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ORIGINAL PAPER

Spatial convergence in the quality of public services: evidence from European regions

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Abstract

The study of institutional quality at the regional level within the European Union reveals significant differences in the quality of public services both between and within countries, along with considerable shifts over time. Using spatial panel data models, this paper examines spatial regional convergence in public service quality over the period 2010–2021. The results identify two distinct clusters of European regions: Northern-Western and Southern-Eastern. Convergence patterns in public service quality are observed within both clusters, emphasizing the dominant role of a region's own quality standards in driving convergence, which outweighs the impact of neighboring regions. However, significant differences emerge between the clusters regarding the influence of economic development. In the Northern-Western cluster, the economic development of neighboring regions influences convergence, while in the Southern-Eastern cluster, neither the region's nor its neighbors' economic development significantly enhances convergence.

Keywords Spatial convergence · Public service quality · European regions

JEL Classifcation R11 · H40 · C23

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1 Introduction

Income convergence has long been a central topic in regional economic studies; yet, fully understanding its dynamics requires the incorporation of spatial econometric approaches. Traditional methods often fail to account for spatial effects, such as spatial autocorrelation and heterogeneity, which are essential for capturing the interconnected nature of regional economies (Rey & Montouri 1999; Fischer & Stirböck 2005; Niebuhr 2000). Several studies provide evidence of income convergence, but the strength and nature of this process vary significantly across regions and time periods (Paas et al. 2007; Yildirim et al. 2009). By applying techniques such as spatial error models, geographically weighted regression, and other spatial econometric methods, researchers not only improve model fit but also uncover spatial patterns often overlooked in traditional analyses (Fischer & Stirböck 2005; Lee 2004; Lundberg 2006a). Beyond income, however, the concept of convergence extends to other relevant variables, such as education, health, and institutional quality, all of which are increasingly recognized as essential components of regional development and equity. Together, these findings underscore the complexity of convergence processes and the critical role of spatial econometric techniques in understanding regional economic and social dynamics.

Numerous studies have recently highlighted the lack of convergence in various aspects of institutional quality across the European Union, and the resulting implications for economic performance, social and territorial cohesion, the effectiveness of public policies, political stability, and resilience, among others (Beyaert et al. 2019; Glawe & Wagner 2021; Pérez-Moreno et al., 2020, 2023, etc.). However, the spatial dynamics and potential regional convergence in public service quality remain underexplored, despite their significance for institutional credibility, human capital development, economic efficiency, and social equity (Lafortune & Tessada 2021; Pérez-López & Prior 2021; European Commission 2024; etc.).[1]

In this context, a crucial question arises regarding the nature of convergence in public service quality: does it tend to converge toward an average level, or does it follow another specific pattern? This question relates to the broader "race-to-the-bottom" literature (see, for instance, Blöchliger & Pinero Campos 2011; Razin & Sadka 2011; Costa-Font et al., 2014; Chirinko & Wilson 2017), which examines how tax competition and public expenditures influence regional policy decisions. If public service quality perceptions systematically converge in a particular direction, this would reinforce our findings and contribute to a deeper understanding of how regional competition and institutional dynamics shape governance outcomes. Addressing this

[1] The literature has also posed that economic incentives and the spillover effects of public services play crucial roles in shaping migration patterns. This dynamic is explored in studies by Sala-i-Martin (1996a) and Lundberg (2006b). Sala-i-Martin focuses on European migration, emphasizing the role of public services and economic incentives in regional mobility, while Lundberg examines the spatial spillover effects of locally provided services and their impact on migration. These findings are consistent with broader research on migration and public services (Rappaport 2007; Rodríguez-Pose & Ketterer 2012), underscoring the complex interplay between migration, public service quality, and regional growth, and showing that these factors jointly influence patterns of economic and spatial development.

issue can help clarify whether regions align their service quality standards to remain competitive or whether independent factors drive convergence.

This paper advances the literature by presenting novel insights into the spatial convergence of public service quality across European regions. Focusing on the period 2010–2021, we identify distinct geographical patterns of convergence. In Northern and Western regions, economic development, particularly the influence of neighboring regions, plays a pivotal role in driving convergence. In contrast, economic development in Southern and Eastern regions—whether within the regions themselves or their surrounding areas—has a limited impact on reducing disparities in public service quality. Thus, our research offers a deeper understanding of how regional disparities in public service quality evolve and highlights the varying significance of economic factors in shaping these dynamics across Europe.

