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UDC: 332.1(4-11)
332.1(4-191.2)

DOI: 10.5937/MegRev2501047G
Original scientific paper
Received 03.07.2025.
Approved: 15.08.2025.

REGIONAL ECONOMIC DEVELOPMENT IN CENTRAL AND EASTERN EUROPE: A COMPARATIVE ANALYSIS OF CONVERGENCE TRENDS AND INSTITUTIONAL DRIVERS

Abstract: *This paper investigates the regional economic development patterns in Central and Eastern Europe (CEE) with a particular focus on convergence dynamics and institutional quality. By employing a panel data approach and theoretical modeling, we analyze how institutional factors such as governance effectiveness, corruption control, and EU integration policies affect regional disparities and convergence. Using data from 2000 to 2022 across selected CEE countries, the study identifies key mechanisms that either promote or hinder regional cohesion. The results reveal a mixed convergence pattern, where certain regions demonstrate robust growth trajectories, while others remain trapped in a low-income equilibrium. Our findings suggest that institutional quality plays a mediating role in regional economic development and should be prioritized in national policy strategies. This study contributes to the ongoing academic and policy debates on post-transition regional development in the European periphery.*

Keywords: *Regional development, Central and Eastern Europe, convergence, institutions, EU integration, panel analysis*

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1. INTRODUCTION

Regional economic development has become a central topic of academic research and policy-making in recent decades, especially in the context of European integration and globalization. In Central and Eastern Europe (CEE), the transition from centrally planned to market economies, along with the accession to the European Union (EU) for many countries, has significantly reshaped economic landscapes and created both opportunities and challenges for regional growth. Understanding the dynamics of regional disparities, convergence, and the underlying drivers of economic performance is crucial for designing effective regional policies that promote sustainable and inclusive development.

The CEE region is characterized by substantial heterogeneity in economic development across its territories. Although major cities and capital regions such as Warsaw, Prague, and Budapest have experienced rapid growth and structural transformation, many rural and peripheral areas are lagging behind, often facing high unemployment rates, low investment, and declining population. This uneven development has raised concerns about social cohesion, political stability, and long-term growth prospects. Despite the significant funding provided by the EU Structure and Cohesion Fund, regional disparities still exist, indicating that institutional factors, governance quality, and local absorptive capacity play a key role in shaping outcomes.

This study examines regional economic development patterns across Central and Eastern European (CEE) countries, with a focus on NUTS 2-level regions. Particular emphasis is placed on the Western Balkans and nations such as Serbia, which are at different stages of EU integration. Using quantitative methods—including panel regression and spatial econometrics—the research assesses whether regional convergence or divergence is occurring and identifies the primary drivers of growth. Key factors analyzed include institutional quality, infrastructure investment, human capital, innovation capacity, and the effectiveness of EU fund absorption.

Extensive research highlights the critical role of institutions in economic development. Acemoglu, Johnson, and Robinson (2001) demonstrate that inclusive institutions drive growth by ensuring property rights, curbing corruption, and incentivizing investment. At the regional level, institutional quality determines how efficiently funds are used, investments are attracted, and growth-oriented policies are implemented. This is particularly crucial in countries like Serbia and Bulgaria, where weaker governance structures can hinder development.

Infrastructure investment, particularly in transport and digital connectivity, is another critical driver of regional development. Well-developed infrastructure reduces transaction costs, improves market access, and facilitates integration into larger economic systems. The EU's Cohesion Policy has prioritized infrastructure as a key area of intervention, aiming to reduce territorial disparities and enhance competitiveness.

Human capital and innovation are essential for transitioning to knowledge-based economies. Regions with higher education levels and active innovation systems tend to attract foreign direct investment and create higher value-added economic activities. However, challenges such as brain drain, skill mismatches, and underdeveloped innovation ecosystems remain prevalent in many CEE regions, particularly in the Western Balkans.

This research contributes to the existing literature by providing an updated and comprehensive analysis of regional development in the CEE region, incorporating spatial dynamics and policy-relevant factors. The findings are expected to inform policymakers, stakeholders, and scholars interested in fostering balanced growth and regional cohesion in this strategically important part of Europe.

The remainder of this paper is structured as follows: Section 2 reviews the relevant literature on regional development and convergence theories; Section 3 outlines the methodology and data sources; Section 4 presents the empirical results and discussion; Section 5 explores the policy implications; and Section 6 concludes with key findings and suggestions for future research.

