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MODEL APPROACH TO REGIONAL EMPLOYMENT RATE IN POLAND

The aim of this paper is to present differences in regional employment rates and the factors determining them. In the research macroeconomic data for the period 2004−2014 (11 years) obtained from 16 regions in Poland was used. It enabled to use the panel data for drawing conclusions based on time and cross-sectional data.
Keyword: employment rate; panel data; employment market; regional differences.

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МОДЕЛЬНИЙ ПІДХІД ДО РЕГІОНАЛЬНОЇ ЗАЙНЯТОСТІ У ПОЛЬЩІ

У статті описано різниці в рівнях регіональної зайнятості та фактори, що їх визначають. Використано макроекономічні дані за 2004−2014 рр. (11 років) по 16 воєводствах Польщі. Це дозволило побудувати модель панельних даних та зробити висновки на основі аналізу динаміки галузевих даних.
Ключові слова: рівень зайнятості; панельні дані; ринок праці; регіональні відмінності.
Форм. 4. Табл. 5. Літ. 27.

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МОДЕЛЬНЫЙ ПОДХОД К РЕГИОНАЛЬНОЙ ЗАНЯТНОСТИ В ПОЛЬШЕ

В статье представлены различия в региональном уровне занятости и определяющие их факторы. Использованы макроэкономические данные за 2004−2014 гг. (11 лет) по 16 воеводствам Польши. Это позволило построить модель панельных данных и сделать выводы на основе анализа динамики секторальных данных.
Ключевые слова: уровень занятности; панельные данные; рынок труда; региональные различия.

Introduction. Labour market is one of the markets functioning in the economy of every country next to such markets as: product market, capital market, land market or money market (Krynska, 2013: 11). Labour market can be generally defined as a place in which transactions of the exchange of work between employees and employers take place and sizes and conditions of these transactions are defined and particularly the price of such services which is a salary (Ehrenberg and Smith, 1991: 2−22; Bosworth et al., 1996: 175). People defined as work force, human capital, social potential or human resources are the most important participants of the labour market.

The operation of market mechanism together with its basic attributes − price and competition influences the maintenance of balance at the labour market. An ideal state − a market balance − is an unrivalled state and therefore there is first of all lack of balance. In case of the labour market the phenomenon of unemployment is the result of the imbalance at the labour market (Brzychcy, 2014: 51). K. Glabicka (2001: 11) differenciates the following labour markets in Poland:
   - national market − it includes the territory of the whole country;

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- regional market − where regions are administrative territorial units;
- local market − district and commune are the administration units for this concept.

Confrontation of supply and demand for work occurs in reality mainly in the regional or local scale, at the level of voivodeships or poviats according to Polish administrative division of the country. Relations which take place at regional labour markets and processes happening on them play the biggest role in the process of employment. The transformation change and the process of economic development of Poland since the beginning of the 1990s have led to a differentiation of the situation at local markets and as the consequence also at regional labour markets. Nowadays in Poland we can observe serious differences in the levels of employment and its determinants in voivodeships and poviats.

The level of employment is understood as the activities of the state on the macroeconomic scale aiming at fulfilling employment goals as part of economic policy. Employment policy is such an activity of the state which aim is not only full (high) employment but also rational management of human resources both in the macro and in microscales, i.e., in regional or local scale (Jarmolowicz and Knapinska, 2013: 12−13; King and Morley, 2007; Layard, 1986).

The aim of this paper is to present regional differences of the employment rate in Poland and the factors which determine them. In order to ensure the complexity of the analysis on this level and in line with the approach used in literature, macroeconomic variables were used in the model. It must be underlined that in this paper the emphasis was put on the analysis of relations coming from the information included in data (Hoover et al., 2008; Juselius, 2011) and the model specification was selected on the basis of available literature and data. However, the presented exemplification does not have an representative character and cannot constitute a basis for generalization.

Basic features of the labour market.

