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MAREK RĘKLEWSKI[*], MACIEJ RYCZKOWSKI[**]

The Polish Regional Labour Market Welfare Indicator And Its Links To Other Well-being Measures

Abstract

We propose and construct an indicator of labour market well-being in Poland for the year 2013. The indicator is positively related to the degree of civilizational welfare, social welfare, material welfare and psychological well-being in Poland. We conclude that ameliorating the labour market situation improves the quality of the public's life. The link between our labour market indicator and the total fertility rate turned out to be statistically insignificant.

Keywords: *labour market, Weber median, delimitation, well-being indicators, welfare economics*

1. Introduction

Economic growth is not empirically and theoretically the same as an indicator of well-being. As a result, a renewed interest has arisen in analyzing the institutions and conventions through which the economy and society are understood and

[*] Ph.D., Statistical Office in Bydgoszcz, Labour Market Methodology Section, Poland, e-mail: m.reklewski@stat.gov.pl

[**] Ph.D., Statistical Office in Bydgoszcz, Labour Market Methodology Section, Poland, Nicolaus Copernicus University, Faculty of Economic Sciences and Management, The Department of Economics, Toruń, Poland, e-mail: maciej.ryczkowski@wp.pl

measured (Gray et al. 2013, pp. 3–13; Fleurbaey 2009, pp. 1029–1075). As a result there is a growing literature and proposals concerning constructions, alternative to economic growth, of welfare indicators (see, for example, The Global Competitiveness Report, 2013–2014, or the OECD Better Life Index). The labour market is an important and inherent part of these indicators.

The measurement of happiness is a crucial task from the economic point of view, while labour market well-being is in turn an important variable influencing general happiness. The long list of beneficiaries from happy workers include employers, the social environment, and family members. In addition the lower expenditures on healthcare for happy workers and their higher productivity also benefits the government and the budget. The number of positive channels of the impact of worker happiness and the number of particular stakeholders is certainly greater - in general the whole society benefits from the well-being of employees.

However, most of the studies in which aggregate, alternative indexes of happiness are constructed take into account only a small portion of labour market variables. Usually this results from the lack of appropriate data available and relevant for international comparisons. By focusing only on Poland our study, in turn, allows us to include a wider than usual range of labour market variables. As a result, by constructing an objective, complex measure of labour market welfare we deepen the analysis of the importance of the labour market and its influence in selected general welfare indicators. The labour market welfare indicator proposed by us is objective, as it relies only on numerical, quantitative data, free from subjective responses. Such an objective labour market well-being indicator allows us to rank the regions in Poland according to their well-being on the labour market. This in turn allows us to verify which regions need more government support to catch up with the best performing ones. Moreover, we contribute to the literature by delivering evidence that welfare in the labour market is positively linked with the degree of civilizational welfare, social welfare, material welfare and psychological well-being in Poland. We conclude that ameliorating the labour market situation also improves the quality of the public's life.

The evidence we found for a statistically significant correlation between labour market welfare and the public's life quality welfare indicators provides an impetus to local, regional and central government policies to intervene in order to improve the labour market situation, especially in the worst performing regions in this regard. Our indicator can also help to evaluate the effects of government expenditures and to explain how much the labour market situation relates to the level of happiness in particular regions. By identifying the worst performing regions with respect to their labour market situation, the analysis may be helpful for formulating anti-poverty policies. The uneven income distribution between regions, which is taken into account in our indicator, may

help in selecting distributive policies, as patterns of relationships between government, industry and labour may shape the distribution of economic gains among agents (see, Chang 2010, pp. 82–96). Additionally, by incorporating the gender and age issues into our indicator, our analysis may be useful for designing policies preventing discriminatory practices and establishing a link between discrimination on the labour market, labour market well-being, and the more general life satisfaction.

2. Literature review

The labour market situation is an important factor affecting welfare. The literature describes many channels through which particular components of the labour market affect general well-being. Higher incomes and employment have been proven to have a significant impact on happiness (Di Tella et al. 2005, pp. 367–393; Judge et al. 2010, pp. 157–167; Diener et al. 2002, pp. 229–259; Graham et al. 2004, pp. 319–342; Marks and Fleming 1999, pp. 301–323) by increasing the ability to meet one's desired needs. Having a job is key factor in poverty prevention. Health (Frijters and Beatton 2008, pp. 525–542), social justice, unfair inequalities (Alesina and La Ferrara 2005, pp. 897–931), discriminatory practices (for example due to age (M.L. Michaud 2004, pp. 1–22) or gender (Śliwicki, Ryczkowski 2014, pp. 159–173)), social exclusion, security, long commuting times (Stutzer and Frey 2008, pp. 339–366) and stress at work are other components of a broadly understood well-being in the labour market (for a broad list of the dimensions of happiness, see Benjamin et al. 2014, pp. 2698–2735).

Atkinson (2011, pp. 157–161) argues that welfare economics should be restored to a prominent place on the agenda of economists. There are good reasons to advocate this, and certainly the measurement of welfare in the labour market is an important first step in that direction. Happy individuals turn out to be more productive in experimental settings (Oswald et al. 2014), and greater satisfaction among employees allows firm to make predictions about their performance (Bockerman and Ilmakunnas, 2012, pp. 244–262, Harter et al. 2010, pp. 378–389). Happiness may increase creativity and motivation, and happy workers are better evaluated by their supervisors (Jovanovic and Brdaric 2012, pp. 380–384; George and Zhou 2007, pp. 605–622; Peterson et al. 2011, pp. 427–450), are healthier (Davidson, Mostofsky, Whang 2010, pp. 1065–1070; Danner et al. 2001, pp. 804–813; Russ et al. 2012, BMJ 2012;345:e4933) and engage in pro-social behaviour, including improvements in social relationships and networks (Aknin et al. 2013, pp. 635–652; Mehl et al. 2010, pp. 539–541,

Tay and Diener 2013, pp. 28–78), which taken together makes them more efficient in negotiations (Carnevale 2008, pp. 51–63, Lount 2010, pp. 420–433).

