THE ROLE OF CROSS-BORDER COOPERATION INITIATIVES IN RESPECT OF REGIONAL DEVELOPMENT: CASE STUDY OF EUROREGION NEISSE

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Abstract: *The paper seeks to examine the importance of cross-border cooperation on regional development. It focuses on the euroregion Neisse since it fits some important assumptions that need to be matched to overcome limitations that are connected to examination of any cooperation initiatives. Its objective is to find whether regions of euroregion, Neisse, experience different development patterns in economic performance compared against the neighbouring regions in their country. We employed a two-step analysis of volumes, where the correlation analysis is extended by testing for Granger causality. To check the non-stationary issue, the analysis runs the ADF unit root test. The analysis found that the initiatives of the cross-border cooperation appear to be an important instrument of the European Union cohesion policy in the case of the euroregion, Neisse, but at the same time, are very ambiguous as well. In our case, even some significant relations have been identified in both correlation and causality sense; no provable promotion of economic performance has been measured. 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.*

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JEL Classification: *R11, O47.*

Introduction and statement of a problem

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"* (European Commission, 2016a). 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 (European Commission, 2016b). 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) (European Commission, 2016c), the EU still provides a wide range of tools to support this kind of regional development. Since the European Commission estimates that ca 38% of EU citizens live in border areas it operates 60 programmes for the period of 2014-2020 likewise for the period of 2007-2013, where over 6,000 projects have been supported (European Commission, 2016b).

The well-known instruments of cross-border cooperation are, probably, the euroregions and European Groupings of Territorial Cooperation (EGTC) which enable extending

of support to 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 (Duhr et al., 2010; Haselsberger and Benneworth, 2010) and also security issues (Brunnet-Jailly, 2011), but some studies argue that, in particular, small-sized cross-border initiatives do influence regional development significantly (Perkmann, 2003). 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 (Association of European Border Regions, 2016; Committee of Regions, 2016). 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 (Zdražil and Applová, 2016), 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. In this paper we try to find an answer to this question.

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, namely: (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' (Medeiros, 2011); (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 (Euroregion Nisa, 2016), whereas, we can employ NUTS 3 regions data as an analysis input.

There is large literature on cross-border cooperation grouping and euroregions in respect of regional development but there are many limitations of its research (Perkmann, 2003), some of that most important have been pointed above. For this reason, the existing studies are usually focused on surveying of specific issues from both economic and non-economic areas (e.g. business conditions, networking, culture events, tourism, evaluation of specific projects, etc.). Some studies compare the characteristics of population and employment, which are well explored, harmonized and regularly disclosed by national statistical offices. In the case of euroregion Neisse, there are some recent economic studies focusing the competitiveness and business environment (Dědková and Blažková, 2014; Dědková and Folprecht, 2013) as well as studies of cooperation between companies (Honzáková and Ungerman, 2014). Moreover, Piwowar (2013) tried to analyse the issue of unemployment, while Poštolka and Branda (2009) focused the issue of population structure. A study of some economic inequalities and political differences has been introduced by Kepka (2004). The issue of socio-economic networks and its importance for development has been described by Burdack et al. (2016; 2015); furthermore, Herrschel (2011) tried to explain some reasons of existence of euroregion Neisse and the ways of how the public management should behave to promote its functioning.

The above listed studies focused, perhaps even compared, particular parts of Neisse. However, there is a lack of economic performance research in the field of euroregions (in general, not only Neisse). We have found no studies that are examining the issue of economic performance among the parts of cross-border cooperation initiatives or euroregions, and try to find causalities or other kinds of relationships involved. The aim of this paper is then to examine whether the parts (regions) of euroregion, Neisse, experience different development patterns in economic performance, compared with the neighbouring regions in their country. 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 (European Commission, 2016a) is fully justified.

To fulfil the goal, we employ a two-step analysis of volumes, where the correlation analysis is extended by testing for Granger causality. Firstly, we check the non-stationary issue, via the ADF unit root test. After resolving the non-stationary issue, we employ the correlation analysis of volumes to examine relationships between the regions. And finally, we test for Granger causality between the regions which helps to specify the results. Statistical and econometric software package Gretl is used to calculate the results below.

