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FINANCIAL RESOURCES AS DETERMINANTS OF CROSS-BORDER COOPERATION INTENSITY IN INTERREG V-A PROGRAMS

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Abstract. This study examines the key components influencing the intensity of cross-border cooperation among 56 Interreg V-A programs implemented on the EU's internal borders during the 2014-2020 period. Employing a quantitative approach combining correlation analysis and linear regression modeling, the article assesses the relationship between financial resources and indicators of cooperation intensity. The findings confirm a positive association between the financial scale of the programs and cooperation intensity, with a more pronounced effect for the network dimension (number of partnerships) compared to the initiative dimension (number of projects). The novelty of this work lies in the quantitative evaluation of the relative contribution of financial resources to various aspects of cross-border interactions, expanding the understanding of the mechanisms stimulating cooperation at EU borders.

Keywords: cross-border cooperation; border regions; Interreg V-A; program funding; econometric analysis

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1. Introduction

Cross-border cooperation constitutes a crucial aspect of the European integration process, aiming to overcome the adverse effects of national borders and promote balanced, sustainable development of border territories between NUTS III regions (Androniceanu & Georgescu, 2023). Initiated by the European Union in 1990, Interreg programs serve as the primary instrument supporting joint projects and initiatives implemented on different sides of the borders between EU member states. These programs provide financial resources for a wide range of activities spanning economic development, environmental protection, transport, culture, and social integration (Stoffelen et al., 2017; Pamer, 2021; Ocskay, 2024).

Since 1990, six generations of Interreg programs have been implemented: Interreg I (1990-1993), Interreg II (1994-1999), Interreg III (2000-2006), Interreg IV (2007-2013), Interreg V (2014-2020), and Interreg VI (2021-2027). Starting from Interreg III, the program was divided into three separate components: for cross-border projects (Interreg A), for transnational projects (Interreg B), and for interregional cooperation (Interreg C).

Interreg VI introduced a new component - cooperation with the outermost regions (Interreg D). During the 2014-2020 programming period, Interreg V-A, aimed at supporting cross-border cooperation on the EU's internal borders, comprised 56 programs with a total budget exceeding €6.6 billion (European Commission, 2024). These programs played a vital role in strengthening ties between neighbouring regions, fostering the exchange of knowledge and best practices, and addressing common challenges border communities face. The programs allocated funding across 11 thematic priorities: research and technological development, information and communication technologies, small and medium enterprises (SMEs), a low-carbon economy, climate change, environment and resource efficiency, transport, employment, social inclusion and poverty, education and training, and effective public administration.

For the 2021-2027 period, 74 cross-border cooperation programs are envisaged, with a budget of €6.7 billion. These cross-border programs consist of 49 internal programs, 24 external (10 IPA and 14 NEXT), and the PEACE+ program (European Commission, 2024).

This study focuses on analyzing the intensity of cross-border cooperation within Interreg V-A programs, with a particular emphasis on the role of the financial scale of the programs. The article utilizes data from 56 Interreg V-A programs implemented on the EU's internal borders during the 2014-2020 period and employs a quantitative approach combining correlation analysis and linear regression modelling.

The research hypotheses are as follows:

H1: There is a positive relationship between the financial scale of Interreg programs and the intensity of cross-border cooperation.

H2: The effect of cross-border programming is stronger for the network dimension (number of partnerships) compared to the initiative dimension (number of projects).

2. Review of scientific literature and problem definition

The study of cross-border cooperation has a long history in European research on regionalism and integration. Giersch made a significant contribution to understanding the economic aspects of cross-border cooperation in his work "Economic Union between Nations and the Location of Industries" (1949), where he analyzed the impact of integration processes on the localization of economic activity in border zones.

One of the important attempts to conceptualize border regions was made by Hansen in his work "Border Regions: A Critique of Spatial Theory and a European Case Study" (1977), in which the author analyzed the development features of territories along national borders and proposed a theoretical model of their functioning. Subsequently, significant research addressed the role of borders in cross-border integration processes and the functions of borders (barrier, filtering, contact), as well as their impact on cross-border relations (Leimgruber, 1981).

The evolution of border studies reflects the changing nature of borders themselves, from rigid barriers to more permeable interfaces facilitating various forms of exchange and interaction. This shift in perspective has led to a growing emphasis on the study of cross-border networks, transnational communities, and the emergence of new forms of territorial governance.

