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Development of border areas after EU accession, with a special focus on the Serbian-Hungarian border region

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Abstract

Research based on the theory of centre-periphery relations tends to view border regions as peripheries. In this view, distance from the centre and subordination to the centre result in unfavourable development indicators. However, observations on border regions complicate this picture in many respects. Following the opening up of borders, for example in Europe, interactions with neighbouring border regions can be interpreted as capital that enables these border contact zones, which are perceived as peripheral, to develop. The paper seeks to reinforce this basic assumption through a brief empirical investigation of the Serbian-Hungarian border region. This investigation used principal component analysis, one of the most widespread statistical data reduction methods, to describe development trends in small regions/districts on the Hungarian side of the Serbian–Hungarian border zone between 2004 and 2023. The results are thought-provoking in several respects. On the one hand, the investigation demonstrates that the development trends of the small districts in question largely followed the intensity of relations maintained with neighbouring border region during the review period, thus confirming our basic assumption. Between 2013 and 2023, a period characterised by intensive growth in cross-border traffic, four of the five districts in this area moved into a higher development category, surpassing similar Hungarian districts not located in border areas. However, it has been also pointed out that these positive results cannot be generalised to all of Hungary's border small regions/districts. The latter's results usually lag behind those of Hungarian districts not located in border areas. In other words, it would be a mistake to overstate the importance of border location. The potential inherent in interactions with neighbouring border regions can only be optimally exploited through the appropriate application of local and higher-level (EU and member state) development policies.

Keywords: regional development, centre-periphery relations, border region, cross-border relations, Serbia, Hungary

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Introduction

The aim of the following study is to examine development trends in small regions and districts in the Hungarian part of the Serbian–Hungarian border following Hungary's accession to the EU on 1 May 2004. The area under examination is interesting from two perspectives: firstly, as a (situational) periphery, and secondly, as a border region with gateways to a neighbouring country. Before conducting the empirical analysis on which the research is based, it is worthwhile briefly reflecting on these two above-mentioned concepts.

The theory of centre-periphery relations, inspired by Immanuel Wallerstein's theory,[1] has been disseminated in the Hungarian literature on the basis of József Nemes Nagy's research.[2] According to Nemes Nagy's interpretation, three aspects of peripheralisation can be distinguished: situational (geographical), power (social) and developmental (economic). While the situational aspect of peripheralisation seems to be the most obvious interpretation of the term "periphery" in the case of border regions far from the centre, the theory suggest that these areas are not only subordinate to the centre in terms of location, but also in terms of power, with a weak capacity to assert their interests. Consequently, border regions are often characterised by unfavourable developmental indicators, and their disadvantaged position can only be improved with the active involvement of the centre of power — for example, regional development policy at the level of the nation state.

The above interpretation on border regions requires some nuancing. Related publications often quote Nils Hansen's definition, which states that the concept of a border region relates to "that part of the natural space where economic and social life is directly and significantly influenced by the existence of an international border. In this sense we can differentiate between open or potentially open regions and closed regions."[3] However, Tamás Hardi also points out that Hansen's definition "[...] was born in an era when European borders were more or less separative", and that "today and in our region, we can [...] consider a border region as one whose daily life is fundamentally influenced by interactions with the neighbouring border region".[4]

Hardi's observation that European borders, which used to divide, have recently become increasingly connecting is undoubtedly correct. Nevertheless, it should not be overlooked that the connective/interactive nature of borders cannot be absolutised, even in today's Europe. In a previous study, I categorised state borders according to their permeability as follows: closed borders, which are dominated by barrier functions; open borders, which are dominated by contact functions; and semipermeable borders, which are characterised by the coexistence of barrier, filter and contact functions.[5] Although open borders are becoming increasingly prevalent in Europe today, the functions associated with semi-permeable borders continue to play an important role, for example on the external borders of the Schengen Area. Hungary joined the Schengen Area on 21 December 2007, when border controls were lifted at the borders with Austria, Slovakia and Slovenia. Border controls were subsequently lifted on the Croatian-Hungarian and Romanian-Hungarian borders on 1 January 2023 and 1 January 2025, respectively. Currently, the Hungarian border with countries that have not joined the European Union, such as Serbia and Ukraine, cannot be considered open. Nevertheless, even in the latter border regions, we can observe a certain strengthening of cross-border interactions. As far as the Serbian–Hungarian border is concerned, the number of people entering and leaving the border, one of the most important interaction indicators,[6] has remained essentially stagnant since our