1. Employment rate. The level of economic activity of people is key information for evaluating the situation at the labour market. In order to measure it the economic activity rate is used which defines a percentage of people professionally active (people who work or are unemployed) in the total number of people (Borkowska and Bohdziewicz, 1995: 16). When compared with the size of he population, it shows the supply of manpower so it informs how big the resources are.

The employment rate, expressed as percentage of people who work in the given category compared to the total number of people in the given category, is used for measuring and analysing the number of people who work. The employment rate informs about the demand at the labour market but is also gives a lot of information on the capacity of the given economy to create and maintain places of employment. High level of employment is desired and is often a strategic aim of different programs and employment policies of many countries. The International Labour Organization stipulates that the very indicator does not inform well about the conditions of the labour market without taking into consideration such issues as low salaries, the so-called subcontracting, bad working conditions or the existence of black labour market but it should be a basis to evaluate the condition of a given labour market (Kozek, 2014: 29−30).

In order to present a full picture of people economically active it is also necessary to characterize the unemployed who in the statistics provided by GUS are pre-

sented generally by means of a synthetic measurement such as *the rate of registered unemployment*. It is a basic factor of unemployment intensity widely used both in literature and in practice. The unemployment rate expressed in percent measures the intensity of unemployment because it defines percent of people in the working age able and ready to work but who are unemployed. Putting it differently it shows the level of non-using of people who are economically active (Krynska, 2013: 120).

Table 1. **Economic activity rate, employment and unemployment rates by the to regions in 2014,** *%, own preparation on the basis of GUS data*

Region	Employment rate	Economic activity rate	Unemployment rate
polska	51.2	56.2	11.5
lodzkie	53.1	58.3	11.9
mazowieckie	57.1	61.5	9.8
malopolskie	50.8	55.9	9.9
slaskie	49.2	53.8	9.6
lubelskie	50.7	56.3	12.7
podkarpackie	46.9	54.5	14.8
podlaskie	50.8	55.9	13.1
swietokrzyskie	49.0	55.3	14.2
lubuskie	49.6	54.1	12.8
wielkopolskie	53.2	57.7	7.8
zachodniopomorskie	48.3	52.6	15.6
dolnoslaskie	50.0	55.1	10.6
opolskie	49.8	54.0	11.9
kujawsko-pomorskie	49.4	55.3	15.7
pomorskie	50.9	55.7	11.3
warminsko-mazurskie	46.1	51.1	18.9

It results from the presented data that the situation most beneficial from the point of view of the local labour market is in the Mazowieckie Voivodeship – the highest employment rate and the activity rate and in the Wielkopolskim Voivodeship – characterized by the lowest rate of unemployment. The worst situation is in the Warminsko-Mazurskie Voivodeship where the rates of employment and activity are the lowest and unemployment rate is the highest.

The aforementioned relative rates of employment and unemployment are very important as they allow defining the intensity of such phenomena. Their main value is that they can be used in comparative analysis of employment and unemployment between countries, regions and workforce groups.

2. Regional conditions of labour markets. According to the widely accepted definition, labour market includes all the issues related to shaping the demand and supply for work (Bosworth et al., 1996). Many authors enumerate a big choice of determinants which influence labour market. According to E. Krynska (2013: 23–26) the demand for work reported by he employers is dependent on a few determining factors among which the following ones should be mentioned: the level of salary, the price of other production factors and particularly physical capital, the size of demand for products of the company and the production technology used. The author puts salary, non-material advantages deriving from work, the number of people who are able to work among the most important factors influencing the size of supply. Therefore,

according to E. Krynska (2013: 87−88) the following factors: demographic, legal, economic, sociocultural and institutional determine the situation at the regional labour market which in turn influences also the national labour market. She includes into the demographic factors the following ones: the number of people living on the territory of a given labour market (national, regional or local), the structure of inhabitants and migrations. On the other hand, A. Furmanska-Maruszak (2006) enumerates the following demographic conditionings of the labour market in Poland: decline of fertility, increase of the average age of childbirth, reduction of mortality rate, longer life expectancy, larger share of older people in the general population of.