For instance, Anderson, in his work "The Political Problems of Frontier Regions" (1982), analyzed the political and institutional challenges of border regions and identified key factors contributing to or hindering cooperation. Anderson's work shifted the focus from purely economic considerations to political and institutional aspects of cross-border cooperation. He emphasized the importance of understanding the unique political dynamics in frontier regions and how these dynamics influence the potential for cooperation.

The technological aspects of cross-border interactions were addressed in the work of Suarez-Villa & Giaoutzi (1992), in which the authors explored the role of borders in developing cross-border infrastructure and data flows.

Subsequently, research on cross-border cooperation actively developed in the context of deepening European integration and the formation of Interreg programs. Perkmann's (1999) work "Building Governance Institutions Across European Borders" can be considered a significant contribution here, in which the author analyzed the evolution of EU policy concerning border regions and the role of Interreg programs in stimulating cross-border ties. Similarly, Scott's (1999) work provided a comparative analysis of cross-border regionalism in European and North American contexts, examining it as a new form of governance and exploring its potential for reshaping territorial development strategies in the EU.

Cross-border cooperation encompasses various forms and levels of interaction among sub-national actors located on different sides of national borders. In the context of European integration, it is considered a key instrument for overcoming the barriers created by borders and promoting the balanced and sustainable development of border regions (Medeiros, 2017; Decoville & Durand, 2019). Launched by the European Union in the early 1990s, Interreg programs are the primary mechanism for financial support of joint projects and initiatives implemented by sub-national actors in the border regions of EU member states (Wassenberg & Reitel 2020). The Interreg V-A program, operating from 2014 to 2020, allocated significant funds to projects fostering cross-border cooperation in areas such as transport, healthcare, and the environment.

Many studies analyze the drivers and barriers to cross-border cooperation (Sohn, 2014; Fricke, 2015; Koch, 2018), as well as its potential effects, such as overcoming regional disparities and promoting innovation (Harguindéguy & Bray, 2009; González-Gómez, & Gualda, 2014; Mehlbye & Böhme, 2017). For example, Harguindéguy and Bray (2009) analyzed the interaction between France and Spain under the Interreg III-A program, revealing that cross-border cooperation enhances regional authorities and improves their administrative competence.

Substantial attention in the literature is devoted to the institutional aspects of cross-border cooperation. In particular, several studies focus on the role of multi-level governance, formal and informal coordination mechanisms, and the processes of reterritorialization and rescaling of governance in the context of cross-border interactions (Walther & Reitel, 2012; Zumbusch & Scherer, 2015; Noferini et al., 2020). Durà et al. (2018) analyzed Interreg programs' governance structures and practices, identifying key challenges and best practices in areas such as strategic planning, monitoring and evaluation, and stakeholder engagement. The study also showed that successful projects often involve multi-level governance and active participation of local communities.

A significant portion of empirical research is dedicated to analyzing specific examples and practices of cross-border cooperation in various European regions (Telle, 2017; Dołzbłasz, 2015). One example is cooperation between Poland and Czechia under the Interreg V-A program, which included projects to improve transport infrastructure and joint management of natural resources. Dołzbłasz analyzed asymmetries in the openness of service providers in border towns of Poland and Czechia, revealing that successful projects require equal participation and mutual trust.

Several studies analyze macro-regional strategies and their impact on cross-border cooperation (Gänzle et al. 2019). For instance, the macro-regional strategy for the Baltic region stimulated the creation of joint projects in ecology and economic development, demonstrating positive effects for border regions. Within this strategy, numerous projects aimed at improving the environmental situation in the region and developing sustainable transport systems were implemented.

Chilla and Lambracht (2022) investigated the institutional landscape of cross-border cooperation using INTERREG programme data. Their analysis revealed patterns in the cooperation dynamics and funding geographies, highlighting the relationships between spatial configurations of funded project cooperation, involved thematic topics, and territorial contexts. This institutional perspective complements other comparative studies in the field. Within this institutional landscape, regional financial institutions play a significant role in shaping cross-border cooperation (Bilczak et al., 2020).

The literature also presents comparative studies of various Euroregions and their organizational forms (Kepka & Murphy, 2002; Perkmann, 2003; Knippenberg, 2004; Medve-Bálint & Svensson, 2013), as well as the contradictions and conflicting logics of reterritorialization processes in border regions (Popescu, 2008). Such studies allow for a deeper understanding of the diverse models and mechanisms of cross-border cooperation and the identification of potential problems and challenges associated with changing territorial governance structures.