1 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 the neighbouring NUTS 3 regions within the same country 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 (GDP), expressed in purchasing power standard, between pairs of regions. The data have been linked from the Eurostat database (2016) and cover the period of 2000-2013. Firstly, we employ the correlation analysis of volumes, based on Pearson's R, to examine direction and significance of the relationships between regions. Afterwards, we test for Granger causality in our data, to specify the results. The Granger causality (Granger, 1969; Granger, 1988) is based on simple principle that we assume causality between two volumes, let us say x and y, if past values of x can improve the explanation of current y. Then, whether adding lagged values of x help to explain the current y, one can say x Granger causes y. Following the Granger's approach (1969), we used regression model to examine the Granger causality of volumes (1). The null hypothesis is that no causal relation between volumes exists,

and therefore its rejection refers to Granger causality. The optimal lag-length has been estimated via data dependent procedure – the Akaike information criterion (AIC).

$$Y_{(t)} = \alpha_0 + \alpha_1 Y_{(t-1)} + \cdots + \alpha_i Y_{(t-i)} + \beta_1 X_{(t-1)} + \ldots + \beta_i X_{(t-i)} + \epsilon_t \quad (1)$$

where $Y_{(t)}$ and $X_{(t)}$ are values in time (t) and (t-n), respectively; (i) refers to the number of lags; α and β are model parameters and ε refers to error term.

As long as we are using correlation analysis of volumes and the Granger causality approach, we have to deal with the issue of non-stationary to avoid the spurious results. We used the augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979; Said and Dickey, 1988) 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 (2). This transformation helped us to stabilize the variance and mean of examined time series for one side, and on the other side to eliminate the trend.

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

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. In addition, Table 1 shows Durbin-Watson statistics (DW) of transformed volumes which found the DW are around 2 in all cases, and hence there are no serial correlation problems in our data. Based on these findings one can assume that data transformed via the formula (2) are not burden for any more distortions and may be used as an input for following computation. 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.

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

reg.	CZ051	DED2C	DED2D	PL515		PL432	PL516	PL517	PL518
p-v.	0.03	0.02	0.01	0.00		0.03	0.05	0.01	0.02
DW	2.09	2.40	2.03	1.84		1.43	1.89	2.13	2.15
reg.	CZ020	CZ042	CZ052		DE40B	DE40G	DED21	DED2E	DED2F
p-v.	0.02	0.01	0.01		0.03	0.00	0.01	0.00	0.00
DW	2.15	1.93	2.24		2.27	1.88	2.05	2.23	2.64

Notes: reg. = region; p-v. = probability of null of non-stationary; the parts of euroregion, Neisse, highlighted in grey. DW critical values at the significance level of 0.05: dL = 0.93; dU = 1.32.

Source: authors' own work based on Eurostat (2016)

2 Problem solving

The analysis part is divided into two main sections. Firstly, we proceed to examination of regions that create the cross-border cooperation initiative, Neisse. Afterwards, we focus on relationships between Neisse and non-Neisse regions or connections between sample regions and their intranational neighbours, respectively.

We always start with the correlation analysis of volumes that is followed by testing for Granger causality relationships between the developments of per capita GDP of Neisse regions. This analysis part proceeds due to our effort to specify the results of correlation analysis. We examine both directions of causality i.e. whether region *x* Granger causes region *y* and whether region *y* Granger causes region *x*. The following discussion part joins results of both sections to draw some more comprehensive conclusions.

2.1 Regions of Neisse

Now, after dealing with the non-stationary issue, the examination may lead to being processed by the correlation analysis of volumes. First of all, 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.

Tab. 2: Correlation analysis results - regions of Neisse

Relationship	R	p-v.	DW
CZ051 - DED2C	0.67	**0.02**	1.68
CZ051 - DED2D	0.55	**0.06**	1.37
CZ051 - PL515	0.33	0.30	1.81
DED2C - DED2D	0.49	**0.10**	2.28
DED2C - PL515	0.28	0.38	2.68
DED2D - PL515	0.43	0.17	2.48

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. DW critical values at the significance level of 0.05: dL = 0.93; dU = 1.32.

Source: authors' own work based on Eurostat (2016)

Table 3 shows that Granger causality has been found between German regions in both directions. In addition, the Czech region Granger causes one of the Germany (DED2C) but no relationship has been found to another German region (DED2D). The Polish region (PL515) follows the results of correlation analysis i.e. no relationships with other regions have found to be significant. These findings help to understand why some significant correlation relationships between regions of Neisse have been found. The results of Granger causality between the regions within Neisse follow the results of correlation analysis i.e. significant correlation relationships have been explained by at least one significant relationship in Granger sense. There has been found only one exception from this (CZ051 - DED2D). Hence, one can assume that the correlation is spurious in this case but it should likely be result of some "train of events" or indirect causality, respectively; since CZ051 Granger causes DED2C and that causes DED2D.