A. Ziomek (2013: 95−97) underlines that microspace of economy is the space which is the closest to social and economic activities in the organization of local market. Its features are as follows: location, inhabitants, elements of natural environment, the condition of socioeconomic development, small scale of internal distances and comparison to neighbouring communes. The author distinguishes 3 categories of conditionings which invariably accompany the scale of labour market which are: the connections of the labour market with the environment, the lack of balance in the development of local markets, the process of restructuration of local economy which changes the rules of the local labour market functioning. A. Ziomek (2013: 11−13, 246−248) presented a deep analysis of employment determinants in the regional context, where they first of all identified the determinants of employment based on the convictions of institutional economy and special concepts. They also characterized the conditions shaping socioeconomic determinants of employment. Using the taxonomy methods for comparing structures and features of socioeconomic indicators for the analysis of multidimensional objects using Kruskal-Wallis test they verified the impact of single determinants on employment and formulated the following conclusions:

- the average level of employment is determined, e.g., by external factors outside of the given local system such as: the existence of schools, level of offered salaries, demand for job;

- together with the increase of employment at local labour markets the following phenomena taka place: low absorption of employment resulting from the existing functional system and weak territorial competitiveness, low social activity of inhabitants, a lack of the feeling of being related to the place of residence and its surroundings, poor institutional and organizational activity of the local government and nongovernmental organizations;

- local market (poviat level) is characterized by a diverse set of employment factors due to the density the local market (district) is characterized by a diverse set of factors of employment due to the density of employment and participation of rural communities in their area.

On the other hand, K. Brzychcy (2014: 47) has included prices, investments, level of consumption and work effectiveness into the determinants shaping the demand. In case of the supply she mentioned salary where she also paid attention to the positive dependence between the level of real salary and the number of employees and to the demographic factor when its increase also causes an increase of work supply and the other way round − the decrease of birth rate decreases the size of supply.

According to A. Komor and A. Iwanicka (2013: 62) the important conditions of the labour market should include: the number of inhabitants, the direction of changes

in the number of inhabitants, demographic structure, the level of unemployment rate and the level of education and professional qualifications of employees.

S. Roszkowska (2013) has presented a wide analysis of long-term dependencies between salaries, prices and the situation at the labour market in Poland taking into consideration the selected institution of this market on the basis of macroeconomic variables describing the situation at the labour market that is: salaries, employment rate, percentage of long-term unemployed, minimum wages, labour productivity and relative wages in unionized sectors and prices, interest rate and exchange rate. The analysis was based on the data on quarterly frequency for the period 1995–2011 using VAR and VECM models. The basic conclusions drawn from the conducted research show that in Polish economy:

- the extended Philips curve is applied, that is the dynamics of prices influencing the situation at the labour market[3];

- there is a price adjustment according to Ballasa-Samuelson effect that is there is an equality of the flexibility of the exchange rate and price wedge in relation to inflation (Juselius and Ordonez 2009);

- rigidity of the labour market influences real wages and provides pressure to the increase of salary.

Research experiment.

1. Subject of research. As part of the literature review the factors affecting regional labour markets were identified. They are compiled in Table 2.

Table 2. **Selection of the determinants conditioning the situation at regional labour market**

Author	Conditions	Operational determinants
A. Ziomek (2013: 95–97)	Location, natural environment, socioeconomic development, distances to neighbouring local communes	Region, number of inhabitants
E. Krynska (2013: 87–88)	Demographic conditions. Legal conditions. Economic and sociocultural conditions. Institutional conditions	Number of inhabitants, structure of inhabitants. Boundaries of acquiring pension rights, supply and prices offered to consumers, level of salaries, prices for renting, unemployment, prices of production factors, size of demand for company products
A. Komor and A. Iwanicka (2013: 62)	Demographic conditions	Number of inhabitants, demographic structure of inhabitants, unemployment rate, level of unemployment and level of education and professional qualification of employees
S. Roszkowska (2013)	Macroeconomic changes describing the situation at the labour market	Salaries, unemployment rate, percentage of long-term unemployed, minimum wage, labour productivity and relative wages in the unionized sectors
K. Brzychcy (2014: 47)	Economic factors. Demographic factors	Prices, investments, level of consumption, labour productivity, level of real wages. Number of employees

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[3] The results presented in the paper of (Kuczynski and Strzala, 2002) were confirmed.

