

Cyrek, Magdalena

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Social Efficiency of Sectoral Employment in Polish Regions

Magdalena Cyrek

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Magdalena Cyrek

mcyrek@ur.edu.pl

University of Rzeszów, Faculty of Economics, Department of Microeconomics, M. Ćwiklińskiej str. 2, 35-601 Rzeszów, Poland

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Abstract

Research background: Regions that are able to use their resources in the most efficient way could be perceived as valuable benchmarks when shaping socio-economic policy. The efficiency, however, can be related not only to pure economic categories but to social goals as well. These two dimensions: economic and social overlap and often have some common stems, among which sectoral structure of employment seems to be an important one.

Purpose of the article: The aim of the study was to compare the social efficiency of employment in three sectors in Polish voivodeships. Not only were we evaluating the relative performance of each region but we were also paying attention to the efficiency of engagement of human resources in agricultural, industrial and service sectors.

Methodology/methods: We adopted DEA method to assess the social efficiency of Polish regions. We evaluated social cohesion concerning its two output dimensions: positive, that could be described by social activity and negative, that could be reflected in a form of social exclusion stemming from material sources. We took into account a level of employment in agricultural, industrial and service sectors as inputs in the model and thus focused our attention on the three sectoral structure of regional economies. Our model assumed non-radial developmental paths and was input oriented (NR-CCR). Data were describing the 16 Polish voivodeships in the 2015 year and were extracted from the Central Statistical Office of Poland's databases.

Findings & Value added: The conducted research indicate that Polish regions which were the most efficient in terms of social integration were simultaneously those with the best economic results in terms of GDP per capita. The highest social efficiency was characteristic for employment in the service sector, while the lowest – for agriculture. Thus, structural development appears to be favourable for regional economies also in terms of social cohesion, which is often neglected in the literature.

Introduction

The search for an optimal sectoral distribution of employment has been an important aspect of research about a socio-economic development of countries and regions at least since a three-sectoral theory was created by Fisher (1935), Clark (1940) and Fourastié (1949). However, consequences of a sectoral shift are typically reduced to problems of productivity differences between sectors and its changes, which influence an economic growth and convergence (e.g. O'Leary & Webber, 2015; Maudos *et al.*, 2000; Sassi, 2011). Social results of the structural modernisation in terms of distributive and relational cohesion are usually neglected. Meanwhile, modernisation may rise prosperity but also escalate inequality and thus it changes an individual life satisfaction (Abbott *et al.*, 2016, p. 654, 668) as well as conditions for social cohesion. Hence, this paper looks at some social effects of a distribution of labour between three sectors: agriculture, industry and services. An aim of the study is to compare the social efficiency of employment in the three sectors in Polish voivodeships. As a category of efficiency is understood as a relationship between outputs and inputs (e.g. Kaasa, 2016, p. 12), in the paper the results of economic activity are perceived in social terms. The study evaluates a relative performance of each region but also assesses social results of engagement of human resources in each sector.

An aim of achieving social cohesion is specified as a key policy goal in the European Union. The Council of Europe states that social cohesion is the capacity of a society to ensure the welfare of all its members, minimising disparities and avoiding polarisation (New Strategy..., 2010, [http, p. 2](http://www.coe.int/t/e/socdev/Policy%20document/20100527_0001.pdf)). Social cohesion is perceived as the glue that keeps the members of a social system together (a family, an organisation, a neighbourhood, or society as a whole) (Dekker & Bolt, 2005, p. 2448). Most authors claim that enhancing cohesion include reducing economic and social disparities and strengthening the connections and relations (Hulse & Stone, 2007, p. 112), or in other words: enhancing the equity and harmonising the relationships between different social groups (Andrews, 2014, p. 705). Thus distributive (economic) and relational (structural) dimensions of social cohesion are specified (e.g. Loktieva, 2016, pp. 148-150). These classifications of social effects may be adopted to evaluate results of modernisation, enabling to clarify outputs when assessing the social efficiency.