2 Data

This study utilizes the Quality of Public Services Index (QPSI), one of the three dimensions included in the European Quality of Government Index (EQI), developed by the Quality of Government Institute at the University of Gothenburg for the years 2010, 2013, 2017, and 2021 (Charron et al., 2014, 2015, 2019, 2022). The EQI is a comprehensive measure based on Rothstein and Teorell's (2008) definition of government quality, which conceptualizes institutional quality as multidimensional, encompassing aspects such as public service delivery quality, government impartiality, and corruption control. This analysis focuses exclusively on the QPSI dimension, which measures the extent to which average citizens perceive public services in their region of residence as accessible, fair, reliable, transparent, and accountable in meeting their needs and expectations.

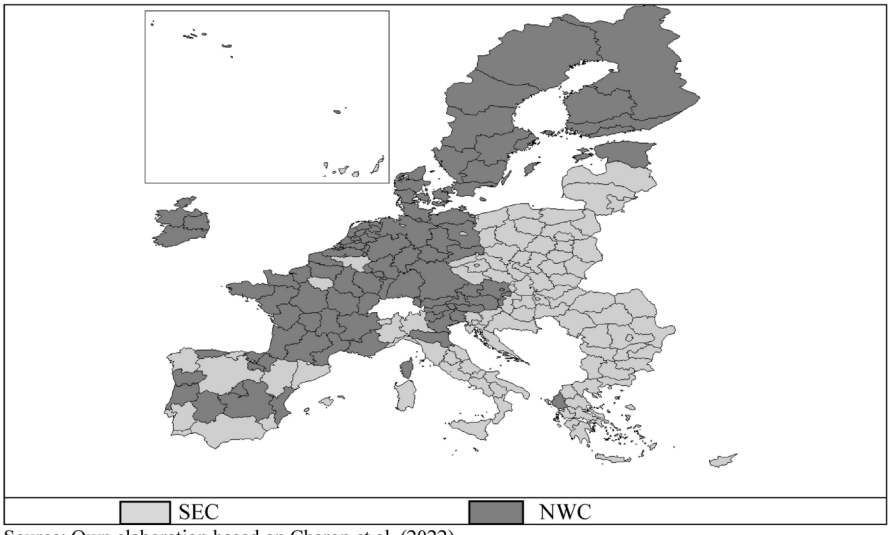
The perceptions underpinning the QPSI were gathered through surveys, which in 2021 captured the views and direct experiences of more than 129,000 respondents across the 27 EU member states (EU-27). Conducted at the NUTS1 or NUTS2 level, the surveys provide a detailed and comprehensive perspective on the quality of regional public services. While the services assessed vary in terms of the administrative level responsible for their delivery across countries, this study focuses on residents' perceptions of service quality rather than the specific institutional or governmental body accountable for providing them.

It is important to emphasize that the QPSI is based on citizens' subjective assessments of public service quality, rather than objective indicators. However, this does not constitute a limitation; rather, it highlights a crucial aspect of governance. Perceptions of public service quality are directly linked to trust in government institutions and political leadership, which can influence broader democratic legitimacy. Additionally, perceptions of service quality may affect individuals' willingness to comply with tax obligations, given that many residents contribute financially without necessarily utilizing public services extensively. In this sense, subjective evaluations of service quality may even hold greater significance than objective measures, as they shape citizens' attitudes toward governance, institutional trust, and democratic stability.

It is also worth noting that the QPSI reflects residents' perceptions of the quality of public services within their own region, rather than in relation to other regions. For instance, an individual in region *i* who rates the quality of public services as a ten is expressing satisfaction with the services in their region, without offering direct insight into how they might evaluate services in neighboring regions. Moreover, preferences for public service quality can vary across regions, as individuals may choose to reside in specific areas based on these preferences. While this limitation is acknowledged, this study focuses on analyzing the perceived quality of services as experienced by residents within their regional context. This approach provides a clear understanding of public service quality in each region, while recognizing that preferences and experiences can differ regionally.