The aforementioned selection shows that labour market is determined first of all by demographic and economic factors in the individual and institutional approaches. The problem is, unfortunately, with the operationalization of these conditions. As the result of brainstorming and data availability, it was stated that attractiveness of employment in a region may be affected by:

- demographic conditions: the number of inhabitants, the number of economically active inhabitants;

- economic factors: average monthly salary, number of registered companies, budget expenditure per capita in region, GDP per capita, regional budget revenue.

These variables in further research are treated as the variables explaining the level of employment in a region. In the research the employment rate was chosen and not economic activity rate or the unemployment rate due to the willingness of analysing positive phenomena at the labour market and showing what influences the achievement of high and effective employment in the economy regionally. In further research it is possible to explore the mechanism of using other dependent variable.

The following research hypotheses were formulated:

H1: factors such as the number of inhabitants, the number of economically active people, the number of registered companies, GDP per capita, average monthly salary, budget expenditure per capita in a region, budget revenue in a region influence significantly employment rate in a given region.

H2: employment rate in regions differ and these differences are statistically significant.

2. Applied research methods. Panel model is the econometric model estimated on the basis of panel data. Panel data (also referred to as longitudinal data) differ from typical cross-sectional data because the number of the observed objects is very big in relation to the number of points in the panel time (Hsiao, 2003: 2). It is worth paying attention to the fact that time and cross-sectional data is a merge into one set of time-series observations, which come from different objects. In the analysed case regions are those objects. Due to a large number of objects and small number of periods the use in case of panel data of the same methods typical for cross-sectional and time data is groundless (Wooldridge, 2001).

Advantages of the panel models are as follows:

- increase in the number of the degrees of freedom and reduction of the problem of data collinearity;

- identifiability of models and choosing between competitive research hypothesis;

- elimination and reduction of the burden of estimators;

- possibility to conduct analysis based on aggregated data.

The first step in the panel approach is model estimation using the classic method least squares (KMNK):

$$y_{it} = x_{it}\beta + v_{it}, \tag{1}$$

where y_{it} —dependent variable; x_{it} — independent variable (vector of independent variables); β — vector with N dimension of the model structural parameters; v_{it} — total sampling error which consists of a fully random part ε_{it} and the individual effect ui

referring to i object $v_{it} = \varepsilon_{it} + u_i$; index $i = 1, ..., N$ means further objects; index $t = 1, ..., T$ refers to the following time units.

Panel models undergo diagnostic tests. The first diagnostic test is Wald test which checks whether the implementation of the differentiated absolute terms for panel give a more accurate estimation of the parameters of the model of panel data. This test is based on F-statistics and the verified null hypothesis and the alternative hypothesis have the form:

H_0 absolute terms are equal for i object (KMNK estimator is correct);

H_1 absolute terms are different for every but constant over time (the estimator with fixed effects is more appropriate) (Cameron and Trivedi, 2005: 25−35).

Test statistics has the form:

$$F = \frac{\dfrac{RRSS - URSS}{N - 1}}{\dfrac{URSS}{NT - N - K}}, \tag{2}$$

where $RRSS$ − the sum of squared residuals of the estimated model; $URSS$ − the sum of square residuals of the model estimated by means of FE estimator; T − the number of periods; N − the number of objects; K − the number of variables explained in the model.

The empirical statistical value F calculated for the sample is compared with a critical value of the statistics F_{α, r_1, r_2}, where α is the accepted level of significance and $r_1 = N - 1$ and $r_2 = NT - N - K$ degrees of freedom. In case when $F \geq F_{\alpha, r_1, r_2}$, the the null hypothesis H_0 is rejected in favour of H_1 stating the heterogeneity of objects.