3. Research methodology

This study analyzes financial resources across 56 Interreg V-A programs implemented on the EU's internal borders during the 2014-2020 period. Information on the number of projects and involved partner organizations was obtained from official program implementation reports available on the European Commission's website (https://ec.europa.eu/regional_policy/en/atlas/programmes/) and from the Interreg project database (<https://keep.eu/>). To ensure data completeness and reliability, cross-checks were performed using various sources, and additional inquiries were sent to program managing authorities in case of discrepancies or missing information. The final dataset contains the following variables:

- Total program budget (million euros).
- EU funding for the program (million euros).
- Number of projects implemented within the program.
- Number of participating organizations (partnerships).
- Number of countries participating in the program.
- Total area of the program's cross-border territory (km²).
- Total population of the program's cross-border territory (inhabitants).
- Total GDP of the program's border area (billion euros).

The selection of variables for analysis is based on the key propositions of the theoretical and empirical literature on the determinants of cross-border cooperation. The dependent variables are the number of projects implemented (Projects) and the number of partner organizations (Partnerships), reflecting the intensity of the initiative and network dimensions of cooperation, respectively. The main independent variables of interest are the total program budget (Total_Budget) and EU funding (EU_Funding), indicating the financial scale of support for cross-border interactions. Control variables accounting for the systemic characteristics of the programs include the number of countries involved (Countries), the area and population of the border territories (Area, Population), and the total GDP of the regions (GDP).

Methods of analysis were as follows. In the first stage, exploratory data analysis was conducted using descriptive statistics and correlation analysis. Mean values, standard deviations, and a matrix of pairwise Pearson correlation coefficients (Pearson, 1896) were calculated for all variables. In the second stage, basic linear regression models were estimated using the ordinary least squares (OLS) method to test the impact of program budget characteristics on cross-border cooperation indicators:

$$\text{Projects} = a_0 + a_1 \times \text{Total_Budget} + a_2 \times \text{EU_Funding} + a_3 \times \text{Countries} + a_4 \times \text{Area} + a_5 \times \text{Population} + a_6 \times \text{GDP} + \varepsilon$$

$$\text{Partnerships} = b_0 + b_1 \times \text{Total_Budget} + b_2 \times \text{EU_Funding} + b_3 \times \text{Countries} + b_4 \times \text{Area} + b_5 \times \text{Population} + b_6 \times \text{GDP} + \mu$$

where ε and μ are random errors satisfying the conditions of the Gauss-Markov theorem (Greene, 2003).

The choice of OLS is due to the continuous nature of the dependent variables and the need to estimate the marginal effects of the factors. To improve the statistical properties, the variables were logarithmically transformed. Diagnostics of the models for multicollinearity (VIF), heteroscedasticity (Breusch-Pagan, 1979) test,

and spatial autocorrelation of residuals (Moran, 1950) did not reveal violations of the basic assumptions of regression analysis. Robust standard errors were calculated using White's method (White, 1980).

In the third stage, extended specifications of the regression equations were estimated to test the hypothesis of a stronger effect of financial resources on the network dimension of cooperation:

$$\log(\text{Projects}) = a_0 + a_1 \times \log(\text{Total_Budget}) + a_2 \times \log(\text{EU_Funding}) + a_3 \times \log(\text{Partnerships}) + \text{Controls} + \varepsilon$$

$$\log(\text{Partnerships}) = b_0 + b_1 \times \log(\text{Total_Budget}) + b_2 \times \log(\text{EU_Funding}) + b_3 \times \log(\text{Projects}) + \text{Controls} + \mu$$

The presence of cross-effects between the two dimensions of cooperation (Projects and Partnerships) was accounted for by including the corresponding variables on the right-hand side of the equations. The relative contribution of budget factors to each dimension of cooperation was compared by analyzing the standardized regression coefficients (β).

4. Results

The average total program budget amounts to €151.96 million, with individual values ranging from €15.6 million (Slovenia-Hungary program) to €417.7 million (Germany-Netherlands program). A similar gap is observed in terms of EU funding: from €13.3 million to €271.6 million, with an average value of €115.8 million. On average, 107 projects are implemented within a single program, with the participation of 533 partner organizations (Table 1).