Tab. 3: Granger causality results - regions of Neisse

Relationship	F-stat.	p-v.	Relationship	F-stat.	p-v.
CZ051 => DED2C	4.32	**0.07**	DED2C => CZ051	3.11	0.12
CZ051 => DED2D	0.70	0.43	DED2D => CZ051	1.54	0.25
CZ051 => PL515	2.14	0.18	PL515 => CZ051	0.31	0.60
DED2C => DED2D	7.18	**0.03**	DED2D => DED2C	4.32	**0.08**
DED2C => PL515	0.44	0.75	PL515 => DED2C	0.80	0.60
DED2D => PL515	1.77	0.38	PL515 => DED2D	0.24	0.86

Notes: F-stat. = F-statistic; p-v. = probability of null of no causal relationship in the Granger sense; bolded figures = rejection of null, i.e., Granger causality; => means the direction of examined relationship; the parts of euroregion, Neisse, highlighted in grey.

Source: authors' own work based on Eurostat (2016)

2.2 Regions and their intranational neighbours

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 correlation relationships among the non-Neisse regions. Very similar results have been found in Poland, where the Neisse region, PL515, does not correlate significantly with the neighbouring areas, while most of non-Neisse regions do, 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. In particular, 7 of 10 relationships have found to be significant in interactions between the Neisse and non-Neisse regions, and 8 of 10 only between the non-Neisse regions. Another important finding is that the analysis found all the significant relationships to be positive. This means that development of any region in our sample seems not to be to the detriment of anyone (region) else.

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. On the other hand, the Czech and Polish regions of Neisse mostly differ from their neighbouring regions in economic performance (measured in per capita GDP). 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 i.e. neighbouring regions.

Tab. 4: Correlation analysis results - regions and their intranational neighbours

Relationship	R	p-v.	DW
CZ051 - CZ020	0.49	0.11	2.01
CZ051 - CZ042	0.31	0.32	2.89
CZ051 - CZ052	0.58	**0.05**	2.63
CZ042 - CZ020	0.53	**0.08**	1.51
CZ052 - CZ020	0.69	**0.01**	3.06
CZ052 - CZ042	0.68	**0.02**	2.88
DED2C - DE40B	0.86	**0.00**	2.48
DED2C - DE40G	0.07	0.83	3.28
DED2C - DED21	0.40	0.20	2.72
DED2C - DED2E	0.51	**0.09**	2.64
DED2C - DED2F	0.67	**0.02**	2.60
DED2D - DE40B	0.53	**0.08**	2.19
DED2D - DE40G	0.66	**0.02**	2.40
DED2D - DED21	0.76	**0.00**	2.80
DED2D - DED2E	0.46	0.13	3.18
DED2D - DED2F	0.66	**0.02**	2.79

Relationship	R	p-v.	DW
DE40B - DED2E	0.51	**0.09**	3.40
DE40B - DED2F	0.59	**0.04**	2.77
DE40G - DED21	0.62	**0.03**	2.52
DE40G - DED2E	0.66	**0.02**	2.39
DE40G - DED2F	0.53	**0.08**	2.28
DED21 - DED2E	0.72	**0.01**	2.39
DED21 - DED2F	0.78	**0.00**	2.32
DED2E - DED2F	0.81	**0.00**	2.06
PL515 - PL432	0.44	0.15	2.63
PL515 - PL516	0.23	0.47	1.92
PL515 - PL517	0.43	0.16	2.68
PL515 - PL518	0.48	0.12	2.68
PL432 - PL516	0.71	**0.01**	2.59
PL432 - PL517	0.56	**0.06**	2.22
PL432 - PL518	0.72	**0.01**	1.84
PL516 - PL517	0.49	0.11	1.96

Relationship	R	p-v.	DW
DE40B - DE40G	0.26	0.41	2.80
DE40B - DED21	0.49	0.11	2.92

Relationship	R	p-v.	DW
PL516 - PL518	0.55	**0.07**	2.34
PL517 - PL518	0.44	0.15	2.40

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. DW critical values at the significance level of 0.05: dL = 0.93; dU = 1.32.

