship between the UR for people with disabilities and the whole population followed an upward trend, which is also reflected by slightly higher values of t-test statistics for the EAR. This means that the relationship between the values of the UR for people with disabilities and the whole population in 2011 needs to be predicted. The growth in the disproportion was particularly noticeable during the economic crisis of 2008–2009. These results confirm that not only natural disasters, pandemics or armed conflicts, but also economic crises disproportionally affect people with disabilities (ILO, 2019).

4.5. Economic activity of people with disabilities by sex and age based on the 2011 census

The findings of the analysis based on the results of the 2002 census, supported by LFS data, provide a good justification for the use of the multiplier method to estimate the economic activity of people with disabilities. In particular, the verified stability of the relationship between the level of employment among people with disabilities and the whole population offers a good argument for using the patterns from the 2002 census to make predictions for 2011. For this reason, the patterns of economic activity and employment by sex and age determined for 2002 were used to predict the economic activity of people with disabilities by sex and age in 2011 (Table 4).

The ratios between the values of the URs of people with disabilities and the whole population from 2002 were applied to 2011 while accounting for the trend observed in LFS data. The geometric mean (G) was used to predict the ratios showing the

relation of the total UR in both populations. In the period 2001–2011, this ratio increased by an average of 4% per year to the disadvantage of people with disabilities ($G = 1.039$). The same adjustment was made to the relationship observed in each age group for men and women to obtain appropriate multipliers. This simplified approach was used in the absence of detailed LFS data about people with disabilities cross classified by age and sex. Finally, the estimates for 2011 were obtained by adjusting the patterns of economic activity, employment and unemployment for men and women by age observed in the 2002 census, taking into account changes occurring in the labour market (Table 4). The resulting characteristics of economic activity were validated by comparing MM estimates with direct estimates of economic activity of people with disabilities by sex and age (obtained from a sample survey conducted as part of the 2011 census) through the application of the HT estimator. These estimates were not published by official statistics, as the sample size was insufficient. However, given the experimental nature of this study, they are used as a point of reference for MM estimates. The 2011 census data used in this analysis was made available under the National Science Centre project via a microdata access portal meant for research purposes and methods of indirect estimation.

First of all, despite certain discrepancies, on the whole, the corresponding estimates are quite consistent. Regarding economic activity and employment rates of people up to the age of 50, the HT estimates are higher than those obtained using the multiplier method, while the opposite relation applies to older age groups. The biggest differences are observed among 40 to 44-year-olds, both men and women. However, in the case of the UR, the differences are much smaller, except for the youngest age group, among whom they are quite considerable. The similarity of the estimates was assessed by examining the correlation between HT and MM estimates and by measures of similarity between resulting distributions W_p (Table 5). Pearson's linear correlation coefficients $r(HT, MM)$ were used to test the degree of correlation.

Table 4. HT and MM estimates of the economic activity of people with disabilities by age and sex in 2011

Age groups	EAR(D)				ER(D)				UR(D)			
	men		women		men		women		men		women	
	HT	MM	HT	MM	HT	MM	HT	MM	HT	MM	HT	MM
	in %											
15–19	6.7	6.3	4.9	3.9	4.0	3.8	2.5	2.3	39.6	50.7	47.9	55.3
20–24	40.3	39.0	33.6	28.3	24.5	26.5	19.2	18.0	39.2	39.3	42.8	45.9
25–29	47.9	46.5	44.7	39.3	35.3	34.5	32.0	29.7	26.2	28.0	28.4	28.0

Table 4. HT and MM estimates of the economic activity of people with disabilities by age and sex in 2011 (cont.)

Age groups	EAR(D)				ER(D)				UR(D)			
	men		women		men		women		men		women	
	HT	MM	HT	MM	HT	MM	HT	MM	HT	MM	HT	MM
	in %											
30–34	49.6	45.5	47.1	37.3	38.1	35.8	36.3	29.6	23.2	21.7	23.0	21.7
35–39	49.7	43.9	51.7	37.6	39.2	35.1	41.1	30.3	21.1	19.8	20.6	20.6
40–44	49.6	43.0	51.8	37.4	39.5	34.9	41.1	30.0	20.4	18.9	20.8	20.5
45–49	45.3	41.2	48.3	35.0	36.1	34.5	38.4	28.5	20.2	18.4	20.6	20.8
50–54	41.0	39.1	40.6	32.0	32.8	33.5	32.4	26.9	19.9	18.4	20.3	20.5
55–59	33.5	37.3	23.4	24.5	27.4	33.0	19.1	21.5	18.1	16.2	18.1	17.4
60–64	21.0	24.7	9.4	10.4	18.2	22.4	8.8	10.0	13.1	12.7	6.2	5.2
65–69	10.4	11.3	5.3	5.5	10.0	11.0	5.1	5.4	4.0	3.8	3.3	3.5

Note. As in Table 1.

