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Local and Regional Economy in Theory and Practice

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THE SOFT MODEL OF THE REGIONAL LABOR MARKET SITUATION OF THE YOUTH

MODEL MIĘKKI SYTUACJI OSÓB MŁODYCH NA REGIONALNYM RYNKU PRACY

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Summary: The aim of this article is to present the results of a model which defines the key factors determining the regional labor market situation of young people and which reveals these factors' impacts. As a result of the statistical analysis as well as the research conducted together with the Polish labor market institutions in 2013–2014, the key research area was defined, i.e. the labor market situation of young people (ZIB) and three contextual areas (determinants): economy (GOSP), education (EDU), family and living conditions (RODZ). The specification of the model was drafted on the basis of the soft modeling methodology, which enables the study of relationships between non-observable (latent) variables.

Keywords: soft model, labor market, labor market situation of young people.

Streszczenie: Celem artykułu jest prezentacja wyników modelu określającego kluczowe czynniki determinujące sytuację osób młodych na regionalnym rynku pracy oraz pokazującego siłę ich oddziaływania. W wyniku analizy statystycznej i badań prowadzonych wspólnie z polskimi instytucjami rynku pracy w latach 2013–2014 zdefiniowano kluczowy obszar badawczy, jakim jest sytuacja osób młodych na rynku pracy (ZIB) oraz trzy obszary kontekstowe (determinanty): gospodarka (GOSP), edukacja (EDU), rodzina i warunki życia (RODZ). Specyfikacji modelu dokonano na podstawie metodologii modelowania miękkiego.

Słowa kluczowe: model miękki, rynek pracy, sytuacja młodzieży na rynku pracy.

1. Introduction

The labor market situation of young people is gradually deteriorating. Since 2002, almost half of the unemployed, registered in employment agencies, have been people who did not turn 34. This concerns the youth not only in Poland, but also in the whole European Union. This is caused by the current economic situation in most European Union countries with still only a slight increase in the gross domestic product, which

may indicate economic stagnation [Fadda, Tridico (eds.) 2013]. Young people, who enter the labor market, are characterized by little professional activity and relatively low employment [Kwiatkowski 2002]. Lack of perspectives and possibilities of professional development cause the increase of the migration process of young and very often highly qualified people [Kryńska 2000]. The unfavorable demographic situation is deteriorating also due to the current population structure according to economic age, with the majority of people in post-working age. These aspects may accelerate the process of population ageing in the European Union. Undertaking activities to subvert this trend seems to be necessary. In December 2012, the European Commission prepared the Youth Employment Package, which constituted the basis for preparing further documents for the Member States. It is directed to young people – most of all at the age up to 25 years who are unemployed and do not study or take part in any trainings [Komunikat KE 2012]. Consequently, this document should help in providing young people with a good offer of employment, further education, vocational training or internship. However, undertaking specific activities and developing instruments aimed at young people in the regional labor market demand establishing a good diagnosis of their situation and defining the influence of various factors on its shape.

The aim of this article is to present the results of the model that defines the key factors determining the regional labor market situation of young people and shows the level of these factors' influences. The specification of the model was drafted on the basis of the soft modeling methodology, which enables the study of relationships between non-observable (latent) variables [Wold 1980; Rogowski 1990]. The soft model is composed of two parts: internal model (theoretical) and external model (metrics). They are both interconnected, i.e. both of them are utilized in the process of parameters estimation. The soft model is estimated with the use of PLS (partial least squares). As a result of the estimates, except for the parameters, the value of a latent variable was being calculated, which can be treated as a synthetic metric. The internal model reveals the relationships between non-observable variables (latent) and the external model – the relationships between latent variables and their detailed indexes (indicators). In the course of the statistical analysis as well as the research conducted together with the Polish labor market institutions in 2013–2014, the key research area was defined, i.e. the labor market situation of young people (ZIB) and three contextual areas (clarifying variables): economy (GOSP), education (EDU), family and living conditions (RODZ) and economy (GOSP) [*Model monitorowania*… 2014]. Calculations were made by means of a specialist program PLS, designed by J. Rogowski.

2. Soft model specification

A soft model for the regional labor market situation of the youth (ZIB) was designed on the basis of the statistics concerning Polish voivodeships in two research periods: 2011 and 2005, which allowed performing a comparative analysis. The data from

2011 were the most recent and reliable when the calculations were being made. Year 2005 was treated as a base year, due to the similar political situation in the country caused by Poland's membership in the European Union. Young people were defined as those between 15 and 34 years old. The specification of the model was elaborated jointly with the working group from the Polish labor market institutions. The scheme of the internal model is presented in Figure 1.