[1] Wallerstein, *The Modern World-System: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*, 1974.
[2] Nemes Nagy, *Terek, helyek, régiók. A regionális tudomány alapjai*, 211.
[3] Hansen, "Temporal Border Regions: A Critique of Spatial Theory and a European Case Study." Cited in Hardi and Uszkai, "Theoretical Models of Cross-border Integration," 11.
[4] Hardi, "A határtérség térszerkezeti jellemzői," 4.
[5] Buskó, "Az államhatárok átjárhatóságáról. Politikai földrajzi vázlat."
[6] See Pascariu et al, "Regional development, spatial resilience and geographical borders" for a compelling argument that the local border traffic had a key contribution to the levelling of the peripheral location of the border areas.

accession to the European Union to 2010 (2004: 7,487,342; 2010: 7,460,565). However, from the 2010s until the lockdown imposed due to the outbreak of the 2019-nCoV (SARS-CoV-2) pandemic, there was a significant increase in Serbian–Hungarian border traffic. We can detect a modest growth in the first half of the decade and much stronger growth between 2015 and 2018. The peak year was 2018, when 12,846,576 people crossed the Hungarian–Serbian border. Although the pandemic drastically disrupted this momentum in 2020, border traffic between Serbia and Hungary showed signs of a V-shaped rebound (Q1-Q2 2018: 4,866,463 people; Q1-Q2 2018: 5,131,687 people) may exceed the 2018 peak as early as 2025.[7] Based on this, we hypothesise that changes in cross-border interactions can significantly impact the entire Serbian–Hungarian border region, influencing the development trends of this "contact zone".[8] The following empirical investigation used principal component analysis, one of the most widespread statistical data reduction methods, to confirm this basic assumption.

Material and method

In order to confirm the basic assumption, I will demonstrate that development trends in the Hungarian part of the Serbian-Hungarian contact zone largely mirrored changes in cross-border interactions with the neighbouring border region from 2004 to 2023. However, to do so, I must first address two methodological issues. Firstly, the contact zone must be defined. Secondly, regional development trends must be made measurable.

Regarding the Hungarian part of the Serbian-Hungarian contact zone, between 1994 and 2012 I identified it with the statistical small regions (kistérség; hereinafter: small regions)[9] bordering Serbia, and since their introduction on January 1, 2013, with the administrative districts (járás; hereinafter: districts)[10] that replaced the small regions. Following the separation of the small region centred on Mórahalom from that centred on Szeged in 2003, the Hungarian part of the Serbian-Hungarian contact zone has comprised five small regions/districts: the small regions centred on Baja, Bácsalmás, Kiskunhalas, Mórahalom and Szeged. There are no significant territorial differences between the current districts and the former small regions-

- The area of the Kiskunhalas district is identical to the former small region centred on Kiskunhalas.
- The areas of the small regions/districts centred on Szeged and Mórahalom differ only in that the municipality of Zsombó, which was previously part of the Szeged small region, is now part of the Mórahalom district.
- Finally, the municipalities of Bácsbokod and Bácsborsód, which previously belonged to the small region centred on Baja, were transferred to the Bácsalmás district when the district system was established, while the municipality of Rém was transferred to the Jánoshalma district, which is not part of the Serbian-Hungarian contact zone.

Since the above-mentioned territorial changes affected only a very small proportion of the population, I will treat the former small regions and the current districts as continuous territorial units, with some simplification.