The test which serves to verify the assumption of the constance of the variation of random component N of the object is the Breusch-Pagan test (Breusch and Pagan, 1980: 239−253). The following structure of hypothesis is assumed:

H_0 the variation of random component of fixed effect is null (KMNK estimator is correct);

H_1 the variation of random component of random effect is different from zero (RE estimator is correct).

Test statistics in case of this test has the form:

$$LM = \frac{NT}{2(T - 1)} \left[\sum_{i=1}^{N} \frac{\left(\sum_{i=1}^{T} e_{it} \right)^2}{\sum_{i=1}^{T} e_{it}} - 1 \right]^2, \tag{3}$$

where e_{it} − the rest of the model estimated by means of the generalized method of least squares (UMNK) which does not take into consideration fixed effects (differentiation of effects).

LM statistics has the distribution χ^2 with one degree of freedom. If $LM \geq \chi^2$, then null hypothesis H_0 is rejected in favour of H_1, which means it is necessary to

apply for model estimation, estimator with random effect. When $LM < \chi^2$, there are no grounds to reject null hypothesis H_0.

Hausman test is serves to verify the assumption about the unbiasedness of FE and RE estimators (Hausman, 1978: 1251−1272).

$H_0 : E(\beta_{it}, x_{itk}) = 0$ (estimator with random effects RE), as compared to the alternative one: $H_1 : E(\beta_{it}, x_{itk}) \neq 0$ (estimator with fixed effects FE).

W-statistics helps to verify a null hypothesis and is defined by the formula:

$$W = \hat{q}^T \left[D^2(\hat{q}) \right]^{-1} \hat{q}, \qquad (4)$$

where $\hat{q} = \hat{\beta}_{FE} - \hat{\beta}_{RE}$, $D^2(\hat{q}) = D^2(\hat{\beta}_{FE}) - D^2(\hat{\beta}_{RE})$, $D^2(\hat{\beta}_{FE})$ and $D^2(\hat{\beta}_{RE})$ are the matrices of variance-covariance of the estimators $\hat{\beta}_{FE}$ and $\hat{\beta}_{RE}$.

W-statistics has the distribution $\chi^2_\alpha(K)$ where α is the predefined level of significance and K is the a number of independent variables in the model. If $W \geq \chi^2_\alpha(K)$, then H_0 is rejected for H_1, which means that for model estimation the estimator with fixed effects is used (FE). And if $W < \chi^2_\alpha(K)$, there is no basis to reject H_0, and then for estimation of the model the estimator with random effects is indicated (RE).

3. *The obtained results*. The model of panel data was prepared on the basis of the characteristics of labour markets in 16 regions in Poland in the years 2004−2014. The sizes used to build the model constitute:

Y_i − employment rate in % (dependent variable) (symbol: WZ_%);

X_1 − the number of inhabitants in persons (independent variable) (symbol: LM_w_o);

X_2 − budget expenditure per capita in regions in PLN (independent variable) (symbol: WYD_B_W_o);

X_3 − GDP per capita in PLN (independent variable) (symbol: PKB_PC_PLN_s);

X_4 − the number of economically active people in ths (independent variable) (symbol: P_tys_o);

X_5 − average monthly salary in PLN (independent variable) (symbol: PW_PLN);

X_6 − the number of entities of the national economy recorded in the REGON register (independent variable) (symbol: PG_szt);

X_7 − budget revenues in the regions in PLN (independent variable) (symbol: DBWwzA).

"Gretl" econometrics software was used for building the model. The preliminary model estimation was conducted and the results presented in Table 3.

Despite the relevance of the model and explanation in 59.54% of the variation in the employment rate it turned out that the independent variables such as: the expenditure of region budgets per capita in PLN (WYD_B_W_o), and GDP per capita in PLN (PKB_PC_PLN_s) are irrelevant. In the next step the test of removing these variables from the model was conducted (it was taken for granted that the regression

parameters for the indicated variable equal zero). The test statistics was obtained: $F_{(2, 168)} = 1.25552$ and $p = 0.287587 > 0.05$. Therefore, there are no reasons to reject the assumption. Omission of these variables improves also 3 informational criteria (compare the data presented in Tables 3 and 4).