This research uses two aspects of social results of employment: distribution of incomes (relative poverty) and engagement in social activities (participation in social organisations). The first dimension reveals a pursuit to equity, broad inclusion and security in terms of economic conditions, while the second represents an active attitude of people who share common goals and feel empowered to take up actions favourable for the whole communi-

ty. Both aspects may be supported by employment, as it enables to avoid monetary marginalisation as well as it creates a sense of personal capability and relational inclusion resulting in social solidarity. We try to investigate to which extend the three sectors' engagement allows to fulfil these goals in the Polish regions.

The research focuses on the performance of 16 Polish voivodeships, which may be treated as relatively homogenous units. However, we try to identify the regions that gain the best social results and thus can create a benchmark for the others. Basing on the experience of the leaders it is possible to suggest an optimal structural solution and shape an industrial policy.

The analysis is conducted for the 2015 year and an evaluation of the modernisation is done in a comparative way. It assumes a typical pattern of the sectoral shift as described in the three sectoral theory (from agriculture to industry and then to services). Relative results of each sector allow to conclude about social benefits induced by the modernisation.

The paper is organised as follows. In the next section, the research methodology is described in a more detailed way. The third section presents results of research and their discussion and the final section concludes.

Research Methodology

The paper uses DEA (Data Envelopment Analysis) method as proposed by Charnes, Cooper and Rhodes (1978) to compare the social efficiency of sectoral employment in the Polish regions. As the aim is to compare social results of each sector we adopt a non-radial model NR-CCR, which allows for different multipliers (λ) for each input.

The data in our model include three inputs and two outputs. Inputs are specified as employment per 100 population in sector n (agriculture, industry and services) in the 16 Polish voivodeships in the 2015 year. To minimise a distortion caused by different sizes of the regions the number of employees was related to the number of population. Thus, the input indicators reflect, additionally to the importance of each sector, also demographic conditions of each region and situation at a labour market (influencing unemployment and economic inactivity).

Output in r dimension of cohesion is specified as: in the distributive dimension – 100% minus the rate of population (%) endangered by the relative poverty in the voivodeships and in the relational dimension – the number of foundations and social organisations registered in REGON per 1000 inhabitants in the voivodeships. We assumed that in a cohesive society there are not many people suffering from economic exclusion and poverty

and a participation in social activities, which reflects solidarity with others and individual sense of empowerment, is high.

The statistical data were derived from the Central Statistical Office of Poland's databases available on-line: the Local Data Bank (GUS, [http, 02.12.2016, 27.03.2017](http://02.12.2016, 27.03.2017)) and STRATEG (GUS, [http, 03.12.2016](http://03.12.2016)).

We used the EMS application to resolve the linear programming problem assuming the inputs minimising. Moreover, as the main issue under consideration was specified as the intersectoral differences in efficiency, there were calculated indicators of substitution for each pair of inputs and a general indicator of substitution of inputs z (as a geometric mean of the individual indicators of the values not least than 1).

Realising the aim of the study we calculated the relative efficiency scores of each voivodeship adopting the model specified above. We identified benchmark regions and compared an average efficiency score of each sector to evaluate the modernisation. We used the indicators of substitution to indicate its directions enhancing cohesiveness.

Results and discussion

The social efficiency of the Polish regions (table 1) reaches at average 79% of the optimal level for the group. 5 regions achieve optimal results, namely: mazowieckie, śląskie, wielkopolskie, zachodniopomorskie and dolnośląskie and these are mostly the richest voivodeships. Moreover, one of the poorest region – świętokrzyskie appears the least efficient one in terms of social cohesion. In świętokrzyskie only 56% of the current employment is efficiently engaged considering cohesive results. The fact additionally supports the pattern of mutually enhancing relations between GDP per capita and social results. Thus, a recipe to strengthen social cohesion seems to be common with measures to leverage a level of production per capita. The rank correlation between GDP p.c. in 2015 year (GUS, [http, 27.03.2017](http://27.03.2017)) and the compound social cohesion results is 0,68 and confirms the conclusion. It supports the view about mutual strengthening interrelations between these phenomena, however, it does not prejudice their succession. Nevertheless, we can generally conclude that in Poland the rich regions are simultaneously the most cohesive ones. Thus any actions supporting one of these phenomena should be favourable also for the other.