[7] "Hungarian Central Statistical Office: Határátkelők személyforgalma. Magyarország államhatárán be- és kilépő személyforgalom."
[8] Buskó, "Az államhatárok átjárhatóságáról. Politikai földrajzi vázlat," 32.
[9] The system of statistical small regions, as set out in the announcement by the President of the Hungarian Central Statistical Office (KSH) No. 9006/1994 (s.k.3), was in place between 1994 and 25 February 2014. The original number and boundaries of the 138 statistical small regions were first modified in 1998 (Announcement No. 9002/1998 (s.k.1) by the President of the Hungarian Central Statistical Office – 150 small regions), then in 2003 (Government Decree No. 244/2003 [18 December] – 168 small regions), then in 2007 (Act No. CVII of 2007 – 174 small regions), and finally in 2011 (Act No. CXLIX of 2010 – 175 small regions).
[10] Although the number of 175 districts established by Act XCII of 2012 corresponded to the small regions, their boundaries differed in some places. Since then, only one change has been made to the number and boundaries of these districts: the abolition of the Polgárdi district on 31 December 2013 and the merger of its constituent municipalities into the Enying and Székesfehérvár districts, as set out in Government Decree 308/2014 [9 December].

Based on the above, I will attempt to determine the development trends of the small regions/districts of Baja, Bácsalmás, Kiskunhalas, Mórahalom and Szeged at three points in time: 2004, 2013 and 2023. Regional development is, of course, a rather abstract concept that is difficult to define and measure. The literature attempts to capture its inherent complexity using a variety of multivariate statistical methods or more simplistic, reductionist, but practical approaches (e.g. based on GDP or HDI values).[11] Below, I propose a multivariate statistical approach that reduces demographic, social, economic and infrastructural indicators relevant to the regional development of Hungarian small regions/districts[12] into a latent development indicator that is not directly observable. This indicator is then used to place the small regions/districts of the Hungarian part of the Serbian–Hungarian contact zone into a development space. I perform this task using one of the most widely used data reduction methods: principal component analysis. Without going into the mathematical details of the procedure, it is generally considered successful if (a) the individual variables fit the latent development indicator, i.e. the principal component, fairly closely with a communality value of at least 0.25 and (b) the principal component explains a sufficiently large proportion of the information content (variance) of the individual variables – by convention, at least 50%.

In one of my earlier studies,[13] I identified the following nine variables as being relevant to determining the principal component of regional development at the level of Hungarian small regions:

- Change in the resident population compared to a base year (e.g. 2004 compared to 2001, 2013 compared to 2011, or 2023 compared to 2012) (“respop”);
- The urbanisation index, i.e. the proportion of people living in settlements with a population density of over 120 people/km² (“urbind”);
- The amount of income forming the personal income tax base per capita (“income”);
- The percentage of registered unemployed persons[14] within the population (“unempl”);
- The ratio of dwellings built in a given year per 1,000 people (“dwelbuilt”);
- The percentage of households consuming piped gas (“pipgas”);
- Percentage of dwellings connected to the public sewerage network (“severage”).
- The ratio of operating businesses per 1,000 inhabitants (“opbus”);
- The ratio of passenger cars per 1,000 inhabitants (“passcar”).

The following principal component analysis uses data similar to that used previously. However, the Information Database of the Hungarian Central Statistical Office no longer contained urbanisation index values for 2023, so I refrained from using it. Moreover, I supplemented the database with two new variables: the number of telephone exchanges per 1,000 inhabitants in 2004 (“phone”) and the number of internet subscriptions per 1,000 inhabitants in 2013 and 2023 (“int”). Finally, I considered the percentage of households consuming piped gas in 2004 and 2013 only, as its communality value did not reach 0.25 in 2023. The communality values of the individual variables and the information content explained by the principal component (“varexp”) for 2004, 2014 and 2023 are shown below (Table 1):