We use regional data (NUTS2) from the 27 EU countries, excluding the overseas departments and regions of France (Guadeloupe, Martinique, Guyana, La Réunion, and Mayotte) as well as the Spanish cities in Northern Africa. Consequently, our analysis covers a total of 203 regions. For each region, we control for the level of economic development, measured by gross domestic product per capita (GDPpc) at current market prices. These data are sourced from Eurostat and expressed relative to the EU-27 average, set equal to 100, for each year, which reduces the influence of inflationary distortions.

The QPSI exhibits significant variation across the 203 NUTS2 regions analyzed within the EU-27. Overall, as shown in Fig. 1, the index reveals a clear geographical pattern, with regions in Northern and Western Europe generally scoring above the EU average, while many regions in Southern and Eastern Europe perform below this benchmark. The data indicate notable regional disparities within certain countries, such as Italy and Spain, where the standard deviation of regional scores is among the



Source: Own elaboration based on Charon et al. (2022).

Fig. 1 Regional clusters for public service quality, 2021.
Source: Own elaboration based on Charon et al. 2022)

highest in the EU. In contrast, regions in countries like Denmark and Austria show lower levels of dispersion, reflecting a higher degree of cohesion in public service quality. Over time, some regions have demonstrated improvements in QPSI scores, particularly in Eastern European countries, while others, such as several regions in Poland and Hungary, have experienced declines, linked to reduced perceptions of accessibility, reliability, and fairness in public services, as well as concerns about diminishing transparency and accountability in their delivery.

3 Empirical strategy and results

3.1 Methodology

First, to identify regional clusters and analyze the spatial dynamics of public service delivery quality, we consider several agglomerative hierarchical clustering methods (see Argüelles et al. 2014). Among these, we select Ward's method due to its suitability for clustering European regions. This method minimizes intra-cluster variance, ensuring homogeneity within clusters. It also works well with spatial weight matrices, preserving spatial relationships, and provides a hierarchical structure for multi-level analysis, making it ideal for spatial modeling in regions with geographic dependencies. Ward's method iteratively merges the two clusters that minimize the increase in total within-cluster variance. It starts with each data point as an individual cluster and progressively combines the most similar clusters until all data points form a single cluster. The resulting hierarchical structure is visualized in a dendrogram, facilitating the interpretation of spatial clustering patterns.

After applying Ward's method, we identify two regional clusters comprising 105 and 98 regions, respectively (Fig. 1). The largest cluster includes Eastern and Mediterranean European regions, which we refer to as the Southern-Eastern Cluster (SEC). Most Northern and Atlantic European regions belong to the other cluster, which we designate as the Northern-Western Cluster (NWC).

Although two Greek regions are geographically located in the southeastern part of Europe, they are grouped into the NWC because Ward's method prioritizes thematic homogeneity over geographic proximity. This method minimizes the internal variance of the analyzed variables, such as economic development or public service quality, allowing geographically distant regions to cluster together if they share similar characteristics. Since geographic distance is not a criterion in this approach, the clustering highlights functional or structural patterns based on socioeconomic indicators rather than the physical location of the regions. Moreover, the exploratory spatial data analysis using the Local Index of Spatial Autocorrelation for the four available years detects virtually no regions with atypical values. The few identified cases are not statistically significant, providing insufficient evidence to confirm them as real outliers.

Before conducting a convergence analysis, examining the standard deviation is essential, as it provides insights into the dispersion of public service quality across regions. A decreasing standard deviation over time suggests a reduction in disparities, indicating potential convergence, while a stable or increasing standard deviation

implies persistent or growing differences. The standard deviation analysis of public service quality across 2010, 2013, 2017, and 2021 reveals a clear pattern of sigma convergence in both clusters. The NWC consistently exhibits lower dispersion than the SEC, indicating greater homogeneity. However, dispersion declines more sharply in the SEC (19.5%) than in the NWC (15.6%), suggesting stronger convergence in the initially more heterogeneous SEC. This supports convergence theory, which predicts faster homogenization in areas with greater initial disparities when effective policies or structural adjustments are in place. Overall, both clusters are moving toward more uniform service quality, albeit at different rates.

