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Economic activity of the disabled in Poland in 2010

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ECONOMIC ACTIVITY OF THE DISABLED IN POLAND IN 2010

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Abstract

The disabled people in Poland are that part of labour force that has not been appreciated enough. Despite the fact that in the recent years the number of the disabled Poles who found employment has risen, their employment rate is still rather low. The majority of them (83% in 2010) are absent on the job market. The aim of the paper is to investigate how gender, place of residence, education, age and disability severeness affect the economic inactivity of the disabled and what impact their gender, place of residence and disability severity had on the likelihood of the reason for the inactivity. The author used the Polish Central Statistical Office data concerning the 4th quarter of 2010. The data were analysed by means of the logistic regression model for the dependent dichotomous variable as well as the multinomial logistic regression model. The estimated parameters helped to determine the inactivity risk quotient in relation to economic activity. They also permitted to calculate the probability of the disabled people's economic inactivity due to a particular reason.

Keywords: logistic regression, multinomial logistic regression, economic inactivity, the disabled.

JEL classification: C01, C51, J64.

Introduction

According to the 2002 National Census the number of the disabled persons in Poland reached almost 5.5 million. The disability of around 4.5 million was legally certified and 4.3 million were 15 plus years of age[1]. The number of the latter was gradually falling to reach 3393 thousand in 2010, which equalled 10.7% of the population aged 15 plus[2]. In the recent years the number of the employed disabled Poles has been growing. In 2010 their professional activity rate amounted 17.4%. The aim of this article was to find out how such variables as gender, the place of residence, age, education and the level of disability affected the economic activity of the disabled people in Poland in 2010. The hypothesis was made that the above mentioned variables in various ways determined the economic activity odds in the examined period. The analysis was conducted by means of the logistic regression model. Thanks to the estimated parameters the author could determine the ratios of the professional activity odds versus the professional passivity ones as well as the ratios of the disabled persons' employment odds versus their unemployment rates according to the examined people's selected features.

1. Statistical data used in the analysis

The analysed figures came from the publication by the Central Statistical Office (GUS) *Aktywność ekonomiczna ludności Polski. IV kwartał 2010* (*The Economic Activity of the Polish Population. The 4th Quarter of 2010)*. For the sake of the study the authors decided to use the term of 'economically active population' to describe people who were professionally active or inactive. The professionally active population included all employed (aged 15 plus) and unemployed Poles, while the group who was professionally inactive contained those who did not work and those who were neither employed nor sought jobs; the job seekers who were not willing to get employed; those who did not seek employment because they were promised a job and waiting to start it for over three months. The group of the unemployed consisted of people aged 16 plus with a certified disability degree or incapacity for work. The data concerned their gender, age, education, the place of residence and the disability degree.

The studied population's disability was divided into three groups. The 1st (severe) disability degree concerns people from the 1st disability group or holders of the certificate of full incapacity for work or independent existence. The 2nd (moderate) disability degree relates to people granted the 2nd disability group or the holders of the certificate of full incapacity for work. The 3rd (light) disability degree related to the people belonging to the 3rd disability group or the holders of either the certificate of limited capacity for work or the certificate of incapacity

for farm work. In total the analysis covered 3393 thousand people and their population structure is presented in Table 1.

Table 1. The structure of the disabled persons aged 16 and more in Poland in the 4th quarter of 2010 (in the thousands)

Features	Groups	Total	Professionally active		Inactive
			total	incl. the unemployed	
Gender	Females	1693	242	34	1451
	Males	1700	348	47	1351
Place of residence	Urban areas	2104	385	57	1719
	Rural areas	1289	205	23	1084
Education	lower secondary at most	1205	90	15	1116
	Basic vocational	1053	216	35	837
	General secondary	234	40	5	195
	Post-secondary and vocational secondary	668	165	21	503
	Higher	232	80	5	152
Age	15–24 (age1)	114	20	6	94
	25–34 (age2)	207	78	17	129
	35–44 (age3)	246	85	11	161
	45–54 (age4)	626	190	28	436
	55–64 (age5)	1075	181	18	894
	65+ (age6)	1125	37	–	1088
Disability degree	I degree	925	53	6	873
	II degree	1325	232	34	1093
	III degree	1143	306	39	837
Total		3393	590	80	2803

Source: own study based on data from the Central Statistical Office (GUS).

The categories of education, age and the disability degree were divided into groups following the GUS classification. The examined population was split: according to their gender and place of residence – into two groups; according to their education level – into five groups; according to their age – into six groups; and, finally, according to their disability degree – into three groups. 82.6% of the economically active were professionally inactive, while 13.6% of the professionally active disabled persons were unemployed.

2. The logistic regression model

In order to analyse the data the author used the logistic regression model[3]. The logistic function expressing the incidence probability takes the form:

$$P(Z) = \frac{\exp Z}{1 + \exp Z} \tag{1}$$

and adopts the values from 0 to 1[4].