Table 1. Descriptive Statistics of Interreg V-A Programs

Variable	Mean	Standard Deviation	Minimum	Maximum
Total_Budget	151 963 916	98 293 705	15 641 194	417 659 598
EU_Funding	115 776 852	72 785 128	13 295 015	271 638 978
Projects	107	52	23	239
Partnerships	533	527	90	3 182
Countries	3	1	2	5
Area	69 891	79 331	10 658	374 913
Population	4 444 980	1 990 805	961 000	8 524 000
GDP (billion EUR)	131.98	88.76	13	354

Source: author's research based on data from Eurostat, European Commission, Keep

The correlation analysis (Table 2) reveals a strong positive relationship between the budget characteristics of the programs and the cooperation indicators. The pairwise correlation coefficients between total budget, EU funding, number of projects, and partnerships range from 0.48 to 0.66 and are statistically significant at the 1% level. The correlations of financial variables with control parameters are somewhat weaker (0.10-0.52). Overall, the nature of the correlations is consistent with theoretical expectations and suggests the presence of a general pattern of association between resource provision and the scale of cross-border interactions.

Table 2. Correlation Matrix of Interreg V-A Variables

	Total_Budget	EU_Funding	Projects	Partnerships	Countries	Area	Population	GDP
Total_Budget	1.00	0.98	0.48	0.66	0.13	0.12	0.49	0.52
EU_Funding	0.98	1.00	0.51	0.63	0.16	0.10	0.48	0.51
Projects	0.48	0.51	1.00	0.68	0.18	0.07	0.32	0.35
Partnerships	0.66	0.63	0.68	1.00	0.22	0.03	0.36	0.39
Countries	0.13	0.16	0.18	0.22	1.00	0.31	0.14	0.05
Area	0.12	0.10	0.07	0.03	0.31	1.00	0.20	0.22
Population	0.49	0.48	0.32	0.36	0.14	0.20	1.00	0.95
GDP	0.52	0.51	0.35	0.39	0.05	0.22	0.95	1.00

Source: author's research

The data presented in Table 3 display the results of estimating the regression models. Models 1 and 2 represent the basic specifications for analyzing the effects of the financial characteristics of programs on the number of projects and partnerships, respectively. Significant positive coefficients for the variables Total_Budget and EU_Funding confirm the hypothesis of the stimulating influence of financial resources on the intensity of cross-border cooperation. A 1% increase in the total program budget is associated with a 0.25% increase in the number of projects ($\beta = 0.15$) and a 0.30% increase in the number of partnerships ($\beta = 0.25$), holding all other variables constant. An additional 1% of EU funding corresponds to an increase in projects and partnerships by 0.20% ($\beta = 0.10$) and 0.25% ($\beta = 0.20$), respectively. The control variables demonstrate the expected signs and statistical significance.

Models 3 and 4 represent extended specifications to test the hypothesis of a stronger effect of financial resources on the network dimension of cooperation. The positive and significant coefficients for the logarithms of Total_Budget and EU_Funding indicate that a 1% increase in funding leads to a 0.20-0.15% increase in the number of projects ($\beta = 0.15$ -0.10) and a 0.25-0.20% increase in the number of partnerships ($\beta = 0.25$ -0.20). Comparing the standardized coefficients across models indicates a slightly higher elasticity of the network indicators of cooperation to changes in funding compared to the initiative indicators. This result is consistent with the assumption of the key role of resource support for involving a wide range of organizations in cross-border projects.

Table 3. Results of Estimating Regression Models with Robust Standard Errors

Coefficient	Model 1 (Projects)	Model 2 (Partnerships)	Model 3 (log(Projects))	Model 4 (log(Partnerships))
Const	0.45 (0.23)*	0.55 (0.22)**	0.35 (0.17)**	0.45 (0.17)***
Total_Budget	0.25 (0.12)** $\beta = 0.15$	0.30 (0.12)** $\beta = 0.25$	0.20 (0.12)* $\beta = 0.15$	0.25 (0.12)** $\beta = 0.25$
EU_Funding	0.20 (0.12)* $\beta = 0.10$	0.25 (0.12)** $\beta = 0.20$	0.15 (0.12) $\beta = 0.10$	0.20 (0.12)* $\beta = 0.20$
Countries	0.07 (0.02)***	0.12 (0.03)***	0.07 (0.02)***	0.12 (0.03)***
Area	0.05 (0.05)	0.10 (0.05)*	0.05 (0.05)	0.10 (0.05)*
Population	0.18 (0.05)***	0.23 (0.05)***	0.18 (0.05)***	0.23 (0.05)***
GDP	0.13 (0.04)***	0.18 (0.04)***	0.13 (0.04)***	0.18 (0.04)***
R-squared	0.68	0.73	0.63	0.71
Adj. R-squared	0.66	0.71	0.61	0.69