To examine regional convergence, we use a spatial perspective for estimating two conditional convergence models (Sala-i-Martin 1996b), one for each cluster, following the selection framework provided by Elhorst (2014). The starting point is a spatial Durbin model (SDM), which arises as a special case of the general nesting spatial model (GNS) when $\lambda=0$ (and thus $u_{it} = \varepsilon_{it}$). The GNS model can be denoted as follows:

$$\begin{gathered} g_{it} = \alpha_t + \mu_i + \delta W g_{it} + \beta_1 I_{it-T} + \beta_2 GDPpc_{it-T} + \theta_1 W I_{it-T} + \theta_2 WGDPpc_{it-T} + u_{it} \\ u_{it} = \lambda W u_{it} + \varepsilon_{it}, \end{gathered} \tag{1}$$

where g_{it} represents changes in the QPSI for region i at time t measured through the annualized growth, $\left(\frac{I_{it}-I_{it-T}}{T}\right)$;

I_{it-T} and $GDPpc_{it-T}$ are the initial value of the QPSI and the GDPpc relative to the EU-27 average (set to 100 each year), respectively, for region i;

W is a spatial weights matrix;

WI_{it-T} and $WGDPpc_{it-\mathrm{T}}$ are the interaction effects among the initial I_{it-T} and GDPpc relative to the EU-27 average, respectively, of the neighboring regional units;

Wg_{it} is the spatial autoregressive component of annualized growth in the g_{it};

α_t and μ_i are the vectors of fixed effects for time and spatial units, respectively;

δ represents the spatial autoregressive coefficient to be estimated, while β_1, β_2, θ_1 and θ_2 are additional parameters that also need to be estimated,

u_{it} represents the error term,

λ and Wu_{it} are, respectively, the spatial autocorrelation coefficient and the interaction effects among the disturbance terms of the neighboring regional units, and,

ε_{it} is the vector of the disturbance terms.

The first step in Elhorst's approach to model selection is to choose the most appropriate spatial weight matrix from a variety of matrices based on the geographical distance between the k-nearest neighbors, comparing the model performance for each individual matrix. Equation (1) is simplified as SDM and estimated for matrices ranging from two to nine nearest neighbors. The weighting matrix that optimizes the results is the five-nearest neighbors for the SEC (105 regions) and nine-nearest neighbors for the NWC. We then calculate Moran's I indicator to assess the existence of neighboring relationships (see Table 1) and confirm that regions with high QPSIs are adjacent to others that also have high-quality public services.

Table 1 Moran's index test for QPSI by cluster, 2010–2021

	2010		2013		2017		2021	
	Index	z-value	Index	z-value	Index	z-value	Index	z-value
SEC	0.4964	7.1193	0.5544	7.9350	0.6448	9.2059	0.6001	8.5778
NWC	0.4075	8.0131	0.5147	10.0703	0.3840	7.5631	0.5012	9.8098

When the z-value is greater than − 1.96 and lower than 1.96, Moran's index suggests there is a high likelihood that the spatial distribution of QPSI is the result of a random process. Otherwise, the hypothesis of no spatial correlation is rejected at a 5% probability level

Table 2 Significance of spatial and time fixed effects for QPSI by cluster

	Significance of spatial fixed effects			Significance of time-period fixed effects		
	LR test	D. of F	p-value	LR test	D. of F	p-value
SEC	327.0395	105	0.0000	2.2697	3	0.5184
NWC	335.1782	98	0.0000	17.8192	3	0.0005

Table 3 Significance of SDM against SAR and SEM for quality by cluster

	SDM against SAR			SDM against SEM		
	LR test	D. of F	p-value	LR test	D. of F	p-value
SEC	22.0463	2	0.0000	2.6680	2	0.2634
NWC	24.6731	2	0.0000	8.1582	2	0.0169

3.2 Model selection and results

The selection of the fitted spatial panel data model requires exploring the significance of random or fixed effects and, within these, what kind of fixed effects: spatial, time-period, or both (also known as two-way fixed effects). For all clusters, the Hausman test statistic implies the rejection of the random effects model in favor of the fixed effects model. Regarding the Southeastern cluster, the spatial fixed effects model shows good performance compared with the other models based on the Likelihood Ratio (LR) test of joint significance (see Table 2). That is, the (null) hypothesis that the spatial fixed effects are jointly not significant must be rejected, while the hypothesis that the time-period effects are not significant must be accepted. In contrast, for the Northwestern cluster, a two-way fixed effects model is selected based on the LR tests.