Source: author's estimates based on the 2002 and 2011 censuses and the 2002–2011 LFS via the microdata access portal.

Table 5. Similarity of economic activity estimates for people with disabilities and the resulting age distributions in Poland in 2011

Measure of similarity	Men			Women		
	EAR(D)	ER(D)	UR(D)	EAR(D)	ER(D)	UR(D)
$r(HT, MM)$	0.9827	0.9687	0.9714	0.9805	0.9721	0.9947
$W_p(HT, MM)$	0.9507	0.9457	0.9513	0.9272	0.9197	0.9452

Note. As in Table 1.

Source: author's estimates based on data from Table 4.

The similarity of the distributions was examined using a measure defined as the sum of smaller values of relative frequencies w_i, according to HT and MM estimates for each i-th age group: $W_p = \sum_{i=1}^{k} \min(w_{HTi}, w_{MMi})$ for both of the examined populations. Similarity index W_p takes the values from 0 to 1. Index values closer to unity indicate a greater similarity of the examined distributions and a value equal to unity means that the distributions are identical. The similarity measures for distributions of the economically active, employed and unemployed by age and sex are close to one, which indicates a high degree of consistency. Slightly higher values of W_p were obtained for men (0.95) than for women (0.92). A correlation between HT and MM estimates of EAR, ER and UR of people with disabilities is also close to unity. The results seem to have a high diagnostic value and confirm the usefulness of economic activity patterns of persons with disabilities by sex and age.

5. Summary

The study focused on identifying labour market inequalities across various disability statuses by age and sex. Inequalities were examined by analysing the differences in the economic activity of people with disabilities and the whole population. In order to achieve this aim, patterns of economic activity of people with disabilities in relation to the whole population were constructed for men and women by age. After examining whether this relation remained unchanged over time, attention was shifted to the possibility of using this pattern to estimate the economic activity of people with disabilities in another period. The disaggregation of disability indicators allows the development of programmes and policies aiming to address the existing disparities effectively.

The results showed considerable disproportions on the labour market in Poland, particularly evident in the younger age groups (25–50). The employment rate for men with disabilities aged 30–35 is lower by a factor of 3 compared to the whole population, and for women by a factor of 2.5. The unemployment rate among people with disabilities is over 60% higher for men and 50% for women compared to the rate for the whole population. The difference in the employment rate between the whole population and people with disabilities was more or less constant in the period of 2001–2018, but the difference in the unemployment rate grew by 60%, especially during the economic crisis.

The patterns of economic activity for people with disabilities were used to assess the characteristics by sex and age, based on other sources which provide only aggregate values, in particular the 2011 census. For this purpose, the multiplier method was used. This approach was justified by a statistically verified relationship, which was found to be stable over time for the economic activity and employment rates. The observed upward trend in the relation to the UR was also taken into account. The usefulness of MM estimates was assessed by comparing them with direct HT estimates based on a sample survey accompanying the 2011 census.

The Agenda for Sustainable Development (UN, 2015) states that to ensure a disability-inclusive development, disability data must capture the degree to which the society is inclusive in all aspects of life, such as work, education, transportation or civic participation. In Poland, the monitoring of the implementation of the strategic aims is still missing. Moreover, the functional disability approach suggests monitoring to what degree the labour market and work environment are open, inclusive and accessible to persons with disabilities with the use of: (i) the employment rate, (ii) the youth idle rate, which measures the share of youth aged 15–24 who are not enrolled in school and are not employed, (iii) the number of

working individuals in manufacturing, (iv) the number of women in managerial positions and (v) the number of adults in informal work. Poland, similarly to most European countries, does not have national datasets with functional difficulty questions.

The economic activity patterns by sex and age can be used in further research involving more advanced statistical methods to highlight the work-related gaps with respect to people with disabilities. The recognition of the differences in access to the labour market of people with disabilities by age may help design and introduce appropriate programmes in order to increase employment in this group. To achieve this goal, it is necessary to intensify the process of making the workplace and the general environment accessible to those with disabilities by removing the barriers they encounter (e.g. improving the accessibility of infrastructure, promoting an open mindset towards the potential of people with disabilities to achieve success at work) and introducing anti-discrimination policy.

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