Source: authors' own work based on Eurostat (2016)

Now, we approach to testing for Granger causality in relationships between the regions of Neisse and their neighbouring areas that results are shown in Table 5. No Granger causalities have been measured among the Czech region of our sample. This result can take anyone to surprise since 4 of 6 correlation relationships have been found to be significant for the Czech Republic. Of course, correlation is not in any way a condition for causality but one can expect that some correlation relationships should be supported by that causality. Since no signs of Granger causality found among Czech regions one can assume the examined regions should be interconnected through other that are not involved in our sample. However, we have to point out that this is only speculation which calls for further deeper analysis; certainly, it can be an effect of many other factors, that we are not able to catch by this simple analysis, likewise.

Tab. 5: Granger causality results - regions and their intranational neighbours

Relationship	F-stat.	p-v.	Relationship	F-stat.	p-v.
CZ051 => CZ020	1.67	0.23	CZ020 => CZ051	0.14	0.71
CZ051 => CZ042	1.08	0.33	CZ042 => CZ051	0.05	0.83
CZ051 => CZ052	0.01	0.94	CZ052 => CZ051	0.75	0.52
CZ042 => CZ020	0.66	0.44	CZ020 => CZ042	1.24	0.30
CZ052 => CZ020	0.13	0.72	CZ020 => CZ052	0.75	0.41
CZ052 => CZ042	0.20	0.67	CZ042 => CZ052	0.66	0.44
DED2C => DE40B	0.08	0.79	DE40B => DED2C	0.05	0.95
DED2C => DE40G	0.04	0.97	DE40G => DED2C	0.88	0.38
DED2C => DED21	0.06	0.94	DED21 => DED2C	1.94	0.24
DED2C => DED2E	2.70	0.16	DED2E => DED2C	0.89	0.47
DED2C => DED2F	0.80	0.50	DED2F => DED2C	3.92	**0.09**
DED2D => DE40B	5.43	**0.06**	DE40B => DED2D	6.93	**0.04**
DED2D => DE40G	29.12	**0.03**	DE40G => DED2D	0.83	0.58
DED2D => DED21	0.09	0.78	DED21 => DED2D	0.00	0.97
DED2D => DED2E	2.06	0.19	DED2E => DED2D	0.16	0.70
DED2D => DED2F	4.03	**0.08**	DED2F => DED2D	1.70	0.23
DE40B => DE40G	0.08	0.92	DE40G => DE40B	1.21	0.37
DE40B => DED21	0.14	0.87	DED21 => DE40B	0.71	0.53
DE40B => DED2E	1.40	0.27	DED2E => DE40B	0.08	0.79
DE40B => DED2F	2.10	0.19	DED2F => DE40B	0.33	0.58
DE40G => DED21	35.80	**0.03**	DED21 => DE40G	0.36	0.79
DE40G => DED2E	9.67	**0.10**	DED2E => DE40G	3.57	0.23
DE40G => DED2F	0.03	0.86	DED2F => DE40G	0.89	0.37
DED21 => DED2E	1.92	0.20	DED2E => DED21	4.36	**0.07**
DED21 => DED2F	5.28	**0.05**	DED2F => DED21	8.68	**0.02**
DED2E => DED2F	3.30	0.12	DED2F => DED2E	2.82	0.15
PL515 => PL432	1.19	0.38	PL432 => PL515	0.93	0.45

Relationship	F-stat.	p-v.	Relationship	F-stat.	p-v.
PL515 => PL516	2.31	0.17	PL516 => PL515	5.06	**0.05**
PL515 => PL517	1.62	0.29	PL517 => PL515	6.30	**0.04**
PL515 => PL518	0.13	0.73	PL518 => PL515	0.55	0.48
PL432 => PL516	1.07	0.41	PL516 => PL432	1.81	0.26
PL432 => PL517	8.48	**0.02**	PL517 => PL432	7.95	**0.03**
PL432 => PL518	0.52	0.49	PL518 => PL432	4.84	**0.06**
PL516 => PL517	9.89	**0.02**	PL517 => PL516	9.26	**0.02**
PL516 => PL518	4.21	**0.07**	PL518 => PL516	22.58	**0.00**
PL517 => PL518	6.30	**0.04**	PL518 => PL517	0.48	0.64

Notes: F-stat. = F-statistic; p-v. = probability of null of no causal relationship in the Granger sense; bolded figures = rejection of null, i.e., Granger causality; => means the direction of examined relationship; the parts of euroregion, Neisse, highlighted in grey.