Although 5 regions are fully efficient, only zachodniopomorskie is a real benchmark for the other voivodeships. Thus, features of employment in zachodniopomorskie are important to be tracked to find the best way to enhance social cohesion. The region is a deindustrialised one, with a share of employment in the service sector reaching 62%, in the industry 30% and only 8% in the agriculture. Apart from mazowieckie, it is the voivodeship with the highest proportion of a labour force in services. However, the

sectoral structure of employment in mazowieckie is less developed as the agriculture engages a relatively high share of employment, reflecting polarised situation within the region.

Table 1. Efficiency scores of the sectoral employment in terms of the social cohesion in the Polish regions in 2015

	voivodeship	benchmarks	□ agr	□ ind	□ ser	□
1	łódzkie	11 (0,98)	40%	64%	70%	58%
2	mazowieckie	0	100%	100%	100%	100%
3	małopolskie	11 (0,96)	54%	81%	90%	75%
4	śląskie	0	100%	100%	100%	100%
5	lubelskie	11 (0,97)	23%	87%	75%	61%
6	podkarpackie	11 (0,94)	39%	81%	95%	72%
7	podlaskie	11 (0,91)	23%	89%	88%	67%
8	świętokrzyskie	11 (0,90)	21%	67%	79%	56%
9	lubuskie	11 (0,99)	96%	69%	85%	83%
10	wielkopolskie	0	100%	100%	100%	100%
11	zachodniopomorskie	11	100%	100%	100%	100%
12	dolnośląskie	0	100%	100%	100%	100%
13	opolskie	11 (0,97)	59%	68%	92%	73%
14	kujawsko-pomorskie	11 (0,94)	41%	74%	86%	67%
15	pomorskie	11 (0,97)	83%	67%	75%	75%
16	warmińsko-mazurskie	11 (1,04)	50%	89%	98%	79%
		mean	64%	83%	90%	79%

□ - a relative efficiency score (subscripts: agr, ind, ser stand for: agriculture, industry, services; an indicator without any subscript reveals a general efficiency score calculated as a mean efficiency of the three sectors)

Source: own calculations based on statistics from the Central Statistical Office of Poland available in STRATEG (GUS, [http, 03.12.2016](http://03.12.2016)) and Local Data Bank (GUS, [http, 02.12.2016](http://02.12.2016)) databases.

Comparing the cohesive efficiency of employment in different sectors, it is possible to conclude about socially favourable results of modernisation. As a modern shift in employment is specified by labour movement from agriculture and industry into a service sector, it may enhance social cohesion because the service sector achieves the best efficiency followed by industry and then agriculture.

Employment in the service sector allows to gain an average level of social efficiency of 90%. The best performance is observed in the 5 affluent

regions that are fully efficient (mazowieckie, śląskie, wielkopolskie, zachodniopomorskie, dolnośląskie). On the other hand, łódzkie is the least efficient voivodeship and 30% of its service employment is wasted concerning the social yields.

The best results of the service sector can be explained by their classical features specified by a predominant role of personal interactions within the service process. It may induce a general prosocial activity of the employees who more willingly participate in actions undertaken also in non-profit organisations. Moreover, the results also suggest that the service employment allows to limit the poverty the most. It may be connected with an inclusive character of the heterogenic service sector that creates workplaces also for the manual workers who are less educated and professionally qualified as well as for women or the young and the old who are more commonly discriminated. The employment can give them an opportunity to earn and thus to avoid poverty and material exclusion. Unemployment or economic passivity is the alternative pushing them into exclusion.

An engagement in the other sectors also brings positive social gains, however, they are generally weaker. The industrial employment allows to achieve an average level of the social efficiency of only 83%. There are 5 efficient regions (as previously) and the looser (łódzkie) gains efficiency of 64%.

The poorest efficiency scores may be attributed to the agriculture. At average 36% of the employment does not bring any social gains when assessing the cohesion. The least efficient region is świętokrzyskie and it is followed by lubelskie and podlaskie. In these voivodeships about 77-79% of the agricultural employment does not enhance social cohesion. It is connected with over-employment in the agricultural sector, hiding the real unemployment and thus inducing low incomes that do not protect from poverty. Generally, agricultural character of the regions is associated with their comparably low level of socio-economic development.