Therefore it might be expected that the impact of labour market well-being on regional welfare is influential and can thus deliver constitute important motivation for local or central government bodies and policy makers to act for their economic welfare. Local and central state bodies might use the research outcomes to boost the welfare of the region, assuming a particular level of the current labour market well-being as well as the region's resources and quality, as leadership is proven to be an important factor shaping regional success (see, Sotarautaet al., 2012). Public authorities can do this for example by influencing the ability to innovate and to implement new technologies (see Helpman 2004) or by government spending (Rodríguez-Pose, Maslauskaite 2013, pp. 77–96), since politics, democracy and multi-level governance are crucial regional development determinants (Hanssen et al. 2011, pp. 38–57). The quality of government is another important determinant of growth and welfare. A region with a low value in terms of quality of government will be unable to use Cohesion Funds efficiently and effectively and will remain trapped in a low growth environmental equilibrium (Charron et al. 2012a, 2012b).

3. Data and methodology

In order to calculate the labour market data which we used to construct our labour market welfare indicator, we used data collected by the Central Statistical Office: Labour Force Survey data for the year 2013, Structure of Wages and Salaries by Occupations in October 2012, and Survey of Employees, Wages, Salaries and Working Time (Z-06 form) for the year 2013. To present the labour market well-being at the NUTS2 regions (voivodeships) we constructed aggregated synthetic indicators for the given year 2013. The construction of these synthetic indicators was preceded by the procedure of diagnostic variables' selection. First, potential diagnostic variables were the subject of a discrimination analysis. For that purpose we used variation coefficient V_j. The value of the V_j coefficient was calculated as a product of the median absolute deviation $Mad\left(X_j\right)$ and the median $Med\left(X_j\right)$. The equation takes the following form (Panek 2009, pp. 19–20):

$$V_{p_j} = \frac{\underset{i=1,2,\ldots,n}{Med}\left|X_{ij} - Med\left(X_j\right)\right|}{Med\left(X_j\right)} = \frac{Mad\left(X_j\right)}{Med\left(X_j\right)}. \qquad j = 1, 2, \ldots, m. \quad (1)$$

During the procedure of selecting the statistical variables used to construct the synthetic labour market welfare indicator, we applied the discriminative-correlation two-stage approach from taxonomic research. In the analysis, we used only the variables for which the value of the positional variation coefficient was greater than the critical value of $V^* = 0{,}1$. Elimination of the variables was carried out using the parametric method. However, instead of calculating absolute sums in the given columns of the matrix, we implemented a positional counterpart, i.e. the median, in order to avoid the problem of biased outcomes due to the existence of outliers (Panek 2009, p. 22) – which is especially important in labour market analyses. The Pearson correlation matrix was in turn replaced by τ – Kendall Rank Coefficient Matrix[1]. The critical value selected was at the $r^* = 0.5$. To construct the synthetic labour market welfare indicator for NUTS2 regions, which we further call the Indicator of The Labour Market (abbreviated as ILM), we applied the procedure presented by Młodak (2006), which is a positional reference method assuming usage of the Weber median σ. The synthetic aggregated indicator ILM_i^t takes the following form:

$$ILM_i^t = 1 - \frac{\varphi_{i0}^t}{Med(\varphi) + 2{,}5Mad(\varphi)}, \quad i = 1, 2, \ldots, n. \tag{2}$$

Where: $\varphi = (\varphi_1, \varphi_2, ..., \varphi_n)$ is the data distance vector given by the equation (3), while $Mad(\varphi) = \underset{i=1,2,\ldots,n}{Med} \left| \varphi_{i0}^t - Med(\varphi) \right|$ is the absolute median deviation; t stands for time and in our research it simply equals 2013. Instead of classical distances (like Euclidean or Manhattan), the distance from the benchmark ψ_j was calculated by the partial median difference:

$$\varphi_{i0}^t = \underset{i=1,2,\ldots,n}{Med} \left| c_{ij} - \psi_j \right|. \qquad i = 1, 2, \ldots, n. \tag{3}$$

The benchmark is a vector with maximum values of normalized variables as coordinates (Młodak 2006, pp. 136–138), as follows:

$$\psi_j = \max_{i=1,2,\ldots,n} c_{ij}, \quad j = 1, 2, \ldots, n. \tag{4}$$

[1] The τ –Kendall correlation coefficient is given by $\tau = \frac{K - P}{n(n-1)}$. Where, K – number of concordant pairs, P – number of discordant pairs, n – number of variables in the matrix.