Table 1
Results of the principal component analysis[15]

	2004	**2013**	**2023**
respop	0,308	0,396	0,558

[11] Buskó, *Regionális politika*, 29-31.
[12] The capital city, Budapest, is not part of the district system established by Act XCII of 2012. However, to ensure comparability with the 2004 data series, which includes the Budapest small region, Budapest was treated as a 'virtual' district when the 2013 and 2023 databases were compiled.
[13] Buskó, “Néhány megjegyzés a hazai kistérségek 2009/2010. évi komplex versenyképességi rangsorához.”
[14] In 2013 and 2023: registered job seekers.
[15] Own calculation based on “Hungarian Central Statistical Office: Területi adatok. Éves településstatisztikai adatok 2024-es településszerkezetben.”

income	0,685	0,772	0,800
unempl	0,415	0,654	0,666
dwelbuilt	0,525	0,492	0,556
pipgas	0,361	0,250	xxx
severage	0,362	0,416	0,353
opbus	0,745	0,826	0,818
passcar	0,800	0,703	0,587
phone/int	0,654	0,734	0,431
varexp	53,945	58,258	59,605

Results

I will present the results of the principal component analysis using the so-called principal component scores. The standardised values of the principal component scores indicate the position of each small region/district within the development space defined by the principal component; that is to say, higher scores indicate a higher level of development, and lower scores indicate a lower level of development. To make the results easier to interpret, I divided the interval between the highest and lowest principal component scores into five equal classes for all three years, classifying the small regions/districts in question into one of the following five development categories: highly developed, developed, average developed, moderately developed, and weakly developed. Table 2 shows the number of these small regions/districts classified into each development category, with those belonging to the Serbian-Hungarian contact zone listed separately. The results for the small region centred on Mórahalom in 2004 are not included in the table because the indicator "Change in the resident population compared to 2001" is unavailable due to the establishment of the Mórahalom small region on 1 January 2004.

Table 2
Distribution of Hungarian samll regions/districts by development categories (2004, 2013, 2023)[16]

2004	No.
highly developed (2,86 - 1,90)	8
developed (1,90 - 0,95)	21
Szeged small region (1,15)	
average developed (0,95 - -0,01)	45
Baja small region (0,07)	
Kiskunhalas small region (0,01)	
moderately developed (-0,01 - -0,97)	70
weakly developed (-0,97 - -1,92)	23
Bácsalmás small region (-1,11)	
2013	No.
highly developed (3,36 - 2,28)	4
developed (2,28 - 1,23)	18
Szeged district (1,65)	
average developed (1,23 - 0,18)	44

[16] Own calculation based on "Hungarian Central Statistical Office: Területi adatok. Éves településstatisztikai adatok 2024-es településszerkezetben."

moderately developed (0,18 - -0,87)	72
Baja district (0,14)	
Kiskunhalas district (-0,07)	
Mórahalom district (-0,05)	
weakly developed (-0,87 - -1,92)	38
Bácsalmás district (-1,05)	
2023	No.
highly developed (2,69 - 1,69)	13
developed (1,69 - 0,69)	27
Szeged district (1,11)	
average developed (0,69 - -0,30)	63
Baja district (0,13)	
Kiskunhalas district (-0,05)	
Mórahalom district (-0,15)	
moderately developed (-0,30 - -1,30)	57
Bácsalmás district (-0,83)	
weakly developed (-1,30 - -2,30)	15