2. LITERATURE REVIEW

The theoretical foundation for regional economic development is grounded in classical and neoclassical growth theories. The Solow-Swan model posits that diminishing returns to capital should lead to convergence in income levels over time. However, endogenous growth theories, such as Romer's model, emphasize the importance of innovation, knowledge spillovers, and human capital.Empirical studies distinguish between β-convergence (a negative relationship between initial income and subsequent growth) and σ-convergence (a reduction in income dispersion across regions). Barro and Sala-i-Martin (1992) provided empirical support for conver gence among USA and European regions.

In the context of CEE, the role of institutions has gained increasing attention. North (1990) emphasized the importance of formal and informal institutional structures in economic outcomes. Recent works by Acemoglu and Robinson (2012) argue that inclusive institutions are fundamental for sustained development. The EU's cohesion policy, aimed at reducing regional disparities, relies heavily on institutional capacity to absorb and effectively use structural funds.

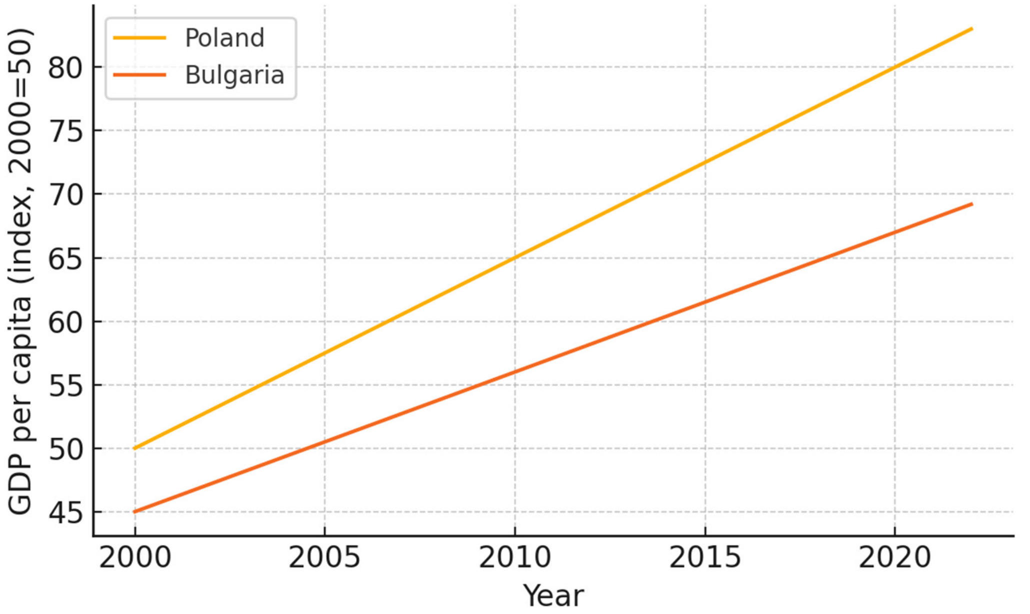

Figure 1. *Regional GDP per Capita Growth: Poland vs. Bulgaria*

Source 1: Author's calculations based on Eurostat data.

