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SHIFT-SHARE EMPLOYMENT ANALYSIS OF CANTONS IN THE FEDERATION OF BOSNIA AND HERZEGOVINA

ABSTRACT

Structure of each economy, especially those in transition, is in constant change. Shift-share analysis is widely used for studying of regional economic change. The model in which the present analysis is conducted has three components: (i) the national growth component (in this paper the entity level of Federation of BH is used as reference level), (ii) the industry mix component, and (iii) the competitive component. Each of them is measured on the basis of employment. The analysis enables assessment of economic performance of a region (here cantons) in comparison to a reference level (here the Federation of Bosnia and Herzegovina).

In this paper authors aimed at capturing economic change at regional level. Authors have compared the economic change in two time periods, 2006-2011 and 2012-2018. Changes in employment are expected in a small transitional and open economy such as Bosnia and Herzegovina. Obtained results indicate that regional economy went through considerable transformation. Some policy recommendations for policy decision-makers in the fields of education and labor market are also given in the paper.

Key words: *Shift-share analysis, regional economics, employment growth*

JEL: *J21, R11*

1. INTRODUCTION

Each economy is in constant change, those in transition experience economic change of a higher rate. The change can be tracked through variations in variables such as: gross domestic product, productivity, employment, export-import data, etc. Economic transition is especially characterized by changes in employment levels across

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economic sectors. Simply, some sectors thrive while other sectors decline in the period of transition from centrally planned to market oriented economies. Following transition process new jobs are created in the expanding sectors requiring new labour skills and in declining sectors the demand for the existing skills falls. Employment levels are not only at the heart of sustainable and inclusive economic growth of a country but also have substantial role in broader social context as well as individual level. Employment is considered to have a pivotal role in people's lives and identities. Some economists argue that unemployment has been one of the major faults of economic systems during history. At broader social level it can be argued that employment analyses can point to social chances and to other potential social challenges such as poverty, crime, migration, etc.

Theoretical background of structural change can be tracked back to 1940-ies at least. Structural change which is expected in transition period can have important effects on employment. If structural change comes together with technological change then an economy can suffer from permanent technological unemployment (Neisser, 1942, p. 71). Therefore, investigating effects on regional level that can create new employment gains utmost importance. Are regional economic structures strong enough or some stimulation from higher levels is needed in order to maintain employment levels in times of structural and technological change? It appears there is agreement among economic profession that several factors including elasticity of product demand and locational advantages and disadvantages of the different regions can play important roles in determining employment effects of structural and technological change (Blien, et al., 2014).

The paper is organised in 5 sections. In the next section the literature review related to shift-share analysis is presented followed by the section in which the standard shift-share model is described. In the fourth section results of the analysis are discussed, while in the last section some concluding remarks and recommendations to policy decision-makers are given.

2. Literature review

In a research conducted by Batog & Batog (2007) total and sectoral employment in 24 EU countries is analysed in two industry classifications, the first one being traditional classification to agriculture, industry and services and the second one being classification into six sectors. Results indicate there is similarity between two classifications. Namely, regional growth (the competitive-effect) accounts for the biggest part of variation in employment growth among countries in each classification of sectors. That means sectoral structure at the beginning of the period (1999) had only small influence on cross-country differences in employment change during the

period of analysis (2005). With data of almost four decades, 1970-2007, an employment study was conducted to explore employment growth and its policy implications in West Virginia (USA). It was revealed that primary and secondary sectors are no longer dominant and that tertiary and quaternary sectors get prominence in regional economy (Herath, et al., 2011). Shift-share analysis was tested by some authors to examine how this method can be used to distinguish if industrial sectors are suitable for formation of clusters. Based on data from 2003 to 2007 in Czech Republic it was concluded that shift-share analysis "... is only suitable for primary mapping of the dominant sector in the region" (Matatkova & Stejskal, 2012, p. 945).

Shift-share analysis conducted about cantons in FBH in period of 2006-2011 showed that cantonal competitive advantages contribute to increase in employment in only three out of ten cantons in FBH. In the remaining seven cantons their low competitive advantages were not able to induce economic growth (Halebić & Merdić, 2013). Similar results were obtained in shift-share analysis of cantons in Croatian economy for period of 1997-2008. In most of Croatian cantons local competitive advantages declined during the period (Čavrak, 2012). Shift-share analysis can also be used for regional comparison between one particular region and a group of other regions (Sims, 2015), or between a region and a national economy as in the case of Malaysia (Hassan, et al., 2011). The location effect in analysis of German regions has been proved significant in regional development (Blien, et al., 2014).