The normalization of the diagnostic variables (stimulants – "s", destimulants – "d") was conducted by using formula (5) (Walesiak, Gatnar 2012, pp. 68, Młodak 2009, pp. 53–69):

$$c_{ij} = \frac{x_{ij} - \sigma_{0j}}{\rho \cdot m\tilde{a}d\left(X_j\right)}, \qquad i = 1, 2, \ldots, n. \tag{5}$$

where: ρ – a constant equal to 1,4826, $m\tilde{a}d\left(X_j\right)$ is an absolute median deviation with the distance analyzed in relation to the Weber median, i.e.:

$$m\tilde{a}d\left(X_j\right) = \underset{i=1,2,\ldots,n}{med} \left| x_{ij} - \sigma_{0j} \right|, \qquad j = 1, 2, \ldots, m. \tag{6}$$

The most satisfactory outcomes in applying the Weber median are especially obtained when the statistical variables are subject to asymmetric distributions (Walesiak, Gatnar 2012, p. 67), which is an important feature of much labour market data. In case of nominants – "n" in the standardization algorithm, like in case of *s*(stimulants) and *d*(destimulants) the Weber median σ was applied. Thus the transformation of nominants into stimulants was carried out in line with the formulas (7) to (9):

$$c_{ij} = \frac{-1}{x_{ij} - \sigma_{Nj} - 1} \quad \text{for } x_{ij} < \sigma_{Nj}, \tag{7}$$

$$c_{ij} = 1 \qquad \text{for } x_{ij} = \sigma_{Nj}, \tag{8}$$

$$c_{ij} = \frac{1}{x_{ij} - \sigma_{Nj} + 1} \quad \text{for } x_{ij} > \sigma_{Nj}. \tag{9}$$

where: σ_{Nj} is the Weber median.

The synthetic measures of the ILM then takes values from the interval [0,1]. On the basis of calculated and sorted descending values of ILM, while applying the positional method of grouping (Three Medians) we assigned the NUTS2 regions into four typological categories (Młodak 2006, pp. 136138):

1. group **A**: $\{ILM_i \in ILM : ILM_i^t > Med_1(ILM)\}$,
2. group **B**: $\{ILM_i \in ILM : Med(ILM) < ILM_i^t \leq Med_1(ILM)\}$,
3. group **C**: $\{ILM_i \in ILM : Med_2(ILM) < ILM_i^t \leq Med(ILM)\}$,
4. group **D**: $\{ILM_i \in ILM : ILM_i^t \leq Med_2(ILM)\}$.

Each group of NUTS2 regions according to the ILM values can be given the following descriptions: group **A –** highest values of ILM – best performing voivodeships in terms of labour market welfare; group **B –** high ILM values; group **C –** low ILM values; group **D –** lowest ILM values – worst performing NUTS2 regions in terms of labour market welfare.

The relation between the ILM and eight synthetic indicators of life quality (designed for the research: Social Diagnosis 2013)[2] and a demographic variable TFR (*Total Fertility Rate*) in the division into NUTS2 regions were analyzed basing on the Pearson Correlation Matrix, and additionally simple regression models were estimated.

4. Empirical results

We selected and calculated the following labour market descriptive statistics associated with labour market well-being and assigned them one of three categories *s* (stimulant), *d* (destimulant), and *n* (nominant) (Table 1). The shaded areas represent the variables rejected by us (X1, X4, X5, X9, X10, X13, X19, X23) due to low variability (<10%).

[2] 1. **Social capital** – activity to the benefit of the local environment, participation in the parliamentary elections in 2007 and 2011, the local government elections in 2005 and 2007, and the EU referendum in 2003, participation in voluntary gatherings, a positive attitude towards democracy, membership in and performing functions in organizations, a belief that most people can be trusted; 2. **Psychological well-being** – sense of happiness, assessment of one's entire previous life, intensification of the symptoms of depression, assessment of the previous year; 3. **Physical well-being** – intensity of somatic symptoms, a serious illness during the previous year, level of disability, intensity of health-related stress; 4. **Social welfare** – absence of the feeling of loneliness, sense of being loved and respected, number of friends; 5. **Degree of civilizational welfare** – level of education, possession of modern communication devices and familiarity with them (satellite or cable television, laptop, desktop computer, cell phone, connection to the Internet, the use of a computer, the use of the Internet), active command of foreign languages, having a driver's license; 6. **Material welfare** – income of the household per equivalent unit, number of goods and appliances possessed by the household ranging from an automatic washing machine to a motorboat to a summer house (with the exclusion of devices making up the civilizational development degree index); 7. **Life-related stress** – the sum of six categories of stress measured by experiences with respect to finances, work, contacts with public offices, raising children, marriage relationships, ecology (home, the neighbourhood); 8. **Pathologies** – abuse of alcohol and the use of drugs, smoking, visits to a psychiatrist or psychologist, being a perpetrator or a victim of a violation of the law (burglary, assault, theft).

Table 1. Descriptive statistics of potential variables describing the Labour situation of NUTS2 regions in Poland in the year 2013[3]

Variable	Description	The category (s, d, n)	Median	Absolute Median Deviation	Positional Variation Coefficient (%)
X1	The share of employees who received sickness benefits or remuneration for disability time or inability to work due to illness	d	6.9	0.4	5.1
X2	**The share of employees with minimum wage (salary) (1680 zlote)**	**d**	**15.9**	**1.9**	**11.9**
X3	**The share of NEETS[4] in the population of young people aged 15-29**	**d**	**2.8**	**1.0**	**34.7**
X4	Employment rate of people over 50	s	31.8	1.4	4.3
X5	Employment rate of people below 30	s	43.3	2.4	5.5
X6	**LFS unemployment rate of people over 50**	**d**	**6.7**	**0.7**	**10.2**
X7	**LFS unemployment rate of people below 30**	**d**	**17.5**	**1.9**	**10.8**
X8	**Registered unemployment rate**	**d**	**14.3**	**2.2**	**15.0**
X9	Average monthly gross wage	s	3499.4	163.5	4.7
X10	Employment rate	s	49.0	1.1	2.1
X11	**The share of the unemployed in the population of productive age**	**d**	**9.2**	**1.4**	**14.7**
X12	**The share of the unemployed registered 1 year and more in the economically active population**	**d**	**5.3**	**1.0**	**18.9**
X13	The share of the unemployed registered 1 year and more in the total amount of the registered unemployed	d	37.1	3.4	9.2
X14	**The number of job offers per 1000 registered unemployed**	**s**	**12.4**	**3.9**	**31.2**
X15	**The number of persons injured in accidents at work per 1000 employees**	**d**	**7.8**	**1.5**	**18.6**