Source: authors' own work based on Eurostat (2016)

By focusing on regions of Germany, we can see ca one half of significant correlations (8 of 15) have been explained by at least one Granger causality relationship. One can conclude that situation among the German regions is very ambiguous again, since cases of null rejections are distributed equally in both the relationships with Neisse regions and that without. These findings explain about one half of correlation relationships that above analysis found to be significant. We can assume the other correlation relationships may be explained by networks of causal relations among the German regions, i.e. some pairs should correlate thanks to their indirect relationships through the other regions. By focusing on the Neisse regions we found that DED2C is less often involved in the Granger causality relationships vis-à-vis DED2D. Furthermore, DED2D influences the other regions more often than it is influenced by them.

Serious gaps between the results of correlation analysis and Granger causality analysis have been found by Polish regions. Even though we found no correlation relationship to be significant for the Neisse region (PL515), we found that 2 regions Granger cause that (PL516 and PL 517). Furthermore, we found all significant correlation relationships, except one (PL432 - PL 516), to be explained by at least one Granger causality. Besides, we found 2 other relationships in the Granger sense (PL516 - PL517 and PL517 - PL518) that has not been assumed due to the result of correlation analysis part. This result is really interesting since we found not even one such a case neither in the Czech Republic nor Germany. Another said, Granger causality relationships that are not supported by significant correlations have been found only among the regions of Poland. Based on these facts we can conclude that analysis found the ratio of causal relationships among Polish regions to be the highest but it is not well-reflected in the terms of common trends of GDP per capita development.

3 Discussion

The analysis of volumes found that development of per capita GDP correlates significantly in the cases of Czech and German regions of Neisse. These findings have been supported by causal relations in the Granger sense that have been identified. At the same time, the Polish region did correlate with none of the Neisse regions which have been followed by finding of not even one causal relationship from or to that. So, as long as we assume that the Czech and the German regions could be involved in some kind of interconnected economic network or system, the Polish region seems to be out of such structure.

In terms of correlation analysis, the other section showed us that the regions of Neisse differ significantly from its neighbouring areas in Poland and in the Czech Republic but no obvious differences in development have been found between the German Neisse and non-Neisse regions. The results of testing for Granger causality follow these findings to some extent since one can see obvious differences between the Neisse and non-Neisse regions in Poland while neither in Germany nor in the Czech Republic. In particular, the causality part confirms very ambiguous results among the German regions since there is no obvious difference between developments of Neisse and non-Neisse regions. Furthermore, the Polish region of Neisse was found different from its intranational neighbours since its neighbouring areas are interconnected by many causal relationships but the Neisse region creates relationship with only 2 other. In addition, it is interesting that some Polish regions are the only exceptions of the sample, where conclusions about causalities are not supported by correlation relationships that found to be significant. Moreover, the correlation analysis found the Czech region of Neisse to be significantly differing from its neighbouring regions vis-à-vis Granger causality tests, where we identified no significant causal relations.

With these findings in mind, one can probably generalise the results as follows: the cross-border cooperation initiative seems 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 impacts of Neisse on German regions, along with some differences in development between the Neisse and non-Neisse regions, that may perhaps be seen as some signs of impact, 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 6). Besides, both regions grew less than all of their neighbouring areas and even less than their respective countries, i.e. the Czech Republic (CZ) and Poland (PL). In addition, the German regions of Neisse do not show any unambiguous deviations from their benchmarks. That implies that the cross-border initiative seems to provide any real benefits to their participants, actually it unites the less growing regions of the broader tri-border geographical area.

Tab. 6: 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 ratio of per capita GDP of selected years; the parts of euroregion, Neisse, highlighted in grey.

Source: authors' own work based on Eurostat (2016)

Conclusion

This paper sought to examine the importance of cross-border cooperation on regional development based on the evidence from the euroregion of Neisse. The two-step analysis based on testing for correlation and Granger causality has been proceeds to fulfil its goal. The analysis found that development of per capita GDP in the regions of Neisse differs significantly from its neighbouring areas in Poland while not in Germany. The situation of Czech region is less obvious since the correlation relationships haven't been supported by the Granger causality tests. Furthermore, the analysis thought that some relationships exists between the Czech and German regions of Neisse but don't to that Polish.

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 (Czech and Polish), as seen from a brief view on the growth figures. 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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