THE IMPORTANCE OF CROSS-BORDER COOPERATION ON REGIONAL DEVELOPMENT: EVIDENCE FROM THE EUROREGION, NEISSE

Pavel Zdražil, Grażyna Kozuń-Cieślak

Abstract: *This paper aims to focus on the importance of cross-border cooperation in respect of regional development. We aim to examine whether the regions of the euroregion, Neisse, experience different patterns of development in economic performance compared against both the neighbouring regions in their country, and to their country itself. The methodological framework is based on correlation analysis of volumes, where the non-stationary issue has been examined via the ADF unit root test. The results showed that the initiatives of the cross-border cooperation appear to be vital instruments of the European Union cohesion policy in the case of the euroregion, Neisse, but at the same time, are very ambiguous as well. The Czech and Polish regions of Neisse seem to be influenced by the 'cross-border cooperation factor', since they differ from the benchmark entities; however, no obvious differences have been found to occur on the German side of the border. Furthermore, the figures obtained show that the growth rates of the Czech and Polish regions of Neisse were slower than in their neighbouring regions and respective countries. In summary, we may suggest that some linkages within the euroregion, Neisse, do exist, but we may ask whether their existence is unfavourable or whether their potential is or is not used in the best way possible.*

Keywords: *cross-border cooperation, Neisse, cohesion, euroregions, regional development.*

JEL Classification: *R11, O47.*

Introduction

Cross-border cooperation among different regions is influenced by the long-term and ongoing goals of the European regional policy since it falls under the European Territorial Cooperation objective. It follows the strategic aims of the European Union (EU) cohesion policy while it seeks to *"promote a harmonious economic, social and territorial development of the Union as a whole"* [6]. To reach this goal, it is focusing on reducing national borders within EU, and between EU and some adjacent countries, by supporting joint actions and policy exchanges between national, regional and local actors involving at least two countries [7]. Even though its importance is considerably lower than the main objectives (currently, investment for growth and jobs) within EU regional policy budget (for the period of 2014-2020, it is about 2.5% of the total amount) [8], the EU still provides a wide range of tools to support this kind of regional development.

The well-known instruments of cross-border cooperation are, probably, the euroregions and European Groupings of Territorial Cooperation (EGTC) which enables extending of support from local initiatives, i.e., shifting the aim of a policy of cohesion from territorial unit NUTS 2 to a lower regional level. The cross-border cooperation is important especially for the field of spatial planning in border areas [5] and also security issues [2], but some studies argue that, in particular, small-sized cross-border initiatives do influence regional development significantly [12]. Today, the Association of European Border Regions lists about 200 euroregions, and the Committee of Regions lists about 60 that exist under EGTC, and about 10 EGTC under construction [1; 3]. Furthermore, many of those regional groupings are situated in the 'new' member states from Central and Eastern Europe that joined the EU in 2004 or thereafter. Since the regions of these countries usually belong to the less developed areas in the EU [13], we may ask whether the factor of euroregion, or EGTC, is able to significantly impact the development of the regions involved in such groupings, and contribute to the European cohesion.

1 Statement of a problem

Keeping all of the above in mind, this paper seeks to examine the importance of cross-border cooperation on regional development, laying heavy focus on economic performance. Being limited from many angles, viz: (I) the cross-border initiatives being based on a very large range of reasons and motivations, moreover, there are no rigid criteria to define the platforms for cooperation, e.g., 'euroregions' [11]; (II) the shift towards a lower regional level enables the possibility of involvement of small districts and municipalities, where economic performance statistics are unavailable; (III) the initiatives for cooperation are founded continuously, i.e., the large time bias can occur by comparison of results; (IV) cross-border cooperation initiatives are founded on a voluntary basis, hence, the range of cooperating area is often unstable (changing in time), etc., we decided to reduce our analysis only to one cross-border cooperation initiative, where none of the above issues are of any significance. Since we found a case where the assumptions of insignificance fit fairly well, our attention is now drawn toward the euroregion, Neisse, which is the oldest euroregion in Central and Eastern Europe, established in 1991 [9], whereas, we can employ NUTS 3 regions data as an analysis input.

In keeping with the facts outlined above, the aim of this paper is to examine whether the parts (regions) of euroregion, Neisse, experience different development patterns in economic performance, compared with both the neighbouring regions in their country and to their country itself. Because if so, one can assume that the cross-border cooperation initiatives are very critical instruments of EU cohesion policy, even down to its modest budget; and, hence, its growing share within the budget [6] is fully justified.