[3] Due to problems with data availability, the variables X1, X2, and X3 refer to the year 2014.

[4] Not in Employment, Education, Training nor Study.

X16	**The number of newly created jobs per 1000 persons in the productive age**	**s**	**17.9**	**4.3**	**23.9**
X17	**The share of employees to the population in production age**	**s**	**37.9**	**13.3**	**35.1**
X18	**Gender Pay Gap (GPG)**	**d**	**1.6**	**5.5**	**352.0**
X19	Gini Coefficient	d	0.3	0.0	2.8
X20	**Average commuting time (minutes)**	**d**	**24.8**	**7.6**	**30.6**
X21	**The share of persons with additional jobs (among all employees)**	**n**	**5.7**	**1.4**	**24.8**
X22	**The share of part-time employees who wish to work full-time**	**d**	**28.0**	**3.8**	**13.6**
X23	The share of employees with indefinite term contracts	s	72.4	2.8	3.8
X24	**Number of unpaid overtime hours worked in the reference week by the employee**	**d**	**8.1**	**1.6**	**19.5**
X25	**Number of paid overtime hours worked in the reference week by the employee**	**n**	**9.9**	**1.1**	**10.9**

Source: Own compilation.

Among the removed variables we included the Gini Coeffcient, which is in line with the results that citizens in Central and Eastern Europe are quite tolerant of higher levels of interpersonal inequality (Rodriguez-Pose and Kristina Maslauskaite 2012, pp. 77–96) – therefore the coefficient should not be responsible for any large portion of labour market welfare differences. Surprisingly the average wage was removed from the set of variables. The explanation for this is that we calculated the median wage based not on individual data but on aggregated, officially published for NUTS2 regions, gross wages obtained only for the medium and big enterprises with more than nine employees, which distorted the results and led to low median wage variability. The highest dispersion we received for the variable X18 (Gender Pay Gap – GPG), describing the differences in male and female hourly wages and salaries. The value of Positional Variation Coefficient amounted to 352%. The lowest variation was measured for the variable X10, where V_{P_j} =2.1%. To verify the different informational content of the potential variables we applied the Kendall Correlation Matrix (see the Kendall correlation coefficients in Tables 2 and 3). The removal of the variables was carried out in

line with parametric method. We selected the concentrations of central, satellite, and isolated (single) variables. Satellite variables duplicate the informational content of central variables, with central variables being their representatives.

Table 2. The selected diagnostic variables Fasing on Kendall Correlation Matrix

Variables		
Central	Satellite	Isolated
X12;	X8, X11;	**X14; X22; X6; X3; X7; X24; X20; X25; X2, X17.**
X22;	X15;	
X16;	X18;	

Source: Own calculations.

To construct the synthetic ILM indicator we used central and isolated variables (Table 2), which altogether constituted 13 variables (2 nominants, 3 stimulants and 8 destimulants). The final list of variables thus includes: X2, X3, X6, X7, X12, X14, X16, X17, X20, X21, X22, X24, X25. In order to group the NUTS2 regions we obtained the following cross-border values: *Med* = 0.6384, Med_1=0.7391, Med_2=0.5556. Into each group we placed four regions according to their ILM value (see Table 4):

- group **A**: Wielkopolskie, Mazowieckie, Opolskie, Śląskie;
- group **B**: Dolnośląskie, Małopolskie, Pomorskie, Podlaskie;
- group **C**: Lubuskie, Łódzkie, Zachodniopomorskie, Lubelskie;
- group **D**: Kujawsko-Pomorskie, Podkarpackie, Warmińsko-Mazurskie, Świętokrzyskie.

The brackets for particular allocations are the following: Group A (0.8044 – 0.7399); Group B (0.7382–0.6397); Group C (0.6371–0.5651); Group D (0.5461–0.4236); see Table 4.

On the basis of the ILM indicator, the most favourable situation in the labour market in 2013 was in the two biggest Polish voivodeships: Wielkopolskie (0.8044) and Mazowieckie (0.7917). This result is not surprising as these voivodeships have for the past few years attracted the most prominent investments (in 2013: Mazowieckie – 47 mld (zlotys), Wielkopolskie – 18.9 mld (zlotys)). Similarly, in these two voivodeships the percentage of newly created jobs per 1000 inhabitants in productive age is the greatest and amounts to 27.6% and 29.2% respectively for the Wielkopolskie and Mazowieckie voivodeships. The share of the registered long-term unemployed among economically active persons was also very low in these two provinces (4.7% in the Mazowieckie and 3.2% in the Wielkopolskie voivodeship).