In case of the dychotomic dependent variable the model can be written as follows[5]:

$$P(Y=1|x_1,x_2,...,x_k)=\frac{\exp\left(\alpha_0+\sum_{i=1}^{k}\alpha_i x_i\right)}{1+\exp\left(\alpha_0+\sum_{i=1}^{k}\alpha_i x_i\right)} \tag{2}$$

where:

Y – a dychotomic dependent variable,

$x_1, x_2, ..., x_k$ – independent variables,

α_i – regression coefficients.

The expression $\frac{p}{1-p}$ describes the odds (or risk) of a specific event to happen, where $p = P(Y = 1)$ is the success (or risk) probability. The expression $\ln\left(\frac{p}{1-p}\right)$ is written down as logit(p) and is used in the logit model notation:

$$\text{logit}(p)=\ln\left(\frac{p}{1-p}\right)=\alpha_0+\sum_{i=1}^{k}\alpha_i x_i \tag{3}$$

To construe the logit model parameters we use their transformed form of $\exp(\alpha_i)$ which is called the OR (*odds ratio*)[6]. In order to estimate the model parameters the author used the *STATISTICA* programme.

3. The analysis of the disabled persons' economic activity

The author examined the impact of such factors as gender, the place of residence, education, age and a disability degree on the disabled persons' professional activity and employment opportunities. To encode the explanatory variables binary system was used, which enabled the author to compare selected groups of individual features (represented by the number 1) with a selected group (represented by 0)[7]. Gender was represented by men, the place of residence – by rural areas, the education groups – by junior high school graduates, the age groups are represented by people aged 15–24 and, last but not least, out of the disability degree groups only the 1st degree was taken into consideration.

The first stage of the analysis included the construction of models where the dychotomic dependent variable (economic activity) was encoded in the following way: professional activity was attributed with 1, while professional inactivity – with 0. They were called the logit models

of professional activity. The author studied the effect the determinants have on the professional activity odds of the disabled.

Table 2. The results of the estimation of the professional activity logit models in relation to the disabled persons' features

	Parameter	Standard error	*p*	Odds ratio
Gender (χ^2 = 23035, p = 0,0000)				
Constant	–1.3535	0.0019	0.0000	
Females/Males	–0.4375	0.0029	0.0000	0.6456
Place of residence (χ^2 = 3221.2; p = 0.0000)				
Constant	–1.6654	0.0024	0.0000	
Urban areas/Rural areas	0.1691	0.0030	0.0000	1.1843
Education (χ^2 = 333300; p = 0.0000)				
Constant	–2.5177	0.0017	0.0000	
Basic vocational/ lower secondary at most	1.1631	0.0030	0.0000	3.2000
General secondary/ lower secondary at most	0.9336	0.0058	0.0000	2.5436
Post-secondary and vocational secondary/ lower secondary at most	1.4031	0.0033	0.0000	4.0676
Tertiary/ lower secondary at most	1.8758	0.0047	0.0000	6.5263
Disability degree (χ^2 = 283400; p = 0.0000)				
Constant	–2.8016	0.0045	0.0000	
II degree/I degree	1.2517	0.0050	0.0000	3.4963
III degree/I degree	1.7954	0.0049	0.0000	6.0219
Age (χ^2 = 372400; p = 0.0000)				
Constant	–1.5476	0.0078	0.0000	
age2/age1	1.0445	0.0090	0.0000	2.8419
age3/age1	0.9088	0.0089	0.0000	2.4814
age4/age1	0.7169	0.0083	0.0000	2.0482
age5/age1	–0.0496	0.0082	0.0000	0.9516
age6/age1	–1.8336	0.0094	0.0000	0.1598

Source: own study.

On the second stage of the analysis the author estimated models where the dychotomic dependent variable (professional activity) was encoded in the following way: the employed were represented by 1, the unemployed – by 0. The models were called the employment logit models. It allowed the author to examine the impact of the determinants on the disabled persons' employment.

On the Figures 3–5 the education, age and disability degree groups are marked as in Table 4.