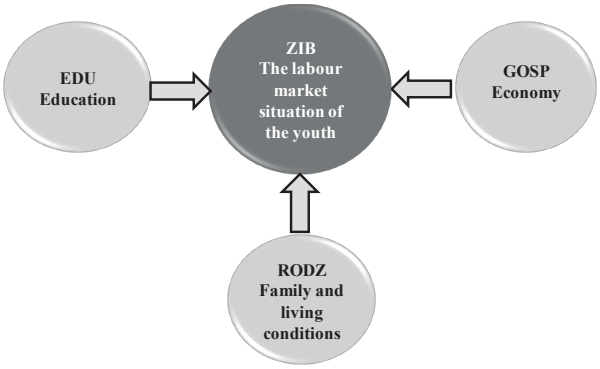

Figure 1. The scheme of the internal model for the labor market situation of the youth

Source: own elaboration.

Line relationship between latent variables included in the internal model is presented in the following equation (1):

$$\underset{}{ZIB_t} = \underset{S(\alpha_1)}{\alpha_1 EDU_t} + \underset{S(\alpha_2)}{\alpha_2 RODZ_t} + \underset{S(\alpha_3)}{\alpha_3 GOSP_t} + \underset{S(\alpha_4)}{\alpha_4 + \varepsilon_t}, \quad (1)$$

in which: ZIB_t – the regional labor market situation of the youth in year t, EDU_t – education in year t, $RODZ_t$ – family and living conditions in year t, $GOSP_t$ – economy in year t, α_i, i = 1, 2, 3, 4 – structural parameters, $S(\alpha_i)$, i = 1, 2, 3, 4 – errors in the estimation of structural parameters resulting from the Tukey test, ε_t, random component, t – examined year.

It was assumed that the labor market situation of young people is determined by the level of education, family situation and living conditions as well as economic development (1).

As the soft modeling methodology infers, latent variables existing in the model can be defined in two ways: deductive and inductive [Rogowski 1990]. Depending on the attitude, differences in ways and estimation results can be observed. Continuing the soft model for the labor market situation of the youth, the deductive attitude to latent variables' definition was adopted, which means that all the studied non-observable

variables, as theoretical concepts, are a starting point in the search for the set of detailed indexes that define them. This constituted the substantive criterion for the choice of detailed indexes. The indexes of this type of non-observable variables are called reflective. The reflective indicators, in principle, should be in high correlation with each other. That is why, when choosing variables, the classical methods of selection were not adopted [Kuszewski 2000].

Table 1. Latent variables indicators of the model of the labor market situation of the youth

Latent variable	Symbol	Indicator's meaning
ZIB	*Z1*	Employment index of young people (15–34 years old) in %
	Z2	Average gross monthly salary in total in PLN
	B1	Unemployment rate of young people (15–34 years old) according to BAEL in %
	B2	Share of young people being long-term unemployed (18–34 years old) among the total number of the unemployed at the same age (registered unemployment) in %
EDU	*E1*	Premature exclusion from the education system in %
	E2	The passing rate of the vocational qualifying examination in %
	E3	Graduates of full-time studies per 10,000 inhabitants
RODZ	*R1*	Average monthly salary for a household (with people aged 18 to 29) in PLN
	R2	Relative poverty threat index after including social transfers in the salary, in %
	R3	People benefiting from social assistance per 10,000 people
GOSP	*G1*	Gross domestic product in PLN *per capita*
	G2	Entrepreneurship index counted as the number of business entities per 10,000 inhabitants
	G3	Investment outlays in PLN *per capita*
	G4	The structure of production (share of financial and insurance activity as well as property market service, i.e. the groups of K, L sections in WDB) in %

Source: own elaboration.

Indicators were chosen from the thirty selected observable variables, taken from the regional statistics. The final set was composed of fourteen indicators, which fulfilled successfully all the selection criteria as well as substantive and statistical verification of the model (see Table 1). The labor market situation of the youth (*ZIB*) was defined by means of four indicators describing employment and unemployment of young people (*Z1*, *Z2*, *B1*, *B2*). Latent variable *EDU* – denoting the contextual field of education was described by means of three observable variables (*E1*, *E2*, *E3*). Latent variable *RODZ* – denoting the contextual field of family and living conditions was described by means of three detailed indexes (*R1*, *R2*, *R3*). Latent variable *GOSP* – denoting

the contextual field of economy was described on the basis of four indexes (*G1*, *G2*, *G3*, *G4*). Most indicators of latent variables are stimulators, i.e. variables whose high values are desired from the point of view of the labor market situation of young people. Five indicators are destimulants: the unemployment rate of young people according to BAEL (*B1*), share of young people being long-term unemployed among the total number of the unemployed at the same age (*B2*), premature exclusion from the education system (*E1*), relative poverty threat index after including social transfers in salary (*R2*), people benefiting from social assistance per 10,000 people (*R3*). The lower the variables' values, the higher the level of the latent variable *ZIB*.