Table 3. The Kendall Correlation Coefficient Matrix for diagnostic variables with $V_{P_j} \geq 10\%$

Variables	X2	X3	X6	X7	X8	X11	X12	X14	X15	X16	X17	X18	X20	X21	X22	X24	X25
X2	**1.0000**	-0.1008	-0.0753	0.3500	0.3667	0.3698	0.2954	-0.3833	-0.1865	-0.1000	-0.1333	-0.1849	-0.1167	0.0921	0.1000	-0.0333	-0.1500
X3	-0.1008	**1.0000**	-0.1435	-0.0840	0.1681	0.2034	0.1617	0.1345	0.3248	0.0000	0.3025	-0.0678	-0.0672	-0.3291	-0.1345	0.0336	0.0168
X6	-0.0753	-0.1435	**1.0000**	0.0084	-0.0251	0.0422	0.0847	0.0251	-0.0085	0.1255	-0.0251	0.2954	0.2092	-0.1008	0.2092	0.2762	-0.0586
X7	0.3500	-0.0840	0.0084	**1.0000**	0.3500	0.3698	0.3460	-0.1667	-0.2204	-0.2833	-0.0167	-0.1177	-0.1000	0.1757	0.2167	-0.0167	-0.3667
X8	0.3667	0.1681	-0.0251	0.3500	**1.0000**	0.7059	0.7005	-0.3500	0.0848	-0.5667	0.3667	-0.4538	-0.4833	-0.0586	0.2000	0.1000	-0.2833
X11	0.3698	0.2034	0.0422	0.3698	0.7059	**1.0000**	0.8596	-0.4874	-0.1026	-0.4202	0.1345	-0.3390	-0.3025	0.1097	0.2185	0.2521	-0.2857
X12	0.2954	0.1617	0.0847	0.3460	0.7005	0.8596	**1.0000**	-0.4811	-0.0601	-0.4979	0.1941	-0.4511	-0.2954	0.0847	0.2616	0.2785	-0.1772
X14	-0.3833	0.1345	0.0251	-0.1667	-0.3500	-0.4874	-0.4811	**1.0000**	0.4407	0.2167	0.1833	0.3361	0.2667	-0.4268	-0.2500	-0.1833	0.0333
X15	-0.1865	0.3248	-0.0085	-0.2204	0.0848	-0.1026	-0.0601	0.4407	**1.0000**	-0.0509	0.5594	-0.0342	-0.1526	-0.6724	0.0678	0.0170	-0.1695
X16	-0.1000	0.0000	0.1255	-0.2833	-0.5667	-0.4202	-0.4979	0.2167	-0.0509	**1.0000**	-0.5000	0.6219	0.4833	-0.0084	-0.0667	-0.0333	0.1167
X17	-0.1333	0.3025	-0.0251	-0.0167	0.3667	0.1345	0.1941	0.1833	0.5594	-0.5000	**1.0000**	-0.3193	-0.3500	-0.4268	0.0667	0.0000	-0.1167
X18	-0.1849	-0.0678	0.2954	-0.1177	-0.4538	-0.3390	-0.4511	0.3361	-0.0342	0.6219	-0.3193	**1.0000**	0.5210	-0.0591	0.0504	0.0000	-0.1177
X20	-0.1167	-0.0672	0.2092	-0.1000	-0.4833	-0.3025	-0.2954	0.2667	-0.1526	0.4833	-0.3500	0.5210	**1.0000**	0.0084	0.0167	-0.0833	0.1000
X21	0.0921	-0.3291	-0.1008	0.1757	-0.0586	0.1097	0.0847	-0.4268	-0.6724	-0.0084	-0.4268	-0.0591	0.0084	**1.0000**	-0.0418	-0.0418	0.0921
X22	0.1000	-0.1345	0.2092	0.2167	0.2000	0.2185	0.2616	-0.2500	0.0678	-0.0667	0.0667	0.0504	0.0167	-0.0418	**1.0000**	0.2000	-0.4500
X24	-0.0333	0.0336	0.2762	-0.0167	0.1000	0.2521	0.2785	-0.1833	0.0170	-0.0333	0.0000	0.0000	-0.0833	-0.0418	0.2000	**1.0000**	-0.1500
X25	-0.1500	0.0168	-0.0586	-0.3667	-0.2833	-0.2857	-0.1772	0.0333	-0.1695	0.1167	-0.1167	-0.1177	0.1000	0.0921	-0.4500	-0.1500	**1.0000**

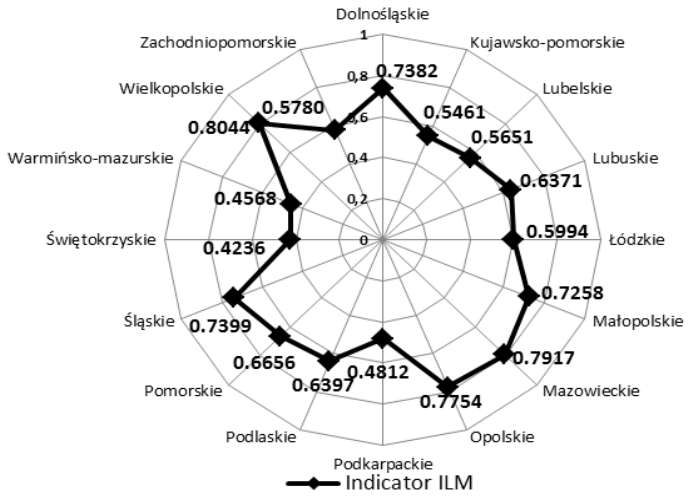
Source: Own calculations.