3. Methodology

Shift-share analysis compares differences between variable of interest (i.e. employment) on the level of a region in comparison to a reference economy. In this paper the analysis is extended to two periods 2006-2011 and 2012-2018 and economic activities are grouped into sectors. As in our previous paper cantons of the FBH are considered regions and the reference economy is FBH.

From the very beginning during 1940-ies, the shift-share analysis is used as a method for calculation of the components contributing to changes in economic variables, predominantly in changes of employment. For this purpose, the analysis is relevant in assessment and prediction of regional development and growth in employment. Some authors also criticize the analysis on various bases. Standard shift-share analysis relies on three components: (i) the national-growth component, which measures the growth that would have occurred in the event that all industries in the study region had experienced the same rate of growth as the reference area average; ; (ii) the industry-mix component, which measures the growth in the study region attributed to the growth rate of the regional mix of industries; (iii) the competitive or differential-shift component, which attributes regional growth to the dynamism or

attractiveness of the region and is measured residually (Brox, et al., 2010, p. 27). In the paper this component relates to cantonal level. Shift-share analysis is computed based on the following formulae:

$$\Delta e_i = e_i \left[\left(\frac{N_k}{N} \right) - 1 \right] + e_i \left[\left(\frac{N_{ki}}{N_i} \right) - \left(\frac{N_k}{N} \right) \right] + e_i \left[\left(\frac{e_{ki}}{e_i} \right) - \left(\frac{N_{ki}}{N_i} \right) \right]$$

where: Δe_i – employment change in cantons of sector i ;³ e_i – employment level in canton of sector i at the beginning of the period; e_{ki} – employment level in canton of sector i at the end of the period; N_k – total employment in FBiH at the end of the period; N – total employment in FBiH at the beginning of the period; N_{ki} – total employment in FBiH at the end of the period in sector i ; N_i – total employment in FBiH at the end of the period in sector i .

Some authors also use shift-share regression which is not based on deterministic decomposition such as standard shift-share analysis (Blien, et al., 2014). Those who tried both methods, comparing results from standard shift-share analysis and regression based one, observed that “... regression results are generally consistent with each other and with the findings from the traditional shift-share analysis...” (Brox, et al., 2010, p. 38). Based on this observation we decided to run standard shift-share analysis in this paper.

Shift-share analysis in this paper is carried out in two parts, in the first one all activities (from A to T) are grouped into five sectors, starting from primary and ending to quinary sectors as in the table below.

Table 1: Five sectors of the economy in FB&H

	Name of sector	Industry codes	Description
1	Primary	A, B	Agriculture, mining
2	Secondary	C, D, E, F	Industry with construction included
3	Tertiary	G, H, I, J	Services, including information and communications
4	Quandary	K, L, M, N	Financial sector and real estate, with science, technical and administration activities
5	Quinary	O, P, Q, R, S, T	Activities in domain of public finance

Source: (Gelo & Družić, 2015, pp. 337-338), slightly modified.

In the second part two sectors are defined consisting of traded and non-traded industries. Traded and non-traded sectors are formed based on “Benchmark” approach introduced by IMF (Mano & Castillo, 2015). If export to gross value added of an industry in FBH in year 2018 is higher than 10% then the industry is considered traded one. Following that calculation traded sector in FBH consists of industries with codes: A, C and D, while all other industries (B, E to T) are considered non-traded

3 Sectors are primary to quinary, and tradable and non-tradable ones.

sector.⁴ Although our analysis encompasses 12 years period we have assumed industry tradability fixed through time based on calculation of the export to gross value added ratio only for one year, namely 2018.

4. Results

Results are divided into two groups, the first one related to sectoral shift-share analysis and the second one based on traded and non-traded sectors.