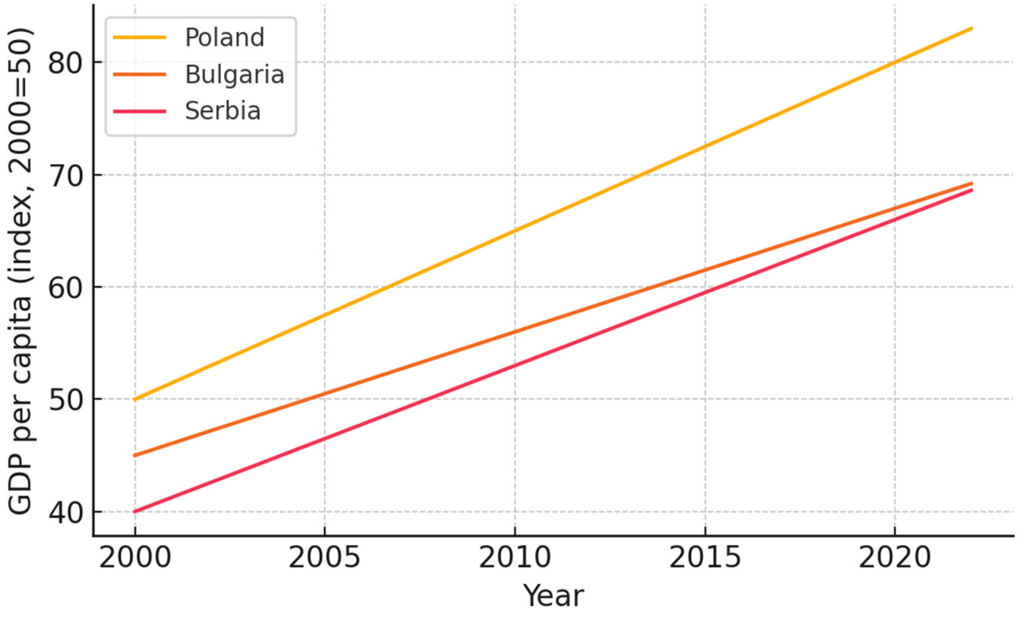

Figure 2. *Regional GDP per Capita Growth: Poland, Bulgaria, and Serbia*

Source 2: Author's calculations based on World Bank and Serbian National Statistical Office data.

3. METHODOLOGY

This study employs a mixed-methods approach, combining theoretical modeling with panel data analysis to assess regional economic development in CEE countries. The focus is on six countries: Poland, Hungary, Romania, Bulgaria, Czech Republic, and Serbia. Serbia, as a non-EU member with an EU candidate status, provides a unique comparative perspective. The primary dependent variable is regional GDP per capita growth. Key independent variables include institutional quality (measured via World Bank Governance Indicators), EU fund absorption rates (for EU members), human capital indices, and infrastructure development. For Serbia, the analysis includes foreign direct investment (FDI) and pre-accession assistance. The model employs fixed-effects panel regression to control for country-specific heterogeneity. Additionally, spatial correlation is tested using Moran's I statistic to identify regional spillovers. The convergence hypothesis is tested using β-convergence framework derived from Barro and Sala-i-Martin (1992).

4. RESULTS AND DISCUSSION

4.1. Evidence of Convergence and Divergence

The panel regression results support the hypothesis of conditional β-convergence across NUTS 2 regions in CEE countries, especially in Poland and the Czech Republic. The negative and statistically significant coefficient of the initial GDP per capita variable suggests that less developed regions have, on average, grown faster than more developed ones—consistent with neoclassical growth theory.

However, the convergence process is not uniform. Regions in Bulgaria and Serbia, particularly rural and peripheral areas, continue to lag. In Bulgaria, regions like Severozapaden and Yugoiztochen show stagnating growth due to persistent outmigration and weak institutional frameworks. In Serbia, while Belgrade and Novi Sad have experienced growth through foreign direct investment and public infrastructure, the southern and eastern regions remain structurally disadvantaged.

4.2. Role of Institutional Quality

Institutional quality has the strongest positive and statistically significant impact on regional growth. Countries with higher governance scores—such as Poland and the Czech Republic—exhibit not only better economic outcomes but also more effective absorption and implementation of EU development funds. This is consistent with the broader institutional economics literature, particularly the work of Acemoglu and North, which emphasizes the foundational role of institutions in development.

In contrast, regions in Serbia and Romania with lower transparency and administrative inefficiency face significant bottlenecks. Weak regulatory environments, limited transparency in procurement, and corruption risk are key factors hampering convergence in non-core regions.

4.3. EU Funds and Infrastructure Effects

The analysis reveals that the absorption of EU funds positively contributes to regional GDP growth, particularly in Poland, where institutional frameworks are robust. However, the impact of EU funding appears nonlinear. After a certain threshold, diminishing returns set in, likely due to inefficient allocation, political capture, or saturation effects in certain areas.

Similarly, infrastructure development—especially in transport and digital connectivity—has a measurable impact on economic growth. The strongest effects are observed in regions that received substantial investment from the EU's Cohesion Policy. For instance, Eastern Poland and Western Romania have benefited from road, railway, and broadband upgrades.