The third and fourth ranking voivodeships are the southern voivodeships of Opolskie (0.7754) and Śląskie (0.7399). The high rank of the Opolskie region could be explained by extremely low unemployment rate among people below 30 years old and low share of the unemployed among the economically active population (12.0%) – to compare: the median of the share of the unemployed in the economically active population in all voivodeships amounted to 17.5%. On the other hand, high rank of the Opolskie region could also be explained by its being a neighbor to the Śląskie voivodship, thus the two regions Opolskie and Śląskie experience synergy effects from their close proximity.

The least favourable situation in the labour market was, according to our indicator, in the voivodships of Kujawsko-Pomorskie (0.5461), Podkarpackie (0.4812), Warmińsko-Mazurskim (0.4568), with the worst outcome being in Świętokrzyskie (0.4236). The Świętokrzyskie viovodeship is characterized by the lowest number of job offers, with only seven job offers per 1000 registered unemployed. To compare, in the Śląskie region the number of job offers is almost four times higher and amounts to 27 per 1000 registered unemployed. Likewise, in Świętokrzyskie the share of the employees (18.6%) earning the minimum wage is one of the highest in Poland (the lowest share was in the Mazowieckie region: 10.7%).

The graphical presentation of the ILM indicator can be found in Chart 1. The spatial distribution of homogenous NUTS2 regions according to the ILM indicator is presented in Map 1.

Chart 1. Polish NUTS2 regions' ranks according to the synthetic Labour market welfare ILM indicator in 2013



Source: Own work.

Table 4. NUTS2 regions ranking in 2013 according to the synthetic Labour Market Welfare ILM Indicator

Voivodeships	Normalized Diagnostic Variables														Rank	Group
	X2	**X3**	**X6**	**X7**	**X12**	**X14**	**X16**	**X17**	**X20**	**X21**	**X22**	**X24**	**X25**			
	d	d	d	d	d	s	s	s	d	n	d	d	n	*ILM*		
Wielkopolskie	0.2396	-0.5005	1.9641	1.1681	1.5630	0.9304	1.4447	-0.4695	0.6210	0.5700	0.6238	-0.5404	0.4129	0.8044	1	**A**
Mazowieckie	1.7909	-0.3384	-0.3485	1.7274	0.4980	-0.5146	1.7179	-1.2218	2.3803	0.5728	0.7237	0.0414	0.3608	0.7917	2	
Opolskie	0.7117	-0.1764	1.5786	2.0236	0.6400	0.0776	-0.8434	0.9578	-1.6242	0.5700	1.2067	0.8904	0.2391	0.7754	3	
Śląskie	0.7454	0.6340	-0.6375	0.3125	0.9950	1.4753	0.0787	0.0802	1.3208	0.3274	-0.4087	0.7051	0.5081	0.7399	4	
Dolnośląskie	1.0827	-0.0143	-2.1792	0.6416	0.4980	0.9541	0.6421	0.1670	0.6405	0.3385	-1.5246	-1.6869	0.4314	0.7382	5	**B**
Małopolskie	-0.7047	2.0115	0.6151	-0.3785	0.7110	-0.1948	0.5909	-0.9035	0.7085	0.3283	0.4906	1.3386	0.6417	0.7258	6	
Pomorskie	-0.0639	0.1478	0.0369	0.5100	0.5690	0.0302	0.6934	-0.1465	-0.0593	0.2895	0.2574	0.4982	0.3729	0.6656	7	
Podlaskie	0.6443	1.4443	-0.7339	0.5429	-0.7090	-0.7515	-1.3386	0.5913	-1.1965	0.8728	-0.2422	-2.5230	0.4898	0.6397	8	
Lubuskie	0.1047	-2.6884	0.5187	-0.0823	0.4270	1.1555	-0.4678	0.7794	-0.9341	0.3631	1.0402	0.2827	0.4930	0.6371	9	**C**
Łódzkie	-1.0082	0.7960	-1.4084	0.7074	-0.2830	-0.2422	-0.0238	-0.3152	0.4072	0.9485	0.6904	0.1276	0.5459	0.5994	10	
Zachodniopomorskie	0.0710	-0.1764	0.6151	0.0822	-0.6380	0.1132	-0.9630	1.2279	-0.5356	0.2467	0.4073	-0.6439	0.3894	0.5780	11	
Lubelskie	0.0035	0.7150	2.3495	-0.8062	-0.7090	-0.6923	-0.9117	-0.2525	-0.0690	0.1325	-0.9583	1.7739	0.5296	0.5651	12	
Kujawsko-pomorskie	-0.0302	-1.1488	-2.0829	-1.9579	-1.2770	-0.3369	-0.9800	0.9482	-0.0010	0.4075	-0.6586	0.2181	0.9820	0.5461	13	**D**
Podkarpackie	-0.1988	-0.3384	0.1333	-4.3270	-1.1350	-0.6567	-0.2458	-0.6624	-0.2829	0.2064	0.6571	-0.8206	1.2170	0.4812	14	
Warmińsko-mazurskie	-0.8396	-3.5798	0.7114	0.5758	-1.7030	-0.7989	-0.6556	0.8903	-0.8855	0.2664	-0.9750	-0.4586	0.5240	0.4568	15	
Świętokrzyskie	-0.8733	0.8771	-0.0594	-1.5301	-0.6380	-0.8936	-0.1604	-0.6865	-0.9244	0.1361	-1.2248	-0.7559	0.2203	0.4236	16	
	Basic statistics of the diagnostics/synthetic variables															
Webera Median (σ)	16.0	2.7	6.8	18.7	5.4	14.2	19.1	38.5	25.4	6.5	30.0	8.2	10.2	–	–	–

Source: Own calculations.