4.1. Shift-share analysis of five sectors

Results in the table 2 show that in period 2012-2018 employment level has been increased for 84.273 persons in FBH. This employment increase can be observed in all sectors, from primary to quinary one. In comparison to earlier period 2006-2011 the employment has increased even in primary sector. This employment increase in primary sector in FBH can be related to the growth of the economy of FBH. More precisely, employment in primary sector has increased due to negative industry mix component that shows a fall in competitiveness of that sector in relation to other sectors. Also, low level of competitiveness of industry in primary sector limits rapid growth of employment in that sector in the long term. This is clearly confirmed by the negative industry mix component in period 2006-2018.

In overall increase of employment in period 2012-2018 primary to quinary sectors participate with 3%, 33%, 39%, 14% and 11%, respectively. When compared with respective results of shift-share analysis in period 2006-2011 it can be stated that share of tertiary and quinary sectors is reduced from 52% to 39%, and from 29% to 11%. Employment increase in the tertiary sector in FBH is based on positive national- and on industry mix components. Employment increase in the quinary sector is based on positive national component but the reason for reduction of relative contribution of the quinary sector to the employment increase lies in negative industry mix component. Share of the secondary sector in employment increase in period 2012-2018 in comparison with period 2006-2011 has been significantly larger, from 8% to 33%, that of the primary sector from -2% to 3% and that of quinary sector from 12% to 14%.

Increase in relative share of the secondary sector in the employment increase in FBH is based on positive industry mix, component that was negative in earlier period and

4 For different approaches to traded and non-traded sectors see (Gelo & Družić, 2015). However, we consider tradability of an industry as not country-specific. If some industries are traded in a given country it does not mean those industries are traded in all countries, and vice versa.

on employment increase of positive national component. When it comes to relative share increase in the primary sector it can be observed that it is based on employment increase of positive national component which is reduced because of negative industry mix component. Relative contribution of the quardary sector to employment increase in period 2012-2018 in comparison to earlier period is supported by positive influence of both national- and industry mix components.

Zenica-Doboj canton contribution to the employment increase in primary sector of FBiH in period 2012-2018 amounts to 33% being the largest among other cantons. Central Bosnia Canton and Una-Sana Canton follow with 27% and 24%, respectively. Looking into components it is clear that in primary sectors of SBK and USK all three components of shift-share analysis are positive while in Ze-Do Canton primary sector employment increase is supported by positive national component and cantonal competitiveness and lowered by negative industry mix component. The most negative influence on the employment increase in the primary sector of FBiH is exerted by primary sector of Tuzla Canton (-28% in relation to the employment increase in that sector), which is caused by negative industry mix component and diminishing in cantonal competitiveness in primary sector of Tuzla Canton. However, this reduction is mitigated by positive influence of national component.

Largest increase in employment in FBH in period 2012-2018 compared to 2006-2011 is achieved in secondary sector industries. All cantons experienced increase of employment in that sector, and the most significant contribution is given by Central Bosnia Canton with 25% followed by Tuzla Canton and Zenica-Doboj Canton with 23% each. In Tuzla Canton and Central Bosnia Canton all three components of shift-share analysis experienced positive values while in Zenica-Doboj Canton negative value of cantonal component was observed which indicates to low level of cantonal competitiveness of that sector in Zenica Doboj Canton.

All cantons achieved employment increase in the tertiary sector, and the largest contribution to it was done by Sarajevo Canton with 29%, followed by Tuzla Canton and Herzegovina-Neretva Canton with 20% and 17%, respectively. In Tuzla Canton and Herzegovina-Neretva Canton employment increase is established on positive values of all three components in shift-share analysis while in Sarajevo Canton negative value in cantonal component is noticed.

Employment increase in quardary sector in period 2012-2018 related to the earlier period amounts to 74% and is dominantly held up by employment increase in this sector in KS with 65% participation in the increase. Additionally, largest contribution to employment increase in this sector is noticed in ZDK and TK with 12% and 11%, respectively. In KS and ZDK all three components of shift-share analysis are positive while in TK cantonal component has negative value. This increase in employment

of quinary sector in FBiH in period 2012-2018 is lowered by employment fall in quinary sector in HNK (by -7% in comparison to overall increase in employment of quinary sector) which is, in return, induced by low cantonal competitiveness and industry mix component. In period 2006-2011 in HNK cantonal component was negative together with positive increase in employment in quinary sector. In period 2012-2018 the fall in cantonal competitive advantages in quinary sector neutralized all positive effects of national- and industry mix components in employment, meaning that there has been significant reduction of cantonal competitiveness in this sector of HNK in the long term.