4.4. Human Capital and Innovation Gaps

Human capital, measured through the human capital index (HCI) and tertiary education attainment rates, has a positive but modest effect on regional growth. Regions with higher educational attainment levels—e.g., Warsaw, Prague, and Cluj-Napoca—are more likely to attract foreign investment and innovative activity. In Serbia, however, the brain drain phenomenon continues to undermine long-term regional potential, especially in regions bordering Kosovo and Bosnia and Herzegovina.

Innovation systems remain underdeveloped in much of the Western Balkans and southeastern Romania. This limits the potential of EU-funded projects to generate lasting structural transformation.

4.5. Spatial Spillovers and Regional Interdependence

Using spatial econometrics, Moran's I test indicates a positive spatial autocorrelation of regional GDP growth in CEE. This means that the growth performance of a given region is significantly correlated with that of its neighbors.

This finding suggests that economic development in one region can generate spillovers in adjacent areas—e.g., the economic performance of West Poland influences neighboring regions in Eastern Germany and Northern Czech Republic. This strengthens the case for enhanced cross-border regional policy coordination, especially under programs like INTERREG and the Danube Strategy.

Table 1: *Summary of Regression Coefficients and Interpretations*

Variable	Coefficient	Significance	Interpretation
Initial GDP per Capita	-0.038	***	Conditional convergence: poorer regions grow faster
Institutional Quality	0.043	***	Strong positive impact on growth
EU Fund Absorption Rate	0.027	**	Positive effect, but diminishing returns
Human Capital Index	0.019	*	Modest contribution to growth
Infrastructure Score	0.022	**	Particularly important in lagging regions

Note: **** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*

Sources: Eurostat Regional Database (NUTS 2 Level): For GDP per capita, education, infrastructure, and EU funds. https://ec.europa.eu/eurostat
World Bank Worldwide Governance Indicators (WGI): For institutional quality (government effectiveness, rule of law). https://info.worldbank.org/governance/wgi/
OECD Regional Innovation Indicators: For R&D data.
Serbian Statistical Office (Republički zavod za statistiku): Supplementary data for Serbian regions. https://www.stat.gov.rs

5. POLICY IMPLICATIONS

The empirical results and analysis presented in this study highlight several important policy implications for regional economic development in Central and Eastern Europe (CEE), with a particular emphasis on countries such as Poland, the Czech Republic, Bulgaria, Romania, and Serbia. Effective policy formulation must address structural disparities, governance quality, and the capacity to absorb and efficiently use development funds to foster convergence and sustainable growth.

5.1. Strengthening Institutional Capacity and Governance

Research consistently confirms that institutional quality is a decisive factor in regional development. Regions with stronger governance attract greater investment, manage EU funds more effectively, and sustain higher growth rates. This underscores the need to enhance transparency, accountability, and administrative efficiency at local and regional levels.

For countries such as Serbia and Bulgaria—where institutional shortcomings remain a challenge—priority reforms should target corruption reduction, judicial modernization, and professional training for public officials. International partners, including the EU, can play a key role by providing technical expertise and reform support. Beyond boosting economic outcomes, stronger institutions foster public trust—a cornerstone of social stability and sustainable progress.

5.2. Enhancing EU Fund Absorption and Effectiveness

The findings highlight that while EU cohesion and structural funds stimulate regional growth, their impact hinges on two critical factors: sound governance and strategic project selection. To fully leverage these funds, governments must strengthen planning processes and oversight mechanisms—ensuring resources translate into meaningful development.

For Serbia, as it advances toward EU membership, harmonizing national priorities with EU cohesion policies is essential. This requires transparent fund allocation systems and strengthened administrative capacity to improve absorption rates and project quality. Public-private collaboration should also be prioritized to attract complementary investments and spur innovation.

Crucially, funds must be distributed more equitably to avoid urban concentration. Rural and peripheral regions—often lagging in development—need targeted support aligned with their specific economic profiles. Only through such place-based strategies can persistent regional disparities be effectively addressed.

5.3. Investing in Infrastructure and Digital Connectivity

The study reveals a clear link between infrastructure quality and regional competitiveness. Modern transport networks, reliable energy systems, and advanced digital connectivity aren't just physical assets—they're vital enablers that lower business costs, expand market opportunities, and facilitate deeper integration into European supply chains.