To select the model that best fits the evolution of the regional QPSI, we use Eq. (1). The log-likelihood ratio test of SDM against the spatial autoregressive model (SAR) or the spatial error model (SEM) supports the decision to use an SDM with spatial and fixed effects for the NWC. Meanwhile, the SEM with spatial fixed effects provides the best fit for the SEC (Table 3 presents the test statistics and their corresponding p-values by cluster). Both models to be estimated are special cases of Eq. (1), with the SDM arising when $\lambda = 0$ and the SEM occurring when $\rho = 0$ and $\theta = 0$.

Results for both models (Table 4) show a remarkable goodness of fit (over 0.64). The results reveal convergence processes in the quality of public services across regions in both clusters, that is, regions with a lower quality of public service delivery are associated with greater increases in quality levels and vice versa. Moreover,

Table 4 Regional conditional convergence models by cluster

	SEC	NWC
Initial QPSI	− 0.319*** [− 19.748]	− 0.344*** [− 20.772]
GDPpc	0.001 [0.648]	− 0.000 [− 0.078]
W*Initial QPSI	–	0.148*** [3.791]
W*GDPpc	–	− 0.003** [− 2.295]
Neighbors' QPSI growth	–	0.355*** [4.166]
Spatial autocorrelation of errors	0.333*** [5.217]	–
R^2	0.7077	0.7636
Adjusted R^2	0.6480	0.6950
Log-likelihood ratio	403.97	470.81
Residuals variance	0.0061	0.0035
Observations	315	294

***Significant at 1% level; **5% level; *10% level

the level of economic development for both regional clusters, measured through GDP per capita, does not seem to be associated with the variations in the quality of public services.

Note that the results for the SEC show evidence of spatial correlation in the errors; that is, changes in the quality of public services in a region are influenced by errors in neighboring regions, which is logical when considering that, in the SEM, spatial autocorrelation is incorporated via the error term. This means that the estimated coefficient for the initial level of QPSI is interpreted as having a direct effect on the dependent variable, without explicitly capturing how a change in one region influences its neighbors. On the other hand, the significant spatial error coefficient indicates the presence of spatial dependency that is not fully explained by the included explanatory variables, suggesting that regions behave similarly because they share many unobserved characteristics.

However, while both clusters show signs of convergence, their trajectories differ in a critical way. In the SEC, the average quality indices are not only declining over time but also remain clearly lower than those of the NWC. This suggests that convergence in the SEC follows a "race to the bottom" dynamic, where disparities are reduced primarily through declining service quality rather than overall improvement. In contrast, the NWC exhibits a "race to the top" pattern, with convergence occurring alongside rising quality levels, reinforcing its position above the European average. These trends align with the estimated annual convergence rates, where the SEC shows a higher rate than the NWC. While these rates indicate overall homogenization, they also highlight a key distinction: convergence in the SEC may come at the cost of service quality deterioration, whereas in the NWC, it is accompanied by quality gains. These findings resonate with the broader literature on regional convergence, which emphasizes that the nature of convergence—whether upward or downward—depends on structural conditions and policy choices.

As regards the NWC, the estimated SDM incorporates spatially lagged independent variables (Initial QPSI and GDPpc) as well as neighbors' QPSI growth. This specification permits a clear distinction between direct effects (the immediate impact

Table 5 Direct and indirect effects on public service quality

SEC	Direct effect	Indirect effect	Total effect
Initial QPSI	− 0.319*** [− 19.748]	–	− 0.319*** [− 19.748]
GDPpc	0.001 [0.648]	–	0.001 [0.648]
NWC			
Initial QPSI	− 0.344*** [− 21.158]	0.036 [0.905]	− 0.308*** [− 7.140]
GDPpc	0.000 [− 0.369]	− 0.005** [− 2.300]	− 0.005** [− 2.334]

***Significant at 1% level; **5% level; *10% level

on the region being analyzed) and indirect effects (spillover effects from changes in neighboring regions). The statistical significance of the previously mentioned variables confirms that these spillover effects are relevant. Specifically, the higher the growth in the QPSI in the neighboring regions, the higher the growth in the specific region.[2] Likewise, the higher the initial level of QPSI in neighboring regions, the higher the growth in the specific region. Finally, the higher the level of economic development in the neighboring regions, the greater the growth in the degree of public service quality in the specific region.