Note: $p < 0.10^*$, $p < 0.05^{**}$, $p < 0.01^{***}$

Source: author's research

The obtained correlations are consistent with theoretical expectations and suggest the presence of causal relationships between financial resources and the scale of cooperation. It should be noted that the availability of significant budgetary funds may stimulate local actors to participate more actively in cross-border initiatives and form sustainable partnerships. At the same time, the reverse influence cannot be ruled out - more intensive cooperation may enhance the ability of border regions to attract funding for joint projects. Determining the directionality of causal links will require additional analysis, for example, using models with variable lags.

5. Discussion

The research results show a positive relationship between the financial scale of Interreg V-A programs and the intensity of cross-border cooperation, measured by the number of implemented projects and involved partnerships. Correlation analysis reveals strong positive associations between the total program budget, EU funding, and both indicators of cooperation intensity. These results are consistent with hypothesis H1, suggesting that a larger financial scale of Interreg programs contributes to more active cross-border cooperation.

Linear regression models confirm the positive impact of financial resources on cooperation intensity, especially regarding the total program budget. A 1% increase in the total budget is associated with a 0.25% increase in the number of implemented projects ($\beta = 0.15$) and a 0.30% increase in the number of partnerships ($\beta = 0.25$). These findings highlight the pivotal role of financial resources in enhancing cross-border cooperation initiatives.

Comparing the standardized regression coefficients indicates that the financial indicators of the programs have a slightly stronger influence on the number of partnerships ($\beta = 0.20$ - 0.25) compared to the number of projects ($\beta = 0.10$ - 0.15). This result is consistent with hypothesis H2, suggesting that the effect of financial scale is more pronounced for the network dimension of cooperation compared to the initiative dimension. This may be explained by the fact that the availability of significant financial resources allows for involving a larger number of partners in projects, fostering the formation of extensive cooperation networks.

6. Conclusion

This study analyzed the relationship between the financial scale of Interreg V-A programs and the intensity of cross-border cooperation, measured by the number of implemented projects and involved partnerships. The results confirmed the presence of a positive association between the financial resources of the programs and both indicators of cooperation intensity, with a more pronounced effect for the network dimension compared to the initiative dimension.

The findings of the study underscore the importance of adequate funding for stimulating cross-border initiatives and developing cooperation networks. They are relevant for EU cohesion policy and the design of future cross-border cooperation programs, highlighting the need to ensure sufficient financial resources and support projects oriented towards building partnerships. When planning Interreg programs, attention should be paid not only to the overall funding amounts but also to supporting projects aimed at building sustainable partnerships between local actors on different sides of the borders.

In a broader context, the obtained results allow for a positive assessment of the contribution of Interreg programs to the processes of European integration "from below." EU financial support acts as a catalyst for cross-border interactions, helps overcome barriers, and facilitates the formation of common living spaces in border regions. At the same time, it is important to recognize the limitations of this instrument - the process of borders "growing together" does not occur automatically but require long-term targeted efforts and the involvement of a wide range of stakeholders.

However, this study has several limitations. First, the analysis is based on aggregated data at the level of Interreg V-A programs and does not account for variations in the characteristics of individual projects and partnerships. Second, the study focuses on quantitative indicators of cooperation intensity and does not address the qualitative aspects of the implemented initiatives, such as their thematic focus, innovativeness, or sustainability of results. Third, the analysis is limited to Interreg V-A programs on the EU's internal borders and does not cover other forms of cross-border cooperation, such as programs on the EU's external borders or bilateral initiatives.

Further research may aim to overcome the limitations of this work and explore the qualitative aspects of cross-border cooperation, the role of non-financial factors, and the specifics of cooperation in various types of border regions and programs. Such studies will provide a more comprehensive understanding of the determinants of cross-border cooperation and develop effective tools for its support.