Table 3. **Model 1. Panel estimation MNK with 176 observations (16 regions and 11 years). Dependent variable (Y): WZ_%,** *authors'*

	coefficient	*std. error*	*t-ratio*	*p-value*	
const	38.9126	1.36467	28.5143	< 0.0001	***
LM_w_o	−3.51146e-06	8.14959e-07	−4.3088	< 0.0001	***
WYD_B_W_o	−0.00331676	0.00273058	−1.2147	0.2262	
PKB_PC_PLN_s	−5.32793e-06	4.1876e-06	−1.2723	0.2050	
LAZw_tys_o	0.00886029	0.00147991	5.9871	< 0.0001	***
PW_PLN	0.0035076	0.000562708	6.2334	< 0.0001	***
PG_szt	−1.20092e-05	4.59762e-06	−2.6121	0.0098	***
DBWwzA	2.5402e-09	1.22101e-09	2.0804	0.0390	**
Mean dependent var	48.30341		S.D. dependent var	3.058065	
Sum squared resid	662.1220		S.E. of regression	1.985246	
R-squared	0.595418		Adjusted R-squared	0.578560	
F(7, 168)	35.32047		P-value(F)	5.57e-30	
Log-likelihood	−366.3302		Akaike criterion (AIC)	748.6604	
Schwarz criterion (BIC)	774.0242		Hannana-Quinna (HQC)	758.9478	
rho	0.816287		Durbin-Watson	0.242044	

Table 4. **Model 2. Panel estimation MNK with deleted irrelevant variables,** *authors'*

	coefficient	*std. error*	*t-ratio*	*p-value*	
const	39.0779	1.18645	32.9367	< 0.0001	***
LM_w_o	−3.23332e-06	7.92063e-07	−4.0821	< 0.0001	***
LAZw_tys_o	0.00890208	0.00141979	6.2700	< 0.0001	***
PW_PLN	0.0029472	0.000436609	6.7502	< 0.0001	***
PG_szt	−1.13562e-05	4.21817e-06	−2.6922	0.0078	***
DBWwzA	1.5758e-09	7.29128e-010	2.1612	0.0321	**
Mean dependent var	48.30341		S.D. dependent var	3.058065	
Sum squared resid	672.0185		S.E. of regression	1.988228	
R-squared	0.589371		Adjusted R-squared	0.577293	
F(5, 170)	48.79976		P-value(F)	3.84e-31	
Log-likelihood	−367.6358		Akaike criterion (AIC)	747.2715	
Schwarz criterion (BIC)	766.2944		Hannana-Quinna (HQC)	754.9871	
rho	0.817003		Durbin-Watson	0.250814	

The estimated independent variables together with the absolute term are statistically important at the significance level of 0.001 (besides budget revenues of regions in PLN which is significant at the level of 0.05). The determination coefficient R^2 in the model which equals approximately 58.94% means that the model explains 58.94% of changes in the employment rate by changes: in the number of inhabitants (LM_w_o), in the number of economically active people (LAZw_tys_o), average monthly salary (PW_PLN), the number of entities of national economy put into REGON registry (PG_szt), the income of the regions' budgets (DBWwzA), and the

remaining 41.16% of changes are explained by other factors not included into the model.

In the following step the diagnostic tests for the obtained panel model were conducted:

- Wald's test ($F(15, 155) = 14.586$ with $p = 1.0643e\text{-}022 < 0.05$) shows that a model with fixed effects is more appropriate – absolute terms are different for this object but constant in time;

- Breusch-Pagan test ($LM = 248.889$ with $p = 4.5347e\text{-}056 < 0.05$) shows that the variation of the S.E. of regression is different from zero than the model of random effects is more appropriate;

- test Hausmana ($H = 2.2736$ with $p = 0.008101 < 0.05$) confirms that the model with fixed effects is more appropriate.