To measure the impact of the explanatory variables, we take into account all the effects generated by the spatial lag effects and calculate both the direct effects (i.e., the impact of changes in the explanatory variables of a given region on the evolution of public service quality in that region) and indirect effects (i.e., the impact of changes in the explanatory variables of the neighboring regions on the evolution of public service quality in a given region). The total effect is the sum of the direct and indirect effects. For the SEC (Table 5), the initial level of public service quality exerts a significant and negative direct effect, thus confirming the convergence process. For the NWC, however, the initial level of service quality as well as the level of economic development exhibit a total significant and negative effect. For the initial level of public service quality, the total effect derives from the direct effect (initial level of the region), while the effect of economic development is due to the indirect effect (of the neighboring regions).

4 Conclusions

This paper examines spatial regional convergence in public service quality across European regions over the period 2010–2021. The study identifies two distinct clusters based on their public service quality standards: the NWC, characterized by significantly higher levels of service quality, and the SEC, which tends to exhibit average to lower levels. Our findings reveal a convergence pattern in service delivery

[2] Given the reasonable doubt about whether the differential behavior of the NWC is influenced by the broader set of European regions, we proceed to estimate the model for all regions. As a result, we observe that the model selected and the outcomes are very similar to those of the SEC (results available from the authors upon request). Therefore, the negative relationship between the quality of public services in a region and the GDP per capita of neighboring regions appears to be a specific characteristic of the NWC that is not evident across the entire set of European regions.

quality within both clusters. In both cases, the initial quality level plays a significant role in the convergence process, mainly through direct effects within the region itself, while the impact of neighboring regions (indirect effect) is non-significant. This highlights the crucial role of a region's inherent quality standards in driving convergence, diminishing the influence of surrounding areas in this context.

Nevertheless, the two clusters exhibit significant differences regarding the potential influence of economic development. While the level of economic development appears to affect the convergence process in the NWC, particularly through the influence of neighboring regions, neither the economic development of the region itself nor that of its neighboring regions plays a significant role in the convergence process in the SEC. This suggests that, due to the limited impact of economic development on service quality convergence in Southern-Eastern European regions, policy strategies focused on directly improving public service quality should be prioritized. Specifically, areas such as healthcare, education, public safety, infrastructure, administrative services, and social services would benefit from targeted interventions. Improving the accessibility, reliability, fairness, transparency, and accountability of essential public services could be crucial in reducing regional disparities, enhancing institutional quality, and promoting more equitable economic and social outcomes in the long term.

In summary, our findings indicate that the convergence of public service quality is not a random process but follows a structured pattern influenced by regional characteristics. While both clusters exhibit sigma convergence, their trajectories differ significantly: the SEC, despite showing a stronger reduction in dispersion, experiences a decline in service quality, suggesting a "race to the bottom" dynamic, whereas the NWC follows a "race to the top" pattern, with convergence driven by rising quality levels. These results highlight that convergence does not necessarily lead to overall improvement but depends on initial disparities, structural conditions, and policy choices. Moreover, we observe strong intra-regional convergence effects, but no universal tendency toward a common service quality level, reinforcing the relevance of the “race to the bottom” literature. This raises important questions about whether regions adjust their service quality in response to competitive pressures or if convergence is primarily driven by internal regional dynamics. The role of economic development in shaping these patterns varies across clusters, emphasizing the need for tailored policy approaches. Future research should further explore how institutional frameworks, governance models, and policy interventions influence regional convergence, shedding light on the mechanisms driving public service quality alignment and their implications for reducing territorial disparities.

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Data availability No datasets were generated or analysed during the current study.

Declarations

Conflict of interest The authors declare no competing interests.

References

Argüelles, M., Benavides, C., Fernández, I.: A new approach to the identification of regional clusters: hierarchical clustering on principal components. Appl. Econ. **46**(21), 2511–2519 (2014)

Beyaert, A., García-Solanes, J., Lopez-Gomez, L.: Do institutions of the euro area converge? Econ. Syst. **43**(3–4), 100720 (2019)

Blöchliger, H., & Pinero Campos, J. M. (2011). Tax competition between sub-central governments. *OECD Economics Department Working Papers*, No. 872. OECD Publishing.