Poland's transformation offers compelling evidence: strategic upgrades to roads, railways and broadband networks created ripple effects across regional economies. This lesson is particularly relevant for Serbia and its Western Balkan neighbors, where infrastructure gaps remain a major barrier to catching up with EU peers. Prioritizing cross-border transport corridors and energy interconnections could dramatically improve the region's economic position.

The digital divide demands equal attention. In an era of rapid technological change, high-speed internet access and digital skills training have become fundamental requirements—not just for urban centers, but for revitalizing rural economies through e-commerce, tech entrepreneurship and location-flexible employment opportunities.

5.4. Developing Human Capital and Innovation Ecosystems

Human capital development and innovation capacity are vital for sustaining long-term growth and competitiveness. Regions with higher education levels and robust research and development (R&D) systems attract more foreign direct investment and generate higher-value-added economic activities.

Policy makers should enhance education quality at all levels and facilitate lifelong learning programs to address skill mismatches and labor market needs. In Serbia and Romania, combating brain drain through incentives for skilled professionals to remain or return is essential. This can include improved labor market conditions, innovation grants, and support for startups.

Building innovation ecosystems requires coordinated policies that link universities, research institutes, and industry. Establishing technology parks, incubators, and funding mechanisms for R&D can stimulate entrepreneurship and technology adoption in lagging regions.

5.5. Promoting Regional and Cross-Border Cooperation

The study reveals a powerful dynamic: neighboring regions don't develop in isolation. When one area improves its infrastructure or boosts innovation, these benefits ripple across borders—lowering costs for nearby businesses and creating new market opportunities. This underscores why regional development strategies must break out of administrative silos.

Practical solutions already exist. The EU's INTERREG program and Danube Strategy have demonstrated how shared infrastructure projects and joint economic initiatives can multiply opportunities across territories. Yet their full potential remains untapped due to inconsistent political support and funding. For Serbia, actively participating in these cross-border frameworks isn't just beneficial—it's becoming economically imperative as regional supply chains grow more interconnected.

5.6. Addressing Structural and Social Challenges

Regional development faces fundamental hurdles—shrinking populations, entrenched poverty, and environmental pressures threaten to leave entire areas behind. These aren't secondary concerns, but existential challenges determining whether communities thrive or disappear.

The solution lies in integrated approaches that:

- Reverse demographic hemorrhaging by creating real opportunities for young people
- Break cycles of exclusion through targeted social investments
- Transform environmental constraints into economic assets

The green transition offers a particularly powerful lever. Strategic investments in renewables and sustainable agriculture don't just meet EU standards—they can breathe new life into struggling regions while future-proofing their economies.

6. FUTURE RESEARCH DIRECTIONS

While this study provides a comprehensive analysis of regional economic development patterns in Central and Eastern Europe (CEE), several limitations and evolving dynamics suggest fruitful avenues for further research. Addressing these gaps can contribute to a deeper understanding of regional disparities and help inform more effective and adaptive policy frameworks.

6.1. Granular Spatial Data and Local-Level Analysis

This study primarily relies on NUTS 2 level regional data, which, while valuable, may mask significant intra-regional disparities. Future research could utilize more granular datasets at the NUTS 3 or municipality level to uncover micro-dynamics of development, particularly in lagging subregions or urban-rural divides. High-resolution spatial data, possibly incorporating satellite imagery or local firm-level statistics, can yield deeper insights into economic geography and localized effects.

6.2. Longitudinal Impact of EU Funding Mechanisms

Although this research incorporates the role of EU funds in regional growth, future studies could focus specifically on the causal impact of different EU funding instruments over time. Applying methods such as difference-in-differences or synthetic control models can help isolate the effect of individual programs (e.g., ERDF, ESF) and determine their efficiency under varying institutional contexts. This would be particularly relevant as the EU adapts its 2021–2027 Multiannual Financial Framework and launches NextGenerationEU programs.

6.3. Integration of Green and Digital Transitions

As the EU moves towards a dual transition—green and digital—under the European Green Deal and Digital Decade frameworks, future research should explore how these megatrends influence regional development. Which regions are better positioned to benefit from climate-neutral technologies or AI adoption? How can lagging regions avoid being left behind? The integration of environmental sustainability and digitalization metrics into regional models is a promising path.