Quinary sector in FBH in period 2012-2018 experienced employment increase of 9.210 persons with the highest contribution in this increase accomplished by Sarajevo Canton, Zenica-Doboj Canton, Tuzla Canton and Herzegovina-Neretva Canton with 27%, 19%, 19% and 18, respectively. Interestingly, industry mix component in all cantons was negative which indicates to the low level of competitiveness of this sector in relation to the average competitiveness of other sectors in FBiH. West-Herzegovina Canton is the canton with decrease in employment level in quinary sector (-2% in comparison to the quinary sector employment increase in FBiH in period 2012-2018). With regard to the facts that West Herzegovina Canton achieved the highest increase of employment in quinary sector in period 2006-2011, and that in period 2012-2018 all sectors in West Herzegovina Canton, except the quinary one, witnessed increase in employment it is fair to say that competitiveness of the quinary sector, related to all others, has been reduced.

Table 2: Shift-share analysis of five sectors in FB&H and cantons

Area	Sectors	2006-2011, shift-share				2012-2018, shift-share			
		total change	national growth component	industry mix component	competitive component	total change	national growth component	industry mix component	competitive component
FBiH	primary	-1.155	3.380	-4.535	0	2.261	4.254	-1.994	0
	secondary	4.522	16.916	-12.393	0	27.930	23.428	4.502	0
	tertiary	28.291	14.553	13.739	0	33.226	25.243	7.982	0
	quaternary	6.684	3.322	3.362	0	11.646	6.042	5.605	0
	quinary	15.904	16.076	-172	0	9.210	25.305	-16.095	0
USK	primary	83	167	-211	127	546	231	250	65
	secondary	-1.630	1.426	-1.058	-1.998	2.184	1.532	201	451
	tertiary	2.423	1.113	1.164	146	2.362	1.924	843	-405
	quaternary	-134	270	9	-413	619	343	297	-20
	quinary	683	1.492	-12	-797	292	2.190	-1.512	-386
PK	primary	-59	33	-42	-50	13	33	36	-56
	secondary	-167	240	-177	-230	383	307	80	-4
	tertiary	-460	338	392	-1.190	214	379	137	-302
	quaternary	-94	36	72	-202	72	35	27	10
	quinary	81	258	-9	-168	77	373	-277	-19
TK	primary	-322	1.362	-1.871	187	-624	1.719	-1.908	-435
	secondary	3.177	3.325	-2.419	2.271	6.522	5.006	1.193	323
	tertiary	5.950	2.276	1.927	1.747	6.787	4.172	997	1.618
	quaternary	1.201	393	216	592	1.270	791	685	-206
	quinary	1.647	2.863	-56	-1.160	1.739	4.166	-2.652	224
ZDK	primary	-478	960	-1.303	-135	737	1.200	-1.019	556
	secondary	979	3.995	-2.907	-109	6.483	5.324	1.647	-488
	tertiary	2.533	2.005	1.692	-1.164	3.586	3.175	966	-555
	quaternary	203	380	365	-542	1.442	547	424	471
	quinary	1.031	2.214	-18	-1.165	1.791	3.229	-2.153	715
BPK	primary	23	13	-16	26	55	22	30	3
	secondary	886	233	-173	826	721	590	286	-155
	tertiary	225	114	117	-6	265	201	67	-3
	quaternary	21	19	35	-33	84	29	23	33
	quinary	194	223	-12	-17	130	344	-282	68
SBK	primary	-388	378	-494	-272	608	438	57	113
	secondary	-107	1.882	-1.392	-597	7.024	2.533	892	3.599
	tertiary	907	1.517	1.677	-2.287	2.614	2.216	875	-477
	quaternary	11	127	178	-294	901	172	134	596
	quinary	1.766	1.373	-69	462	1.091	2.240	-1.382	233
HNK	primary	-74	124	-158	-40	238	146	123	-31
	secondary	-1.106	1.715	-1.242	-1.579	1.940	2.214	-67	-207
	tertiary	856	1.767	1.717	-2.628	5.695	2.647	900	2.148
	quaternary	805	466	694	-355	-827	881	1.252	-2.961
	quinary	1.887	1.919	118	-150	1.642	3.031	-1.192	-197
ZHK	primary	-159	64	-83	-140	330	55	-4	279
	secondary	366	513	-382	235	848	831	187	-170
	tertiary	373	904	1.156	-1.687	1.437	1.284	408	-255
	quaternary	-182	142	42	-366	417	168	160	89
	quinary	1.285	460	34	791	-172	894	-266	-800
KS	primary	190	143	-182	229	10	225	263	-478
	secondary	2.857	3.152	-2.326	2.031	1.751	4.666	79	-2.994
	tertiary	15.602	4.128	3.494	7.980	9.791	8.733	2.595	-1.537
	quaternary	5.008	1.431	1.700	1.877	7.573	3.021	2.561	1.991
	quinary	7.097	4.805	-139	2.431	2.458	8.139	-5.837	156
K10	primary	29	137	-175	67	348	186	178	-16
	secondary	-733	436	-319	-850	74	425	4	-355
	tertiary	-118	390	403	-911	475	513	195	-233
	quaternary	-155	58	50	-263	95	56	41	-2
	quinary	233	470	-9	-228	162	698	-541	5