As the social efficiency of employment in the three sectors appears to differ, it is suitable to specify some desirable directions of structural changes that would be favourable in terms of social gains. Table 2 presents indicators of substitution of employment in the three sectors in pairs as well as an aggregate indicator of substitution of inputs (z).

The general pattern of structural change in the Polish regions that could enhance social cohesion may be described by the threesectoral theories' conclusions for the developed countries. The shift from agriculture into service sector is mainly needed, followed by the movement from agriculture into industry. The decrease in industrial employment in favour of the service sector is also necessary, however, the substitution does not have

to cover such numerous group of employees. Generally, about 25% of employment should be substituted to improve social results.

Table 2. Indicators of substitution of inputs enhancing social efficiency of employment in the Polish regions in 2015

	voivodeship	agr(ind)	agr(ser)	ind(ser)	ind(agr)	ser(agr)	ser(ind)	z
1	łódzkie	0,62	0,56	0,91	1,61	1,77	1,10	1,46
2	mazowieckie	1	1	1	1	1	1	
3	małopolskie	0,67	0,60	0,89	1,49	1,66	1,12	1,40
4	śląskie	1	1	1	1	1	1	
5	lubelskie	0,26	0,30	1,16	3,81	3,29	0,86	2,44
6	podkarpackie	0,49	0,41	0,84	2,04	2,42	1,18	2,46
7	podlaskie	0,26	0,26	1,01	3,86	3,81	0,99	2,46
8	świętokrzyskie	0,31	0,26	0,84	3,20	3,79	1,18	2,43
9	lubuskie	1,38	1,13	0,81	0,72	0,89	1,23	1,24
10	wielkopolskie	1	1	1	1	1	1	
11	zachodniopomorskie	1	1	1	1	1	1	
12	dolnośląskie	1	1	1	1	1	1	
13	opolskie	0,88	0,64	0,73	1,14	1,56	1,37	1,35
14	kujawsko-pomorskie	0,55	0,48	0,87	1,82	2,09	1,15	1,64
15	pomorskie	1,23	1,11	0,90	0,81	0,90	1,10	1,15
16	warmińsko-mazurskie	0,56	0,51	0,91	1,79	1,97	1,10	1,57
	Poland*	0,77	0,72	0,93	1,30	1,39	1,07	1,25

*indicators of substitution of inputs calculated basing on the average efficiency scores for the 16 regions

Source: own calculations based on statistics from the Central Statistical Office of Poland available in STRATEG (GUS, [http, 03.12.2016](http://03.12.2016)) and Local Data Bank (GUS, [http, 02.12.2016](http://02.12.2016)) databases.

The most important structural changes are required in podlaskie, podkarpackie, lubelskie and świętokrzyskie voivodeships, which are also the poorest ones. The shifts are evaluated at a level of nearly 150% of the current employment. In all these 4 regions the labour force should move from agriculture into both industry and services. However, while in podkarpackie and świętokrzyskie there is a need of limiting employment in industry in favour of services, lubelskie and podlaskie require to be industrialised even to the detriment of services. Nevertheless, the deagrarian trend seems to be the most important revealing an early level of structural development of these poor regions.

Conclusions

The conducted research allows to conclude that results of the modernisation of threesectoral structure of employment in the Polish regions are favourable for social cohesion. The best social results are gained when employing people in the service sector, while an employment in the agriculture appears to be the least efficient.

Moreover, it is possible to conclude that the most affluent regions are simultaneously the most cohesive ones. Thus, the same measures might be used to strengthen social cohesion and to increase a level of GDP per capita. Deindustrialisation and deagrarisation seem to constitute trends favourable for the regional development. Nevertheless, the comparisons suggest that a high share of service employment is not enough to balance social losses connected with an agrarian over-employment. Hence, a developmental path in Polish regions should follow a pattern described in the threesectoral theories with a phase of industrialisation.

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