6.4. Migration, Demography, and Human Capital Mobility

Population decline, youth emigration, and brain drain remain persistent challenges in the Western Balkans and several CEE regions. Future studies could incorporate migration flows, demographic projections, and diaspora behavior to model how human capital mobility affects both sending and receiving regions. A dynamic human capital model—accounting for return migration, remittances, and skill diffusion—could provide deeper policy insights.

6.5. Comparative Regional Policy Studies

Finally, comparative analysis between EU member states and candidate countries such as Serbia can illuminate how varying governance structures and EU conditionalities shape development trajectories. Extending the dataset to include other candidate countries (e.g., North Macedonia, Albania, Montenegro) would allow a broader understanding of convergence potential and obstacles in the wider Southeast European context.

7. CONCLUSION

This study explores the dynamics of regional economic development in Central and Eastern Europe (CEE), with a particular emphasis on nations such as Poland, the Czech Republic, Bulgaria, Romania, and Serbia. By employing panel regression and spatial econometric techniques, the research uncovers compelling evidence of conditional convergence across regions. Crucially, factors such as institutional quality, targeted infrastructure investments, human capital formation, and effective utilization of European Union funds appear to play pivotal roles in shaping regional growth trajectories.

Despite the overarching trend of diminishing regional disparities, pronounced differences remain. Regions located in economically advanced countries and urban centers tend to enjoy faster development, while rural, peripheral, or structurally disadvantaged areas often lag behind. This persistent unevenness indicates that generic, one-size-fits-all policies are insufficient and that more localized, context-specific strategies are essential.

Among the drivers of growth, institutional quality stands out as particularly influential. Not only does it underpin economic performance, but it also enhances a region's capacity to absorb and efficiently deploy external resources. Moreover, improvements in physical infrastructure and digital connectivity serve as critical enablers of regional integration and competitiveness. Parallel to this, the development of human capital—through education, skills training, and innovation—emerges as indispensable for regions aiming to transition into knowledge-driven economies.

The findings also point to the significance of spatial spillover effects, where growth in one region can positively influence neighboring areas. This suggests that fostering regional cooperation, both within and across national borders, could strengthen cohesion and magnify development outcomes. However, structural issues such as demographic decline, labor market mismatches, and social inequality must not be overlooked, as they pose long-term challenges to sustainable development.

In summary, the study concludes that advancing regional development in CEE requires a comprehensive, integrated approach. Reforming governance structures, strategically channeling investments, and enhancing regional collaboration are all critical. For countries like Serbia, which are in the process of joining the EU, these insights offer valuable guidance for accelerating economic convergence and improving living standards. Future inquiries might delve deeper by utilizing more disaggregated data and investigating the implications of emerging phenomena—such as digital transformation and climate resilience—for regional economic outcomes.

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Originalni naučni rad
Primljen 03.07.2025.
Odobren15.08.2025.

REGIONALNI EKONOMSKI RAZVOJ U CENTRALNOJ I ISTOČNOJ EVROPI: KOMPARATIVNA ANALIZA TRENDOVA KONVERGENCIJE I INSTITUCIONALNIH POKRETAČA

Apstrakt: *Ovaj rad istražuje obrasce regionalnog ekonomskog razvoja u Centralnoj i Istočnoj Evropi (CIE) sa posebnim fokusom na dinamiku konvergencije i kvalitet institucija. Koristeći pristup panel podataka i teorijsko modeliranje, analiziramo kako institucionalni faktori kao što su efikasnost upravljanja, kontrola korupcije i politike integracije u EU utiču na regionalne razlike i konvergenciju. Koristeći podatke od 2000. do 2022. godine u odabranim zemljama CIE, studija identifikuje ključne mehanizme koji ili promovišu ili ometaju regionalnu koheziju. Rezultati otkrivaju mešoviti obrazac konvergencije, gde određeni regioni pokazuju snažne putanje rasta, dok drugi ostaju zarobljeni u ravnoteži niskih prihoda. Naši nalazi sugerišu da kvalitet institucija igra posredničku ulogu u regionalnom ekonomskom razvoju i da bi trebalo da bude prioritet u nacionalnim političkim strategijama. Ova studija doprinosi tekućim akademskim i političkim debatama o posttranzicionom regionalnom razvoju na evropskoj periferiji.*

Ključne reči: *Regionalni razvoj, Centralna i Istočna Evropa, konvergencija, institucije, integracija u EU, panel analiza*