The small regions/districts we examined are ranked in the same order of development at all three points in time during the period under review. The most developed is the Szeged small region/district, followed by Baja, Kiskunhalas, Mórahalom,[17] and finally the least developed is the small region/district centred on Bácsalmás. Although it would be tempting to establish a direct correlation between the intensity of relations with neighbouring border regions and the above overall order of development, the situation is probably much more complex. While it is true that small regions/districts with the busiest border crossings (Szeged small region/district – Röszke; Baja small region/district – Hercegszántó; Kiskunhalas small region/district – Tompa) are at the top of the development ranking, and those with low-traffic border crossings (Mórahalom – Ásotthalom; Bácsalmás small region/district – Bácsalmás) are at the bottom, their position depends much more on the importance of the central municipality. The Kiskunhalas small region/district is the best example of this: despite the fact that traffic at the most important border crossing point in the small region centred on Kiskunhalas, Tompa, far exceeded that at the main border crossing point in the Baja small region/district, Hercegszántó (2,978,198 people vs. 616,419 people), its principal component scores lag behind those of the small region/district centred on the more populated Baja.[18]

Now, let us turn our attention to the development trends of the small regions/districts under review. The development of the five small regions/districts in question largely follows the intensity of cross-border interactions with the neighbouring border region. Between 2004 and 2013, not only did the these small regions/districts fail to move into a higher development category, but those centred on Baja and Kiskunhalas also slipped back from "average development" to "moderately development". Given that the Bácsalmás small region/district was already in the "weakly developed" category in 2004 and had little room to deteriorate further, the stability of the Szeged small region/district is the only somewhat positive result. Nevertheless, it would be a mistake to attribute the success of the Szeged small region/district, dominated by a regional centre with a population of over 150,000, solely to its border location. Between 2013 and 2023, however, the relative development position of the examined districts improved almost without exception. Apart from the Szeged district, which remained stable in the "developed" category, the Baja, Kiskunhalas and Mórahalom districts moved

[17] In the absence of the 2004 principal component score, the position of the Mórahalom small region cannot be determined with certainty for this year, but it can be strongly inferred based on the available indicators.

[18] "Hungarian Central Statistical Office: Határátkelők személyforgalma. Magyarország államhatárán be- és kilépő személyforgalom."

from the "moderately developed" category back to the "developed" category. Meanwhile, the Bácsalmás district stepped forward from the "weakly developed" category to the "moderately developed" category.

Discussion

Of course, the changes in position shown in the previous chapter cannot be explained solely by closer interactions with the neighbouring border region. The regional development of the Hungarian part of the contact zone is also inextricably linked to the broader context of Hungary's regional development tendencies during the period under review. Between 2004 and 2013, Hungary's economy, similar to Serbia,[19] grew only modestly. While Hungary's gross domestic product (GDP) in euros more than doubled between 1995 and 2004, rising from EUR 36,000.1 million to EUR 83,793 million, a significant slowdown can be observed between 2004 and 2013. GDP rose to only EUR 102,193.7 million by 2013.[20] Under these circumstances, it is not surprising that most regional development during this period was limited mainly to central regions. Based on principal component scores, regional development differences increased at this time, as shown by the gap between the highest and lowest scores (2.86 – -1.92 vs. 3.36 – -1.92), and by the increased proportion of moderately and weakly developed small regions/districts. While 93 small regions (55.7%) belonged to one of the two lowest categories in 2004, by 2013, the proportion of moderately (72) and weakly (38) developed districts within the total sample of 176 had risen to 62.5%.

Between 2013 and 2023, we witness the opposite trend. In line with stronger GDP growth in Hungary (2013: EUR 102,193.7 million; 2023: EUR 197,850.2 million),[21] there was a possibility of reducing regional disparities and catching up with moderately and weakly developed districts. Consequently, the number of districts in the latter two development categories fell significantly, from 110 (62.5%) to 72 (41.1%) over this period. However, even then, border location was no guarantee of catching up. Of the 48 Hungarian districts located along the border, only 18 (37.5%) moved into a higher development category between 2013 and 2023. This was significantly lower than the result of 52% for the 127 non-border districts.