2 Methods

This analysis has been conducted using the application of following assumptions and methods. We examine parts of the cross-border euroregion, Neisse, on all sides of the borders. Neisse covers the area of two territorial units NUTS 3 on the German side

(DED2C - Bautzen and DED2D - Görlitz), but on the Czech and Polish sides, the euroregion is formed by municipalities that do not reflect borders of any region wherefrom data for our analysis can be collected. Hence, we substituted the Czech part of Neisse with a NUTS 3 region CZ051 - Liberec Region, and the Polish part with a NUTS 3 region PL515 - Jeleniogorski. One can say that both substituted regions cover most of the area and population of municipalities involved during the period under study, therefore, the bias may be acceptable for our study. Besides, a similar approximation is pretty logical by examinations of the euroregion's development. To compare the development of the regions of Neisse, we use their respective countries as a benchmark, i.e., CZ - Czech Republic, DE - Germany and PL - Poland. Furthermore, we use the neighbouring NUTS 3 regions within the same country also as a benchmark (CZ020 - Central Bohemian Region, CZ042 - Usti nad Labem Region, CZ052 - Hradec Kralove Region; DE40B - Oberspreewald-Lausitz, DE40G - Spree-Neiße, DED21 - Dresden, Kreisfreie Stadt, DED2E - Meißen, DED2F - Sachsische Schweiz-Osterzgebirge; PL432 - Zielonogorski, PL516 - Legnicko-Glogowski, PL517 - Walbrzyski, PL518 - Wroclawski).

We study relationships in per capita Gross Domestic Product (expressed in Purchasing Power Standard, PPS) between pairs of regions, and between particular regions and their respective countries. The data have been linked from the Eurostat database [10] and covers the period of 2000-2013. We employ the correlation analysis of volumes, based on Pearson's R, to examine direction and significance of the relationships between regions. As long as we are using correlation analysis of volumes, we have to deal with the issue of non-stationary to avoid the spurious series correlation problem. We used the augmented Dickey-Fuller (ADF) test [4] that examines the null of a unit root, i.e., non-stationary; which found that our data are non-stationary. Furthermore, we found that the non-stationary issue can be overcome by conventional series transformation in its 2nd logarithmic difference (1). This transformation helped us to stabilize the variance and mean of examined time series for one side, and on the other side to eliminate trend.

$$\ln dd\, X_{(t)} = \left[\ln X_{(t-2)} - \ln X_{(t-1)}\right] - \left[\ln X_{(t-1)} - \ln X_{(t)}\right] \qquad (1)$$

where ln dd $X_{(t)}$ is 2nd logarithmic difference of value in time (t); $X_{(t)}$ and $X_{(t-n)}$ are values in time (t) and (t-n), respectively.

As one can see from Table 1, all the transformed volumes are stationary at the significance level of 0.05; hence, data transformed via the formula (1) are not burden for any more distortions and may be used as an input for following correlation analysis. Even though the null of non-stationary cannot be rejected at the significance level of 0.05, we have to point out that our required significance level is 0.10.

Table 1: ADF test results of series transformed in its 2nd logarithmic difference

reg.	CZ051	DED2C	DED2D	PL515		CZ	CZ020	CZ042	CZ052	DE
p-v.	0.03	0.02	0.01	0.00		0.02	0.02	0.01	0.01	0.03
reg.	DE40B	DE40G	DED21	DED2E	DED2F	PL	PL432	PL516	PL517	PL518
p-v.	0.03	0.00	0.01	0.00	0.00	0.02	0.03	0.05	0.01	0.02

Notes: reg. = region; p-v. = probability of null of non-stationary; the parts of euroregion, Neisse, highlighted in grey.

Source: authors' own work based on [10]

3 Analysis, results and discussion

Now, after dealing with the non-stationary issue, the examination may lead to being processed by the correlation analysis of volumes. Firstly, we focus on relationships between the regions within Neisse. The results shown in Table 2 suggest that the development of per capita GDP correlate between the Czech and German regions of Neisse, and between German regions. However, the Polish region does not match these conclusions when no relationship was found to be significant between PL515 and the other regions of Neisse. In addition, all the significant relationships were positively correlated, which one can interpret as direct impacts of development.