Table 3. The results of the estimation of the employment logit models in relation to the disabled persons' features

	Parameter	Standard error	*p*	Odds ratio
Gender (χ^2 = 149.6; p = 0.0000)				
Constant	1.8570	0.0050	0.0000	
Females/Males	0.0931	0.0076	0.0000	1.0976
Place of residence (χ^2 = 1505.9; p = 0.0000)				
Constant	2.0685	0.0070	0.0000	
Urban areas/Rural areas	–0.3186	0.0083	0.0000	0.7272
Education (χ^2 = 6481.7; p = 0.0000)				
Constant	1.6094	0.0089	0.0000	
Basic vocational/ lower secondary at most	0.0337	0.0107	0.0016	1.0343
General secondary/ lower secondary at most	0.3365	0.0176	0.0000	1.4000
Post-secondary and vocational secondary/ lower secondary at most	0.3159	0.0116	0.0000	1.3714
Tertiary / lower secondary at most	1.0986	0.0171	0.0000	3.0000
Disability degree (χ^2 = 628.03; p = 0.0000)				
Constant	2.0584	0.0137	0.0000	
II degree/I degree	–0.2965	0.0149	0.0000	0.7434
III degree/I degree	–0.1347	0.0147	0.0000	0.8740
Age (χ^2 = 9624.5; p = 0.0000)				
Absolute term	0.8473	0.0154	0.0000	
age2/age1	0.4304	0.0177	0.0000	1.5378
age3/age1	1.0589	0.0185	0.0000	2.8831
age4/age1	0.9081	0.0167	0.0000	2.4796
age5/age1	1.3561	0.0173	0.0000	3.8810

Source: own study.

Table 4. The numbering of the education and age groups

Features	Groups	Name
Education	lower secondary at most	W1
	Basic vocational	W2
	General secondary	W3
	Post-secondary and vocational secondary	W4
	Tertiary	W5
Age	15–24	S1
	25–34	S2
	35–44	S3
	45–54	S4
	55–64	S5
	65+	S6
Disability degree	I degree	I
	II degree	II
	III degree	III

Source: own study.

The Figure 1 shows that in 2010 the disabled women were less likely than men to be professionally active (by 35%). On the other hand their employment opportunities were higher by 7% than the men's.

Fig. 1. Odds ratio of the disabled persons' professional activity and employment according to their gender in 2010 in Poland

Source: own study.

The Figure 2 presents the disabled persons' professional activity odds and employment odds ratios depending on their place of residence. It appears that the disabled residents of urban areas had 18% more chance to be professionally active than those living in the rural areas. In contrast, the employment odds of the former were lower by 27% than the latter.

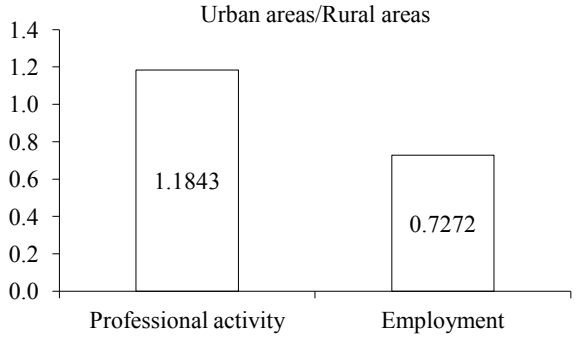

Fig. 2. Odds ratio of the disabled persons' professional activity and employment according to their place of residence in 2010 in Poland

Source: own study.

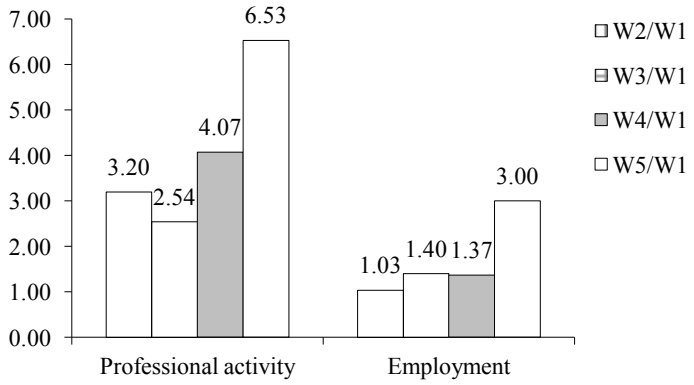

Fig. 3. Odds ratio of the disabled persons' professional activity and employment according to their education level in 2010 in Poland

Source: own study.

In both types of models the people who reached merely the junior high school level had the smallest odds (Fig. 3). Obviously, they could not be professionally active since they were still continuing their education, therefore they were treated as professionally inactive. As far as their employment is concerned, they did not have any professional qualifications, so they were not competitive on the job market. In both models the odds increased along with the education. There was an exception from that tendency in the case of people with secondary education (in relation to professional activity), which may result from the fact that they were proceeding further with their education.

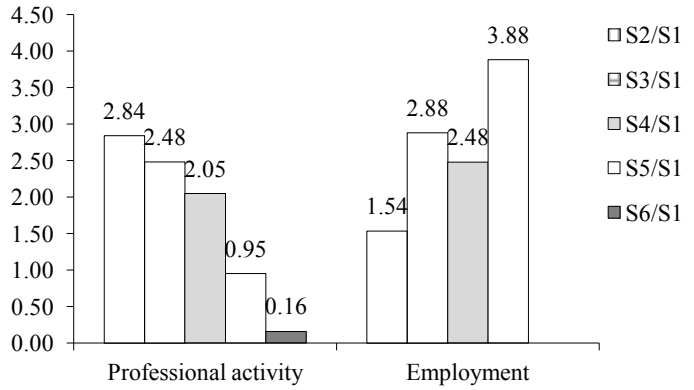

Fig. 4. Odds ratio of the disabled persons' professional activity and employment according to their age in 2010 in Poland

Source: own study.