Charron, N., Dijkstra, L., Lapuente, V.: Regional governance matters: quality of government within European Union Member States. Reg. Stud. **48**(1), 68–90 (2014)

Charron, N., Dijkstra, L., Lapuente, V.: Mapping the regional divide in Europe: A measure for assessing quality of government in 206 European regions. Soc. Indic. Res. **122**(2), 315–346 (2015)

Charron, N., Lapuente, V., Annoni, P.: Measuring quality of government in EU regions across space and time. Pap. Reg. Sci. **98**(5), 1925–1953 (2019)

Charron, N., Lapuente, V., Bauhr, M., Annoni, P.: Change and continuity in quality of government: trends in subnational quality of government in EU member states. Investigaciones Regionales J Reg Res **53**, 5–23 (2022)

Chirinko, R. S., & Wilson, D. J. (2017). Tax competition among U.S. states: Racing to the bottom or riding on a seesaw? *Federal Reserve Bank of San Francisco Working Paper*, 2017–05.

Costa-Font, J., De-Albuquerque, F., Doucouliagos, H.: Do jurisdictions compete on taxes? A meta-regression analysis. Public Choice **161**(3–4), 451–470 (2014)

Elhorst, J.P.: Matlab software for spatial panels. Int. Reg. Sci. Rev. **37**(3), 389–405 (2014)

Commission, E.: Ninth report on economic, social and territorial cohesion. Publications Office of the European Union, Luxembourg (2024)

Fischer, M.M., Stirböck, C.: Regional income convergence in the enlarged Europe, 1995–2000: A spatial econometric perspective. Ann. Reg. Sci. **39**(4), 693–721 (2005)

Glawe, L., Wagner, H.: Convergence, divergence, or multiple steady states? New evidence on the institutional development within the European Union. J. Comp. Econ. **49**(3), 860–884 (2021)

Lafortune, J., Tessada, J.: The long-run effects of access to public health insurance: Evidence from the introduction of Medicare. Rev. Econ. Stud. **88**(2), 776–805 (2021)

Lee, L.F.: Asymptotic distributions of quasi-maximum likelihood estimators for spatial autoregressive models. Econometrica **72**(6), 1899–1925 (2004)

Lundberg, J.: Using spatial econometrics to analyze local growth in Sweden. Reg. Stud. **40**(3), 303–316 (2006a)

Lundberg, J.: Spatial interaction model of spillovers from locally provided public services. Reg. Stud. **40**(6), 631–644 (2006b)

Niebuhr, A.: Spatial interaction and regional unemployment in Europe. Ann. Reg. Sci. **34**(4), 503–529 (2000)

Paas, T., Tafenau, E., Scannell, N.J.: Income convergence within the enlarged EU: A panel data analysis. East. Eur. Econ. **45**(4), 69–95 (2007)
Pérez-López, G., Prior, D.: The influence of quality of service and quality of experience on economic and social impact: A regional analysis. Technol. Forecast. Soc. Chang. **169**, 120847 (2021)
Pérez-Moreno, S., Bárcena-Martín, E., Ritzen, J.: Institutional quality in the euro area countries: Any evidence of convergence? J. Contemp. Eur. Stud. **28**(3), 387–402 (2020)
Pérez-Moreno, S., Bárcena-Martín, E., Ritzen, J.: Institutional convergence and a lingering two-speed euro area: A response. J. Contemp. Eur. Stud. **23**(1), 106–110 (2023)
Rappaport, J.: Moving to nice weather. Reg. Sci. Urban Econ. **37**(3), 375–398 (2007)
Razin, A., & Sadka, E. (2011). Tax competition and migration: The race-to-the-bottom hypothesis revisited. *NBER Working Paper* No. 16670. National Bureau of Economic Research.
Rey, S.J., Montouri, B.D.: US regional income convergence: A spatial econometric perspective. Reg. Stud. **33**(2), 143–156 (1999)
Rodríguez-Pose, A., Ketterer, T.: Do local amenities affect the appeal of regions in Europe for migrants? J. Reg. Sci. **52**(4), 535–561 (2012)
Rothstein, B., Teorell, J.: What is quality of government? A theory of impartial government institutions. Governance **21**(2), 165–190 (2008)
Sala-i-Martin, X.: European migration: A comment. Reg. Sci. Urban Econ. **26**(3–4), 385–391 (1996a)
Sala-i-Martin, X.: The classical approach to convergence analysis. Econ. J. **106**, 1019–1036 (1996b)
Yildirim, J., Öcal, N., Gezek, S.: Income inequality and economic convergence in Turkey: A spatial effect analysis. Anadolu Univ. J. Soc. Sci. **9**(2), 91–105 (2009)