In line with the conducted diagnosis a panel model with defined effects was estimated. In this model it turned out additionally that the variables of the number of inhabitants (LM_w_o) and the number of entities of the national economy recorded in the REGON register (PG_szt) are statistically insignificant and their removal does not deteriorate the results.

Tabela 5. **Panel model 3 with fixed effects,** *authors'*

	coefficient	std. error	t-ratio	p-value	
const	33.794	2.14768	15.7351	< 0.0001	***
LAZw_tys_o	0.00411646	0.00203664	2.0212	0.0450	**
PW_PLN	0.00286212	0.000327505	8.7392	< 0.0001	***
DBWwzA	1.84327e-09	5.83749e-010	3.1576	0.0019	***
Mean dependent var	48.30341	S.D. dependent var		3.058065	
Sum squared resid	282.2590	S.E. of regression		1.340831	
LSDV R-squared	0.827529	Adjusted R-squared		0.695736	
LSDV F(18, 157)	41.84986	P-value(F)		1.51e-50	
Log-likelihood	291.2992	Akaike criterion (AIC)		620.5984	
Schwarz criterion (BIC)	680.8376	Hannana-Quinna (HQC)		645.0311	
rho	0.604071	Durbin-Watson		0.611094	

A group test for the differentiation of absolute term was conducted ($F(15, 157) = 21.7296$ with $p = 5.95914e\text{-}031 < 0.05$), which confirms that regions have different values of the absolute terms of employment rates, which means that employment rates in regions differ and these differences are statistically important. The estimated independent variables together with the absolute term are statistically important. The coefficient of determination R^2 of the model which is about 82.75% means that the model explains 82.75% of changes in the employment factor by changes in: the number of economically active people (LAZw_tys_o), average monthly salary (PW_PLN), budget revenue in regions (DBWwzA) and the remaining 17.25% of changes constitute the factors not included into the model.

Attention must be paid to the fact that in the developed model all the factors positively influence the employment rate that is their average growth causes average growth of the employment factor, e.g.:

- increase in the number of economically active people by 1 ths causes while other factors are not changed causes the increase of the employment rate by 0.0041%;

- increase of the average salary by 100 PLN while other factors are not changed causes the increase of employment rate by 0.2862%;

- increase of budget revenues in the regions by 1 mln PLN while other factors are not changed causes the increase of the employment rate by 0.0018%.

Conclusion. On the basis of the employment rate values regionally it can be stated that there are differences between the regions in terms of their capacities to create and maintain places of work. The created model based on cross-sectional data allowed choosing the main factors which determine the employment rate in the regional contest. This confirms the opinions presented in literature that both demographic and economic factors influence employability. The estimated models and used diagnostic tests allowed to assert that the panel model which assumes the existence of fixed effects is the best for such cases. The model obtained in this procedure has high level of the coefficient of determination − 82.75% which means that in 82.75% changes in employment rate are explained by the number of economically active people, average monthly salary and budget revenues of regions. Additionally the model shows that all these factors influence positively the employment rate.

However, the first research hypothesis (H1) was not fully confirmed as the number of inhabitants, the number of registered entities, budget revenue of regions per capita, GDP per capita do not influence significantly the employment rate in these region. The model confirms the second research hypothesis that employment rates in regions differ and that these differences are statistically important. The obtained results are consistent with the results presented in: E. Krynska (2013), A. Komor and A. Iwanicka (2013), A. Ziomek (2013) and K. Brzychcy (2014).

The results presented here do not cover fully the totality of the issues due to a limited perception of the determinants conditioning regional employment. The use of the selected characteristics, imperfect operation and realization of the conditions of the labour market without defining the specificity of a given region, e.g., the number of the offered job positions, the size of the investment are the limitations of the conducted research. In further research it is necessary to concentrate on the issue related to measurements which are the features of a given region. It must be added that the analysed series are relatively short and that in Polish economy quite dynamic economic processes took place and for this reason it is necessary to refer with a lot of care to the interpretation of the parameters and to the estimations based on them.

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