3. Estimate and verification of the model of the labor market situation of the youth

The soft model, whose scheme was presented in Figure 1, was being estimated. The results of the estimates of balances and factor loadings in the external model, when it comes to the sign, met our expectations. Similarly, the estimates of the internal relationships' parameters were presented in the equations (2) and (3).

$$\begin{aligned} ZIB_{11} &= 0.1792 EDU_{11} + 0.2920 RODZ_{11} + 0.5573 GOSP_{11} - 3.0868 \\ &\quad (0.0445) \quad (0.0503) \quad (0.1045) \quad (0.5516) \; ; \qquad (2) \\ R^2 &= 0.6662 \end{aligned}$$

$$\begin{aligned} ZIB_{05} &= 0.2289 EDU_{05} + 0.3560 RODZ_{05} + 0.4698 GOSP_{05} - 2.4808 \\ &\quad (0.0644) \quad (0.0964) \quad (0.1618) \quad (0.8168) . \qquad (3) \\ R^2 &= 0.6561 \end{aligned}$$

The internal model reveals the influence of contextual fields on the main field, i.e. the employment and unemployment of people between 15 and 34. The estimates received from the data in 2011 and 2005 suggest the same results. The economic development of the region had the greatest influence on the labor market situation of young people in 2011 and 2005 (respectively: 0.5573 and 0.4698). The higher the level of economic development, the better the regional labor market situation of the youth due to many attractive job offers. In 2011, as compared to 2005, we can observe a slight increase in the influence of economic development of Polish voivodeships on the labor market situation of young people. The next area that has a positive influence on the labor market situation of young people is family and living conditions (respectively: 0.2920 and 0.3560) and just after that – education (respectively: 0.1792 and 0.2289). These are the fields that need to be monitored and developed because they have a significant impact on the improvement of the labor market situation of young people aged 15–34. Difficult living conditions result in a limited mobility of young people, which is very often the reason for resigning from education or from looking for a job [Kotlorz (ed.) 2014]. Moreover, they influence the lack of activity

of young people due to family obligations (e.g. help with younger siblings, running a house or responsibilities connected with early parenting). Furthermore, they often result from disability or illness of young people or members of their families.

Statistical verification of the model is also positive, which is proven by the levels of errors in the estimates of the structural parameters of the model obtained by the Tuckey method. They are at least twice lower than the values of the estimated parameters. Additional indications that the verification was positive are: the level of the coefficient of determination (respectively: 0.6662 and 0.6561) informing about a moderate quality of the model and the value of the Stone-Geisser test being higher than zero.

Table 2. General Stone-Geisser test of the model for the labor market situation of the youth

Year	The value of the S-G test
2011	0.5361
2005	0.4085

Source: own elaboration on the basis of the soft model results.

It should be highlighted that the model was estimated for the cross-sectional data and was not much tested. The obtained results are satisfying and due to this they can be analyzed. The values of the latent variable do not have a substantial interpretation, but their changes can be interpreted. In this manner, a statistical variable can be obtained which serves for a comparative analysis. In the model under consideration, there are estimates of balances and factor loadings positive for the stimulant, negative for the destimulants and consequently a higher "value of a latent variable" informs about a better labor market situation of the youth. The ranking of voivodeships is created by assigning to the structured values of a latent variable, the consecutive natural numbers. By contrast, the delimitation of the studied objects into classes is done on the basis of the average synthetic metric value ($\overline{x}$) and the standard deviation (s). Based on that, the following four classes were identified:

- Class I: regions with the best labor market situation of the youth (the value of a latent variable $ZIB \geq \overline{x} + s$);
- Class II: regions with the average labor market situation of the youth ($\overline{x} + s >$ the value of a latent variable $ZIB \geq \overline{x}$);
- Class III: regions with worse than average labor market situation of the youth ($\overline{x} >$ the value of a latent variable $ZIB \geq \overline{x} - s$);
- Class IV: regions with the worst labor market situation of the youth (the value of a latent variable $ZIB < \overline{x} - s$).

In 2011, two voivodeships had the best labor market situation of the youth: Mazowieckie and Śląskie (see Figure 1). These regions constitute class number one. These are also the voivodeships that occupy the leading positions in the country in terms of the level of economic development (Mazowieckie – 1st place, Śląskie – 3rd

place) and living conditions (Mazowieckie – 1st place, Śląskie – 3rd). In 2005, the first group included only Mazowieckie voivodeship (Figure 2).