All of this makes the performance of the districts located in the Serbian-Hungarian border region even more impressive. The fact that four of the five districts in question (80%) have advanced to a higher development category is comparable only to the performance of border regions where neighbouring countries have relatively short sections of border with Hungary, which increases the importance of the immediate vicinity of the few border crossing points.[22] In other border regions, development levels were unable to improve in a similar manner to that seen in the Serbian-Hungarian contact zone. I would now like to focus on two other border regions, as they were also located on the Schengen area border until recently. Accordingly, only three of the seven districts in the Hungarian part of the Croatian–Hungarian border region and four of the ten districts in the Hungarian part of the Romanian–Hungarian border region moved into a higher development category between 2013 and 2023. These relatively unfavorable results may have been influenced by the fact that, in the case of the Croatian-Hungarian border region, the intensity of cross-border relations (see Figure 1) and, in the case of the Romanian-Hungarian border region, the growth of cross-border relations (see Figure 2) lagged behind that of the Serbian-Hungarian contact zone.

Figure 1

[19] Pintér, "Szerbia társadalmi-gazdasági állapota a 21. század elején – jövőbeni gazdaságpolitikai lehetőségek."
[20] "Hungarian Central Statistical Office: A bruttó hazai termék (GDP) értéke forintban, euróban, dollárban, vásárlóerő-paritáson."
[21] "Hungarian Central Statistical Office: A bruttó hazai termék (GDP) értéke forintban, euróban, dollárban, vásárlóerő-paritáson."
[22] I highlight the Ukrainian-Hungarian border region, which is also on the edge of the Schengen area. Two of the three Hungarian districts in this region moved into a higher development category between 2013 and 2023.

Number of passengers entering and leaving Hungary at the Croatian-Hungarian, Serbian-Hungarian and Romanian-Hungarian border crossings, 2004-2022[23]

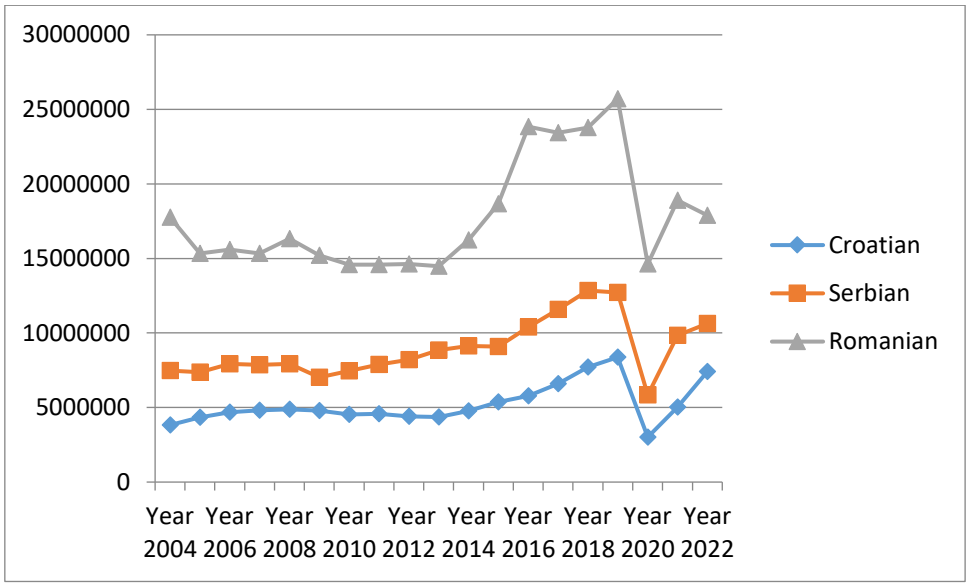
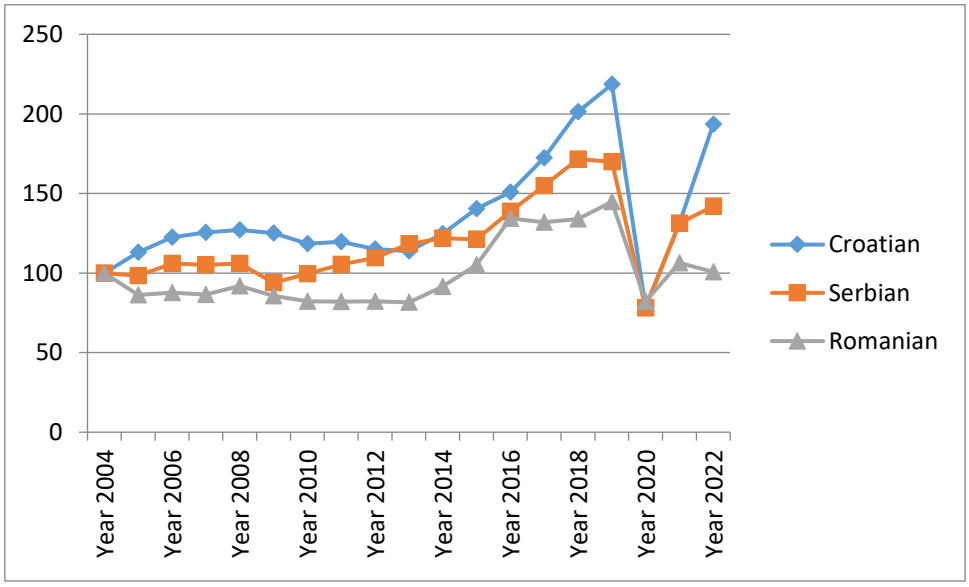