The obtained results confirm the high NUTS2 variability of the labour market situation in Poland. This leaves room for policymakers to implement policies that would re-balance the situation in the labour market in particular regions. According to our further analysis, that would lead to improvements in the degree of civilizational welfare, social welfare, material welfare and psychological well-being – decreasing the economic divergence between regions in Poland. Surprisingly, in Map 2 we do not find confirmation that Poland could be separated into what is often believed and called 'eastern Poland A, and poorer, western Poland B' – however we did not carry any formal tests to verify this.

Next we analyzed the relation of our labour market welfare indicator (ILM) with respect to eight different quality of life indicators and with the total fertility rate (Table 5).

Table 5. Comparison of the ILM Labour market welfare indicator and quality of life indicators and with the total fertility rate for Polish NUTS2 regions in 2013

NUTS2	Indicators									Total Fertility Rate
	Labour Market	Quality of LIfe*								
	ILM	*CW*	*SW*	*MW*	*P*	*SC*	*PW*	*PsW*	*LS*	*TFR*
Dolnośląskie	0.7382	0.12	0.05	0.04	-0.18	0.01	-0.06	-0.02	-0.09	1.153
Kujawsko-pomorskie	0.5461	-0.02	-0.09	-0.19	0.00	-0.06	0.06	0.01	0.04	1.253
Lubelskie	0.5651	-0.07	0.10	-0.22	0.02	0.05	-0.08	-0.08	0.01	1.222
Lubuskie	0.6371	0.04	-0.13	-0.01	-0.13	0.00	-0.12	-0.07	-0.02	1.246
Łódzkie	0.5994	-0.01	-0.02	-0.11	0.02	-0.09	0.04	-0.04	0.03	1.232
Małopolskie	0.7258	0.12	0.13	0.06	0.11	0.05	0.03	0.13	0.08	1.290
Mazowieckie	0.7911	0.17	0.05	0.17	-0.05	0.05	0.02	-0.02	-0.08	1.333
Opolskie	0.7754	0.1	0.18	-0.03	0.07	0.07	0.02	0.06	0.00	1.074
Podkarpackie	0.4812	-0.04	0.07	-0.22	0.05	0.13	-0.01	-0.05	-0.04	1.230
Podlaskie	0.6397	0.07	-0.03	0.02	-0.02	-0.03	0.01	-0.15	-0.05	1.178
Pomorskie	0.6656	0.23	0.07	0.05	-0.04	0.08	0.02	0.07	0.04	1.344
Śląskie	0.7399	0.15	-0.03	0.02	-0.06	-0.02	0.07	0.02	0.01	1.247
Świętokrzyski	0.4236	-0.14	-0.12	-0.32	0.11	-0.08	-0.01	-0.20	0.03	1.161
Warmińsko-mazurskie	0.4568	-0.12	-0.25	-0.11	0.06	-0.19	0.19	-0.08	0.14	1.235
Wielkopolski	0.8044	0.08	0.00	-0.04	0.00	-0.05	0.04	0.09	0.09	1.341
Zachodnio-pomorskie	0.5780	0.11	-0.08	0.06	-0.10	-0.06	0.11	0.02	0.02	1.203

*Degree of civilizational welfare (CW);Social Welfare (SW); Material Welfare (MW); Pathologies (P); Social Capital (SC);Physical well-being (PW); Psychological well-being (PsW);Life-related stress (LS)

Source: Own calculations on the basis of: Social Diagnosis 2013. The conditions andqualityof life of Poles, ed. J.Czapiński, T. Panek,Warsaw 2013, p. 379.

Map 1. Delimitation of the Labour market NUTS2 regions in Poland in 2013

Source: Own work.

In the correlation matrix (Table 6) we can see that the strongest positive link exists between ILM and the degree of civilizational wefare, where the correlation coefficient equals 0.8155. The better is the situation in the labour market, the higher the civilizational level. A positive correlation also exists between ILM and SW, MW, SC, PsW and TFR. These results are in line with expectations. A better situation in the labour market translates into better psychological well-being. Persons can afford to meet more of their needs, thus their material welfare improves too. And they can invest more into studying or training, thus improving their social capital, and they can afford to have more children. A negative correlation coefficient exists in cases of P, PW and LS. We interpret these results as showing that a better situation in the labour market decreases pathologies, however by working more and having more responsibilities and complex tasks persons pay for that with their health and experience more stress.

Table 6. Pearson correlation matrix between ILM and quality of life indicators and total fertility rate