On Figure 4 the odds ratios show that the lowest employment odds affected people older than 65, which was clearly the result with their retirement. Also the disabled persons aged 15–24 were professionally active to a small extent (probably due to further education) as well as those aged 60–64 (this age bracket includes a large proportion of retired females). The most likely to be professionally active were people aged 25–34, while the disabled 60–64-year olds were the most likely to be employed, followed by the group of 34–45-year olds. The least odds to be employed were typical of the youngest group.

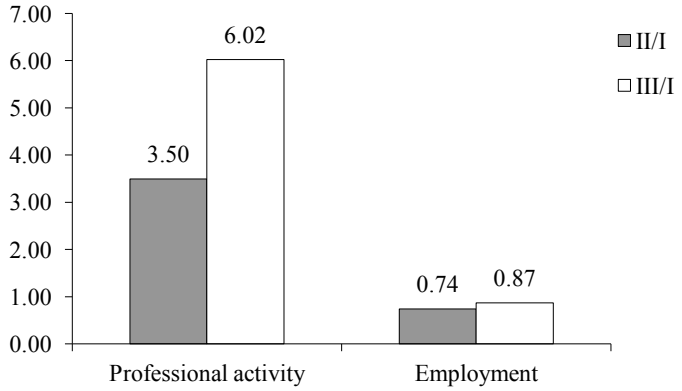

Fig. 5. Odds ratio of the disabled persons' professional activity and employment according to their disability degree in 2010 in Poland

Source: own study.

When examining professional activity odds according to the disability degree, the author found out that the people with the 3rd disability degree had the highest odds (6.02) in comparison to the 1st degree holders. The 1st disability degree holders had the highest chance to be employed (Fig. 5).

Conclusions

The author's analysis confirmed the hypothesis that in 2010 gender, the place of residence, education, age and a disability degree were the determinants of professional activity and employment of the disabled Poles. 25–34-year old male urban residents with university education and the disability of the 3rd degree were most likely to be professionally active. The least likely were 60+ female residents of rural areas with junior high school education and the 1st degree disability. Surprisingly, the second type of the constructed models indicated

a contrary to the common opinion influence of gender and of the place of residence on the chance of professionally active people to be employed. The obtained odds ratios showed that in the group of the professionally active the most likely to be employed were 60–64-year old women living in rural areas, having tertiary education and suffering from disability of the 1st degree.

Notes

[1] See *Niepełnosprawność w liczbach* (2011).

[2] Data from *Aktywność ekonomiczna ludności…* (2011).

[3] See Cramer (2002).

[4] See Wiśniewski (1986), p. 138–139.

[5] See Kleinbaum, Klein (2002).

[6] See Long (1997), p. 79–82.

[7] Find out more on the ways of encoding the explanatory variables in Hosmer, Lemeshow (2000).

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ECONOMETRIC ANALYSIS OF THE IMPACT OF PROPENSITIES ON ECONOMIC OCCURRENCES: A MACROECONOMIC PERSPECTIVE

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Abstract

The main aim of this article was the specification of problems connected with analysis of impact of human propensities on economic occurrences and also a proposition of econometric tools enabling the identification of this impact. According to the meaning of propensities in economics the current state of knowledge is mostly an effect of considerations presented by J.M. Keynes in his famous book "*The General Theory of Employment, Interest and Money*" where J.M. Keynes proposed such economic categories as the average and marginal propensities. One of the goals of the presented deliberations was to specify problems related with economic theory of propensities. Such propensities as a propensity to consume, to save, to invest and thesaurisation were particularly carefully analysed. The impact of these propensities on basic macroeconomic variables was considered with respect to the classical model, the neoclassical Solow-Swan model and the *IS-LM* scheme. In case of spatial data the effects of the impact of propensities could be analysed by means of models with dummy variables showing presence of given propensities. A procedure enabling the construction of such variables was proposed. In case of time series, conceptions delivered by the integration and cointegration theory could be applied. Especially such models as VAR and VECM could be useful. Models for panel data enable direct (models with fixed effects) or indirect (models with random effects) consideration of the impact of propensities on the analysed processes.

Keywords: econometric analysis of the impact of human propensities, the Solow-Swan model, the *IS-LM* scheme, VAR and VECM models, models for panel data.

JEL classification: B22, B40, C01, C22, C23, E20.