Figure 2
Growth of passengers entering and leaving Hungary at the Croatian-Hungarian, Serbian-Hungarian and Romanian-Hungarian border crossings, 2004-2022 (2004 =100)[24]



[23] Own calculation based on "Hungarian Central Statistical Office: Határátkelők személyforgalma. Magyarország államhatárán be- és kilépő személyforgalom."

[24] Own calculation based on "Hungarian Central Statistical Office: Határátkelők személyforgalma. Magyarország államhatárán be- és kilépő személyforgalom."

While not denying the importance of other factors affecting regional development, this brief empirical study confirms our basic assumption that border proximity — that is, the advantages arising from interactions with neighbouring regions — can be considered a form of capital on which local and higher-level development policies (EU and member state) can and should largely be based.

Conclusion

Research based on the theory of centre-periphery relations tends to view border regions as peripheries. In this view, distance from the centre, situational periphery position, and subordination to the centre, power periphery position, result in unfavourable development indicators, developmental periphery position. However, observations on border regions complicate this picture in many respects. Following the opening up of borders, for example in Europe, interactions with neighbouring border regions can be interpreted as capital that enables these border contact zones to develop. My study sought to reinforce this basic assumption through a brief empirical investigation of the Serbian-Hungarian border region. The investigation used principal component analysis, one of the most widespread statistical data reduction methods, to describe development trends in small regions/districts on the Hungarian side of the Serbian–Hungarian border zone between 2004 and 2023. The results are thought-provoking in several respects. On the one hand, we demonstrated that the development trends of the small districts in question largely followed the intensity of relations maintained with neighbouring border region during the review period, thus confirming our basic assumption. Between 2013 and 2023, a period characterised by intensive growth in cross-border traffic, four of the five districts in this area (Szeged, Baja, Kiskunhalas, Mórahalom and Bácsalmás) moved into a higher development category, surpassing similar Hungarian small regions/districts not located in border areas. However, we also pointed out that these positive results cannot be generalised to all of Hungary's border small regions/districts. The latter's results lag behind those of Hungarian districts not located in border areas, with the exception of those located along the relatively short Ukrainian-Hungarian border section. In other words, it would be a mistake to overstate the importance of border location. The potential inherent in interactions with neighbouring border regions can only be optimally exploited through the appropriate application of local and higher-level (EU and member state) development policies. Presenting the effects of the development policies through the example of the Hungarian and/or Serbian side of the border region and generalising the experiences gained in this way may even point to a possible direction for further research.

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