	ILM	*PC*	*DS*	*DM*	*P*	*KS*	*DF*	*DP*	*SŻ*	*TFR*
ILM	**1.0000**	0.8155	0.5658	0.7638	-0.3490	0.3722	-0.1566	0.6502	-0.2610	0.2213
CW	0.8155	**1.0000**	0.4948	0.8791	-0.4930	0.4669	-0.0446	0.6600	-0.3134	0.3248
SW	0.5658	0.4948	**1.0000**	0.2483	0.1162	0.8384	-0.3946	0.5015	-0.3587	-0.0445
MW	0.7638	0.8791	0.2483	**1.0000**	-0.5286	0.2032	0.1000	0.5170	-0.2637	0.3030
P	-0.3490	-0.4930	0.1162	-0.5286	**1.0000**	-0.0507	0.2854	-0.0484	0.5388	-0.0712
SC	0.3722	0.4669	0.8384	0.2032	-0.0507	**1.0000**	-0.5740	0.3301	-0.5325	0.0691
PW	-0.1566	-0.0446	-0.3946	0.1000	0.2854	-0.5740	**1.0000**	0.2152	0.6068	0.1300
PsW	0.6502	0.6600	0.5015	0.5170	-0.0484	0.3301	0.2152	**1.0000**	0.2694	0.3990
LS	-0.2610	-0.3134	-0.3587	-0.2637	0.5388	-0.5325	0.6068	0.2694	**1.0000**	0.2809
TFR	0.2213	0.3248	-0.0445	0.3030	-0.0712	0.0691	0.1300	0.3990	0.2809	**1.0000**

Source: Own calculations.

Next we aimed to verify the statistical significance of the relation between ILM and eight quality of life indicators, along with total fertility rate. These results are presented in the Table 7.

Table 7. OLS estimations of models with quality of life and the Total fertility rate (where *X=ILM*)

Variables	**Model 1** ***Y=CW***	**Model 2** ***Y=SW***	**Model 3** ***Y=MW***	**Model 4** ***Y=P***	**Model 5** ***Y=SC***	**Model 6** ***Y=PW***	**Model 7** ***Y=PsW***	**Model 8** ***Y=LS***	**Model 9** ***Y=TFR***
const	**-0.4051**[3] (0.0877)	**-0.3341**[2] (0.1299)	**-0.5781**[3] (0.1209)	0.1420 (0.1100)	-0.1647 (0.1057)	0.0804 (0.1025)	**-0.3153**[3] (0.0940)	0.0965 (0.0838)	**1.1499**[3] (0.1006)
ILM	**0.7151**[3] (0.1356)	**0.5159**[2] (0.2010)	**0.8281**[3] (0.1870)	-0.2372 (0.1702)	0.2454 (0.1636)	-0.0941 (0.1586)	**0.4657**[3] (0.1454)	-0.1313 (0.1297)	0.1322 (0.1557)
S_y	0.0638	0.0945	0.0880	0.0801	0.0769	0.0746	0.0684	0.0610	0.0732
V_y	129.2%	-1512.4%	-169.6%	-919.9%	-879.2%	361.8%	-353.1%	464.9%	5.9%
R^2	66.5%	32.0%	58.3%	12.2%	13.9%	2.5%	42.3%	6.8%	4.9%
φ^2	44.5%	68.0%	41.7%	87.8%	86.1	97.5%	57.7%	93.2%	95.1%

Standard errors in brackets. Significance level: [1]α =10%, [2]α =5%, [3]α =1%.

Source: Own calculations.

A statistically significant relation between the dependent variable ILM and the descriptive variables was obtained in four models: 1–3 and 7. The relation between situation in the labour market (ILM) and CW, SW, MW and PsW is statistically significant and positive and in line with the Pearson correlation coefficients. The increase of the labour market welfare ILM indicator by 1 pp. is

equivalent to an increase of quality of life indicators CW, SW, MW and PsW by, respectively 0.7151, 0.5159, 0.8281 and 0.4657 pp. We interpret this as meaning that improvements in the labour market situation improves the quality of the public's life. The relation between ILM and the total fertility rate turned out to be statistically insignificant, which is in line with the majority of other studies, which find that the number of children is consistently insignificant in all specifications (see, Rodrıguez-Pose and Kristina Maslauskaite 2012, pp. 77–96). This means that pro-family policies aiming to increase the birth rate should target for other variables than the labour market situation itself and should focus rather on some broader pro-family policies, which could for example include appropriate pro-family laws and regulations.

The high variation coefficients lead to the conclusion that, with exception of model 9, the fit of the models to the empirical data is precarious. Based on the determination coefficient, on average from 33.5% to 97.5% of the variability of Y variables were not explained by the ILM variable.

5. Conclusions

The obtained results confirm high the NUTS2 variability of the labour market situation in Poland. This leaves room for policymakers to implement policies that would re-balance the situation in the labour market in particular regions. According to our analysis, that would lead to improvements in the degree of civilizational welfare, social welfare, material welfare, and psychological well-being – which in turn would decrease the economic divergences between regions in Poland. We conclude that ameliorating the labour market situation improves the quality of the public's life. Nevertheless, the link between our labour market indicator and total fertility rate turned out to be statistically insignificant. This means that pro-family policies aimed at increasing the birth rate may be inefficient if they concentrate solely on labour market issues, without tackling the broader context of the problem.

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Streszczenie

WSKAŹNIK DOBROBYTU NA RYNKU PRACY W POLSCE I JEGO ZWIĄZEK Z INNYMI MIERNIKAMI DOBROSTANU

W artykule zaproponowano i skonstruowano zagregowany miernik dobrobytu na rynku pracy w Polsce na przykładzie roku 2013. Miernik ten okazał się pozytywnie skorelowany z poziomem cywilizacyjnym, dobrostanem społecznym, dobrobytem materialnym i dobrostanem psychicznym. Oznacza to, że wraz z polepszeniem się sytuacji na rynku pracy poprawia się jakość życia społeczeństwa w Polsce. Nie wykazano statystycznie istotnego związku między dobrobytem na rynku pracy a współczynnikiem dzietności.

Słowa kluczowe: *rynek pracy, mediana Webera, delimitacja, mierniki dobrobytu, ekonomia dobrobytu*