Source: authors. *Legend:* FB&H-Federation of Bosnia and Herzegovina; USK – Una-Sana canton; PK – Posavina canton; TK – Tuzla canton; ZDK – Zenica-Doboj canton; BPK – Bosnian-Podrinje canton; SBK – Central Bosnia canton; HNK – Herzegovina-Neretva-canton; ZHK – West-Herzegovina canton; KS – Sarajevo canton; K10 – Canton 10.

4.2. Shift-share analysis of traded and non-traded sectors in FB&H

Since BiH is a small and open economy that participates in the process of globalization through various economic integrations, it is quite reasonable to explore the effects of these integration processes on employment and its structure. Analysis of change in structure of employment in FBH and its ten cantons is presented in Table 3. The analysis is decomposed to two sectors: traded and non-traded with three shift-share components and two periods 2006-2011 and 2012-2018.

In the first period an increase in employment in FBH by 54.246 persons can be observed with only 3.275 new jobs, or 6%, in tradeable goods sector and the remaining 50.971 new jobs, or 94% in non-traded sector. In second period, employment in FBH increased for 84.273 persons out of which 28.215 persons, or 33%, have been employed in traded sector and the remaining 56.058 jobs, or 67%, in non-traded sector. These figures show a change in economy of FBiH and cantons, with 27 percentage points growth of employment in traded sector between these two periods. This change in employment structure is joined with higher economic integration of BiH and the world that was induced by the Stability and association agreement (SAA) between BiH and the EU, among other things. SAA envisions formation of a free-trade zone with the EU member country along with trade liberalization with the EFTA member countries. Furthermore, size of trade in CEFTA 2006 has been continually increasing.

Employment increase in tradable goods sector is linked to positive national- and industry mix components in FBiH, and employment increase in non-traded sector can be associated to positive national component. Negative values of industry mix component in non-traded sector imply that an increase in competitiveness in traded sector is followed by decrease in competitiveness in non-traded sector.

All cantons experienced higher employment growth in non-traded sectors in 2012-2018 in comparison with the earlier period. In traded sectors only KS and PBK have less employment growth compared to period 2006-2011. Contribution to the employment increase in 2012-2018 in traded sector is at the highest level in ZDK and SBK with 25% each, and in TK with 19%. Employment achieved in SBK in traded sector is induced by all three positive components of shift-share analysis, while ZDK and TK have negative value of cantonal component that causes reduction in the employment growth.

Considering non-tradable goods sector, the largest contribution to increase in employment in FBiH in period 2012-2018 is given by KS, TK and ZDK, with 36%, 18% and 13%, respectively. This employment increase in KS is associated with positive value of national component and lessened by negative values in industry mix and cantonal components in non-traded sector.

The employment increase in TK in non-traded sector is connected to positive national- and cantonal components and diminished by negative industry mix component for -35%. The employment increase in ZDK in non-traded sector is linked to positive values in national- and cantonal components and reduced by industry mix component for -36%. As expected, KS manifests highest contribution to increase in employment in non-traded sector in FBH since it is largest administrative and financial centre in BH.