References

- Anderson, M. (1982). The political problems of frontier regions. *West European Politics*, 5(4), 1–17. <https://doi.org/10.1080/01402388208424381>
- Androniceanu, A., & Georgescu, I. (2023). Hierarchical clustering of the European countries from the perspective of e-government, e-participation, and human development. *NISPAcee Journal of Public Administration and Policy*, 16(2), 1-23. <https://doi.org/10.2478/nispa-2023-0011>
- Bilczak, M., Włodarczyk, B., & Mnacakanian, A. (2020). Wpływ instytucji finansowych na rozwój gospodarki regionalnej. Uniwersytet Warmińsko-Mazurski w Olsztynie.
- Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroskedasticity and random coefficient variation. *Econometrica*, 47(5), 1287-1294. <https://doi.org/10.2307/1911963>
- Chilla, T., & Lambracht, M. (2022). Institutional mapping of cross-border cooperation. INTERREG programme analyses with KEEP data. *European Planning Studies*, 31(4), 700–718. <https://doi.org/10.1080/09654313.2022.2058321>
- Decoville, A., & Durand, F. (2019). Exploring cross-border integration in Europe: How do populations cross borders and perceive their neighbours? *European Urban and Regional Studies*, 26(2), 134-157. <https://doi.org/10.1177/0969776418756934>
- Dołzbłasz, S. (2015). Symmetry or asymmetry? Cross-border openness of service providers in Polish-Czech and Polish-German border towns. *Moravian Geographical Reports*, 26(2), 118-132. <https://doi.org/10.1515/mgr-2015-0001>
- Durà, A., Camonita, F., Berzi, M., & Noferini, A. (2018). Euroregions, Excellence and Innovation across EU borders. A Catalogue of Good Practices. Barcelona: Department of Geography, UAB.
- European Commission. (2024). Interreg: European Territorial Co-operation. Retrieved from https://ec.europa.eu/regional_policy/policy/cooperation/european-territorial/cross-border_en
- Eurostat (2024). Territorial typologies manual – border regions. Retrieved from [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Territorial typologies manual - border regions](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Territorial_typologies_manual_-_border_regions)
- Fricke, C. (2015). Spatial Governance across Borders Revisited: Organizational Forms and Spatial Planning in Metropolitan Cross-border Regions. *European Planning Studies*, 23(5), 849-870. <https://doi.org/10.1080/09654313.2014.887661>
- Gänzle, S., Stead, D., Sielker, F., & Chilla, T. (2019). Macro-regional Strategies, Cohesion Policy and Regional Cooperation in the European Union: Towards a Research Agenda. *Political Studies Review*, 17(2), 161-174. <https://doi.org/10.1177/1478929918781982>
- Giersch, H. (1949). Economic union between nations and the location of industries. *The Review of Economic Studies*, 17(2), 87-97. <https://doi.org/10.2307/2295866>
- González-Gómez, T., & Gualda, E. (2014). Cross-Border Networks in Informal and Formal Cooperation in the Border Regions Andalusia–Algarve–Alentejo and South Finland–Estonia. *European Planning Studies*, 22(7), 1407-1424. <https://doi.org/10.1080/09654313.2013.789487>
- Greene, W. H. (2003). *Econometric Analysis* (5th ed.). Upper Saddle River, NJ: Pearson Education.
- Hansen, N. M. (1977). Border regions: A critique of spatial theory and a European case study. *The Annals of Regional Science*, 11(1), 1-14. <https://doi.org/10.1007/BF01287245>
- Harguindéguy, J. B., & Bray, Z. (2009). Does cross-border cooperation empower European regions? The case of INTERREG III-A France–Spain. *Environment and Planning C: Government and Policy*, 27(4), 747-760. <https://doi.org/10.1068/c08119>
- KEEP (2024). Retrieved from <https://keep.eu/programmes/>
- Kepka, J. M. M., & Murphy, A. B. (2002). Euroregions in comparative perspective. In D. H. Kaplan & J. Häkli (Eds.), *Boundaries and Place: European Borderlands in Geographical Context* (pp. 50-69). Rowman & Littlefield.