Table 2: Correlation analysis results - regions of Neisse

Relationship	R	p-v.
CZ051 - DED2C	0.67	**0.02**
CZ051 - DED2D	0.55	**0.06**
CZ051 - PL515	0.33	0.30
DED2C - DED2D	0.49	**0.10**
DED2C - PL515	0.28	0.38
DED2D - PL515	0.43	0.17

Notes: R = correlation coefficient; p-v. = probability of null of no relationship; bolded figures = rejection of null, i.e., significant relationship; the parts of euroregion, Neisse, highlighted in grey.

Source: authors' own work based on [10]

Furthermore, as seen from Table 3, we found that all the regions in our sample, except one (PL515), follow the development of their respective countries in per capita GDP. Basing on these results, we may assume there are no obvious differences between the particular regions of Neisse and both respective countries and neighbouring regions. Additionally, from this point of view, it looks like participation in the euroregion, Neisse, highlights no pros or cons in the economic performance of regions.

Table 3: Correlation analysis results - regions and their respective countries

Relationship	R	p-v.
CZ051 - CZ	0.67	**0.02**
CZ020 - CZ	0.80	**0.00**
CZ042 - CZ	0.73	**0.01**
CZ052 - CZ	0.93	**0.00**

Relationship	R	p-v.
DED21 - DE	0.85	**0.00**
DED2E - DE	0.95	**0.00**
DED2F - DE	0.88	**0.00**

DED2C - DE	0.64	**0.02**
DED2D - DE	0.67	**0.02**
DE40B - DE	0.65	**0.02**
DE40G - DE	0.65	**0.02**

PL515 - PL	0.48	0.11
PL432 - PL	0.93	**0.00**
PL516 - PL	0.73	**0.01**
PL517 - PL	0.71	**0.01**
PL518 - PL	0.85	**0.00**

Notes: R = correlation coefficient; p-v. = probability of null of no relationship; bolded figures = rejection of null, i.e., significant relationship; the parts of euroregion, Neisse, highlighted in grey.

Source: authors' own work based on [10]

At the next step, we focus our attention on relationships between the regions of Neisse and their neighbouring areas. With the summary of results shown in Table 4, one can draw some very interesting conclusions. On the Czech side, the Neisse region, CZ051, does not correlate with the neighbouring regions, except CZ052; but at the

same time we found significant relationships of correlation among the non-Neisse regions. Very similar results have been found in Poland, where the Neisse region, PL515, does not correlate with the neighbouring areas, while most of non-Neisse regions do correlate, one with another (in 4 of 6 cases). Nevertheless, the situation among the German regions differs, since significant relationships of correlation unambiguously prevail in both the Neisse and non-Neisse regions.

Table 4: Correlation analysis results - regions and their intranational neighbours

Relationship	R	p-v.
CZ051 - CZ020	0.49	0.11
CZ051 - CZ042	0.31	0.32
CZ051 - CZ052	0.58	**0.05**
CZ042 - CZ020	0.53	**0.08**
CZ052 - CZ020	0.69	**0.01**
CZ052 - CZ042	0.68	**0.02**
DED2C - DED2D	0.49	**0.10**
DED2C - DE40B	0.86	**0.00**
DED2C - DE40G	0.07	0.83
DED2C - DED21	0.40	0.20
DED2C - DED2E	0.51	**0.09**
DED2C - DED2D	0.67	**0.02**
DED2D - DE40B	0.53	**0.08**
DED2D - DE40G	0.66	**0.02**
DED2D - DED21	0.76	**0.00**
DED2D - DED2E	0.46	0.13
DED2D - DED2F	0.66	**0.02**
DE40B - DE40G	0.26	0.41
DE40B - DED21	0.49	0.11
DE40B - DED2E	0.51	**0.09**
DE40B - DED2F	0.59	**0.04**
DE40G - DED21	0.62	**0.03**
DE40G - DED2E	0.66	**0.02**
DE40G - DED2F	0.53	**0.08**
DED21 - DED2E	0.72	**0.01**
DED21 - DED2F	0.78	**0.00**
DED2E - DED2F	0.81	**0.00**
PL515 - PL432	0.44	0.15
PL515 - PL516	0.23	0.47
PL515 - PL517	0.43	0.16
PL515 - PL518	0.48	0.12
PL432 - PL516	0.71	**0.01**
PL432 - PL517	0.56	**0.06**
PL432 - PL518	0.72	**0.01**
PL516 - PL517	0.49	0.11
PL516 - PL518	0.55	**0.07**
PL517 - PL518	0.44	0.15

Notes: R = correlation coefficient; p-v. = probability of null of no relationship; bolded figures = rejection of null, i.e., significant relationship; the parts of euroregion, Neisse, highlighted in grey.