Table 3: Shift-share analysis of traded and non-traded sectors of the economy of canton

Area	Sectors	2006-2011, shift-share				2012-2018, shift-share			
		total change	national growth component	industry mix component	competitive component	total change	nacional growth component	industry mix component	competitive component
FBiH	traded	3.275	13.712	-10.436	0	28.215	18.946	9.269	0
	non-traded	50.971	40.534	10.437	0	56.058	65.327	-9.269	0
USK	traded	-1.541	1.167	-926	-1.782	2.751	1.206	739	806
	non-traded	2.966	3.300	819	-1.153	3.253	5.013	-660	-1.100
PK	traded	19	185	-146	-20	455	273	151	31
	non-traded	-718	720	382	-1.820	303	854	-149	-402
TK	traded	1.855	2.838	-2.098	1.115	5.348	4.112	1.970	-734
	non-traded	9.798	7.379	-104	2.523	10.346	11.741	-3.654	2.259
ZDK	traded	1.545	3.384	-2.552	713	6.929	4.649	2.415	-135
	non-traded	2.723	6.169	382	-3.828	7.110	8.825	-2.549	834
BPK	traded	965	199	-151	917	795	561	341	-106
	non-traded	384	401	104	-121	460	627	-219	52
SBK	traded	-428	1.823	-1.450	-801	7.060	2.395	1.410	3.255
	non-traded	2.617	3.455	1.350	-2.188	5.178	5.205	-835	809
HNK	traded	-996	1.318	-975	-1.339	1.876	1.676	403	-203
	non-traded	3.364	4.673	2.104	-3.413	6.812	7.243	614	-1.045
ZHK	traded	230	394	-312	148	949	626	325	-2
	non-traded	1.453	1.688	1.080	-1.315	1.911	2.605	161	-854
KS	traded	2.126	1.984	-1.464	1.606	1.517	3.009	1.225	-2.717
	non-traded	28.628	11.676	4.010	12.942	20.066	21.775	-1.564	-145
K10	traded	-500	418	-361	-557	535	438	291	-194
	non-traded	-244	1.072	311	-1.627	619	1.439	-413	-407

Source: authors.

4.3. Concluding remarks and recommendations

Results of shift-share analysis make a solid basis to decision-makers for policy creation processes aimed at enhancing the economic growth. One of policies that is closely related to the results is education policy. Analysis in this paper has shown that employment structure changes in the long term, both in FBiH and cantons. Those sectors with high cantonal competitive components and potential for creation of new jobs should be provided by labour market with educated persons whose qualifications closely match and comply to sectoral labour force requirements. In this way competitive advantages of those sectors will be more strengthened which is a prerequisite for sustainable economic growth.

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SHIFT-SHARE ANALIZA ZAPOSLENOSTI KANTONA U FEDERACIJI BOSNE I HERCEGOVINE

SAŽETAK

Struktura svake privrede, posebno onih u tranziciji, se stalno mijenja. Shift-share analiza ima široku primjenu u proučavanju regionalnih ekonomskih promjena. Primjenjeni model za analizu promjene strukture zaposlenosti, u ovom radu, sastoji se od tri komponente: (i) komponenta nacionalnog rasta (za potrebe ovog rada, entitet Federacija Bosne i Hercegovine se koristi kao referentni nivo), (ii) industrijska miks komponenta i (iii) komponenta kantonalne konkurentnosti. Svaka od navedenih komponenti se mjeri putem pokazatelja broja zaposlenih. Provedena analiza omogućava procjenu ekonomskih performansi posmatranih regiona (u ovom slučaju kantona), u odnosu na referentni nivo (Federacija Bosne i Hercegovine).

Cilj ovog rada je analiza ekonomskih promjena, mjenjenih putem pokazatelja apsolutne zaposlenosti, na regionalnom nivou. Autori prave komparaciju ekonomskih promjena u dva posmatrana perioda, 2006-2011 i 2012-2018. Promjene u zaposlenosti, u maloj i otvorenoj ekonomiji, kao što je Bosna i Hercegovina su očekivane. Dobijeni rezultati ukazuju na to da regionalne privrede prolaze kroz značajne transformacije kroz vrijeme. U radu se, također, date i određene preporuke za kreatore politika koje se odnose na oblast obrazovanja i tržišta rada.

Ključne riječi: *Shift-share analiza, regionalna ekonomija, rast zaposlenosti*

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