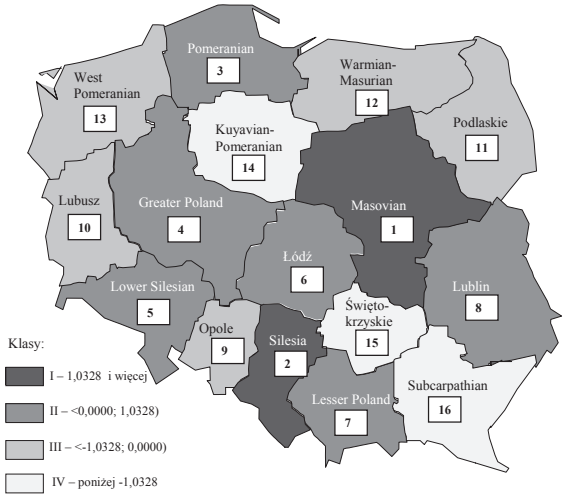

Figure 2. The division of voivodeships into classes according to the latent variable *ZIB* in 2011

Source: own elaboration on the basis of the soft model results.

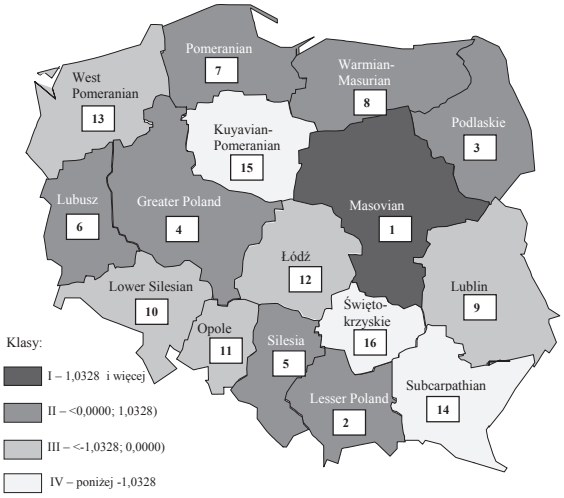

Figure 3. The division of voivodeships into classes according to the latent variable *ZIB* in 2005

Source: own elaboration on the basis of the soft model results.

In 2011, the second class was composed of the regions where the labor market situation of young people was more favorable than the average, i.e. Pomorskie,

Wielkopolskie, Dolnośląskie, Łódzkie, Małopolskie i Lubelskie. Most of these regions are characterized by an outstanding level of economic development (except the Lubelskie and Małopolskie voivodeships), living conditions (except Lubelskie voivodeship) and education (except Łódź voivodeship). In 2005, this group included also two voivodeships from Eastern Poland: Podlaskie and Warmińsko-Mazurskie.

In 2011, the third and fourth classes were composed of regions where the labor market situation of the youth was the worst i.e.:

- The third class: Opolskie, Lubuskie, Podlaskie, Warmińsko-Mazurskie and Zachodniopomorskie.
- The fourth class: Kujawsko-Pomorskie, Świętokrzyskie and Podkarpackie.

These regions need special support in boosting economic growth.

In 2011, as compared to 2005, the biggest improvement can be observed in the following regions: Łódzkie (6 places increase), Dolnośląskie (5 places increase), Pomorskie (4 places increase) and Śląskie (increase by 3 positions). The following voivodeships have been left unchanged: Mazowieckie (1st place), Wielkopolskie (4th place) and Zachodniopomorskie (13th place). On the other hand, the biggest deterioration of the labor market situation of the youth can be observed in: Podlaskie (8 places drop), Małopolskie (5 places drop), Lubuskie and Warmińsko-Mazurskie (4 places drop).

4. Conclusion

The elaborated soft models show the influence of all the studied contextual fields, i.e. economy, education and family and living conditions, on the regional labor market situation of young people aged 15–34.

The greatest influence on the labor market situation of the youth is exerted by the economic potential of a voivodeship. The higher the level of economic development, the better the regional labor market situation of the youth. This means that in order to improve the situation of young people on the labor market, it is necessary to support the instruments boosting the economic development of the voivodeships.

It is crucial to reinforce the cooperation between vocational schools and labor market institutions. It will improve the process of matching the education of young people to the needs of employers (labor market). Low professional activity of the youth is very often caused by the lack of interest in employment. Young people do not feel such a need. Due to this, a significant role should be placed on instruments promoting vocational education, even in lower secondary schools. This should be connected with opening laboratories, where young people will have a chance to master specific and specialist skills. Other instruments (informative and financial) should encourage the youth to start business activities, acquire and develop their qualifications (especially the soft ones – self-organization, interpersonal and communication skills).

These conclusions are confirmed by the achieved rankings. The best labor market situation of young people aged 15–34 can be observed in two highly developed

voivodeships, i.e. Mazowieckie and Ślaskie. The hardest situation, on the other hand, is in regions with a relatively low level of economic development: Kujawsko-Pomorskie, Świętokrzyskie and Podkarpackie. These regions need special assistance in boosting economic development and in monitoring the labor market situation of the youth systematically. The same support is required in the regions that faced the biggest deterioration of the regional labor market situation of young people, i.e. Podlaskie and Małopolskie.

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