Source: authors' own work based on [10]

Keeping the above-mentioned findings in mind, we suggest that the German regions of Neisse, i.e., DED2C and DED2D, experience no noticeable difference in per capita GDP development compared with their neighbouring German regions, and Germany as a country. On the other hand, the Czech and Polish regions of Neisse mostly differ from their neighbouring regions in economic performance. Besides, the Polish region is the only one in the entire sample that does not correlate with its respective country. These simple facts lead us to the conclusion that involvement in the euroregion, Neisse, may influence the economic performance of the Czech and Polish regions, while the German regions remain rather uninfluenced by their Czech and Polish counterparts. This conclusion seems stronger for the Czech region since significant correlation relationships with both the German regions of Neisse have been found. Moreover, even though the per capita GDP of the Polish region does not correlate with that of the other Neisse members, the Polish region differs very unambiguously from its benchmarks on the Polish side of the border in both neighbouring regions and Poland as a country.

Conclusion

This paper sought to examine the importance of cross-border cooperation on regional development based on the evidence from the euroregion of Neisse. By employing the correlation analysis of volumes, it found that development of per capita GDP in the regions of Neisse differ significantly from its neighbouring areas in Poland and in the Czech Republic. Furthermore, no obvious differences in development have been found between the German Neisse and non-Neisse regions. With these findings in mind, one can probably interpret the results as follows: the cross-border cooperation initiatives seem to be a very important instruments of EU cohesion policy in the case of euroregion Neisse, but very ambiguous as well. Owing to the findings of no obvious impact of Neisse on German regions, along with some impact on both less developed regions in the Czech Republic and Poland, one could expect the relatively more developed regions of Germany would help to promote the economic performance of the less developed regions. However, the real figures do not confirm this assumption, since the benchmark entities' growth was faster between 2000 and 2013 than the regions of Neisse in both the Czech Republic and Poland (see Table 5). In addition, the German regions of Neisse do not show any unambiguous deviations from their benchmarks.

Table 5: GDP growth between 2000 and 2013

reg.	CZ051	DED2C	DED2D	PL515		CZ	CZ020	CZ042	CZ052	DE
2013/ 2000	1.34	1.56	2.07	1.82		1.57	1.40	1.47	1.46	1.42
reg.	DE40B	DE40G	DED21	DED2E	DED2F	PL	PL432	PL516	PL517	PL518
2013/ 2000	1.71	2.27	1.59	1.57	1.55	1.95	1.88	2.32	1.83	2.44

Notes: reg. = region; 2013/2000 is the ration of per capita GDP of selected years; the parts of euroregion, Neisse, highlighted in grey.

Source: authors' own work based on [10]

In summary, the factor of cross-border cooperation seems like an important instrument, but, in our case, this is without any provable promotion of economic performance in the less developed regions. Hence, the eligibility of growing expenditures on cross-border cooperation is ambiguous, since its effectiveness has not been approved by our results. However, based on our analysis, we cannot evaluate whether the effect of Neisse is rather positive or negative, i.e., whether the regions would develop less favourably without the 'cross-border cooperation factor', respectively; since our analysis focused on other issues. We may only speculate whether the existence of connections found is unfavourable or whether their potential is or is not used in the best way possible.

We can probably say that this paper enlightened us with an important lesson which should be kept in mind, by shaping regional and developmental policies at both national and EU levels. Even though we examined only one example of cross-border cooperation initiatives, we may suggest that the findings will be relevant to many other initiatives as well. In addition, the paper presented a few important questions which call for further research. At the least, we have to point out that our analysis is limited,

and should be extended, by examining more euroregions, or other kinds of cross-border cooperation initiatives.

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Contact Address

Ing. Pavel Zdražil, Ph.D.
University of Pardubice, Faculty of Economics and Administration,
Institute of Regional and Security Sciences
Studentska 95, 532 10, Pardubice, Czech Republic
Email: Pavel.Zdrazil@upce.cz
Phone number: +420 466 036 702

Grażyna Kozuń-Cieślak, Ph.D.
University of Technology and Humanities, Faculty of Economics, Department of Economics
Chrobrego 31, 26-600, Radom, Poland
Email: g.kozun@uthrad.pl
Phone number: +48 48 361 74 00