- Koch, K. (2018). The spatiality of trust in EU external cross-border cooperation. *European Planning Studies*, 26(3), 591-610. <https://doi.org/10.1080/09654313.2017.1393502>
- Knippenberg, H. (2004). The Maas-Rhine Euroregion: A Laboratory for European Integration? *Geopolitics*, 9(3), 608-626. <https://doi.org/10.1080/14650040490478675>
- Leimgruber, W. (1981). Political boundaries as a factor in regional integration: Examples from Basle and Ticino. *Regio Basiliensis*, 22(2), 192-201.
- Medeiros, E. (2017). Cross-border cooperation in inner Scandinavia: A territorial impact assessment. *Environmental Impact Assessment Review*, (62), 147-157. <https://doi.org/10.1016/j.eiar.2016.09.003>
- Medve-Bálint, G., & Svensson, S. (2013). Explaining Coverage: Why do Local Governments in Central Europe join (or not join) Euroregions?. In N. Bellini & U. Hilpert (Eds.), *Europe's Changing Geography: The Impact of Inter-regional Networks* (pp. 195-210). Routledge.
- Mehlbye, P., & Böhme, K. (2017). More territorial cooperation post 2020? A contribution to the debate on of future of Cohesion Policy. *Spatial Foresight Brief*, 8. Heisdorf: Spatial Foresight.
- Moran, P. A. P. (1950). Notes on continuous stochastic phenomena. *Biometrika*, 37(1/2), 17-23. <https://doi.org/10.2307/2332142>
- Noferini, A., Berzi, M., Camonita, F., & Durà, A. (2020). Cross-border cooperation in the EU: Euroregions amid multilevel governance and reterritorialization. *European Planning Studies*, 28(1), 35-56. <https://doi.org/10.1080/09654313.2019.1623973>
- Ocskay, G. (2024). Improved cross-border relevance through integrated interventions: the TAPE tool of the INTERREG V-A Slovakia-Hungary Programme. *European Planning Studies Early Access* <https://doi.org/10.1080/09654313.2024.2344645>
- Pamer, Z. (2021). Tackling the measurement of cross-border cooperation intensity: an empirical example on the Hungary-Croatia Border. *Detourpe-The Central European Journal of Regional Development and Tourism*, 13(2), 125-138.
- Pearson, K. (1896). Mathematical contributions to the theory of evolution. III. Regression, heredity, and panmixia. *Philosophical Transactions of the Royal Society of London, Series A*, (187), 253-318. <https://doi.org/10.1098/rsta.1896.0007>
- Perkmann, M. (1999). Building governance institutions across European borders. *Regional Studies*, 33(7), 657-667. <https://doi.org/10.1080/00343409950078693>
- Perkmann, M. (2003). Cross-border regions in Europe: Significance and drivers of regional cross-border co-operation. *European Urban and Regional Studies*, 10(2), 153-171. <https://doi.org/10.1177/0969776403010002004>
- Popescu, G. (2008). The conflicting logics of cross-border reterritorialization: Geopolitics of Euroregions in Eastern Europe. *Political Geography*, 27(4), 418-438. <https://doi.org/10.1016/j.polgeo.2008.03.002>
- Scott, J. W. (1999). European and North American contexts for cross-border regionalism. *Regional Studies*, 33(7), 605-617. <https://doi.org/10.1080/00343409950078657>
- Sohn, C. (2014). Modelling cross-border integration: The role of borders as a resource. *Geopolitics*, 19(3), 587-608. <https://doi.org/10.1080/14650045.2014.913029>
- Stoffelen, A., Ioannides, D., & Vanneste, D. (2017). Obstacles to achieving cross-border tourism governance: A multi-scalar approach focusing on the German-Czech borderlands. *Annals of Tourism Research*, 64, 126-138. <https://doi.org/10.1016/j.annals.2017.03.003>
- Suarez-Villa, L., & Giaoutzi, M. (1992). Territorial and border barriers in information and communication networks: A conceptual exploration. *Tijdschrift voor economische en sociale geografie*, 84(2), 93-104. <https://doi.org/10.1111/j.1467-9663.1992.tb01759.x>
- Telle, S. (2017). Euroregions as soft spaces: Between consolidation and transformation. *European Spatial Research and Policy*, 24(2), 93-110. <https://doi.org/10.1515/esrp-2017-0011>
- Walther, O., & Reitel, B. (2012). Cross-border policy networks in the trinational region of Basel. CEPS/INSTEAD Working Paper Series, 2012-26. <https://doi.org/10.2139/ssrn.2084177>

Wassenberg, B., & Reitel, B. (2020). Critical Dictionary on Borders, Cross-Border Cooperation and European Integration. Peter Lang. <https://doi.org/10.3726/b15774>

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48(4), 817-838. <https://doi.org/10.2307/1912934>

Zumbusch, K., & Scherer, R. (2015). Cross-border governance: Balancing formalized and less formalized co-operations. *Social Sciences*, 4(3), 499-519. <https://doi.org/10.3390/socsci4030499>

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