The Composite Development Drawback Index for Romanian Counties

Speranța Pîrciog, Cristina Lincaru, Adriana Grigorescu, and Gabriela Tudose

Abstract The regional development and potential are influenced by various factors. There are regions with different levels of drawback generated by factors such as existing economic development, demography, multiculturalism, education etc. The main concern the researchers had was identifying the development gaps and the economic convergence ways at regional levels. We consider that proper policies could be designed having as starting point the drawback level of the region and the structure of the brakes. Could we evaluate a drawback rank that is acting as a burden for regions to access even the convergence programs? Could the health model of drawback rank be applied to the region's development? The present research is proposing a composite development drawback index (CDDI) for Romanian counties using three sub-components: economic development, demography, multiculturalism, for a first stage. This 3D index applied to Romanian regions is a pilot study from nD (multidimensional) CDDI to be applied at European regions. The result of the pilot study highlighted the 2 ranks of CDDI identifying the main vulnerable regions, with lowest and lower potential of implementing tools of economic development and convergence. The public decision makers should design special push and pull tools to overlay the drawback and to give them a chance to compete with the regular units.

Keywords Regional development · Drawback · Ranking · Convergence · Multilevel governance

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1 Introduction

Territorial cohesion can also be understood as a process of territorial convergence, expected to take place over some time, for a broad set of indicators of territorial development, representing several components and dimensions. If most of these indicators follow a convergent trajectory for a given territory in a period, then we can say that there is territorial cohesion, or in its absence, we can signal a process of territorial exclusion.

Romania has heterogeneous geographical features at territorial level. The geographical diversity of the territory largely explains the differences in economic performance, the standard of living, and finally, the partial presence of convergence processes, at different levels NUTS1, NUTS2 or NUTS3. Territorial differences can offer competitive advantages, but sometimes they can represent barriers, limits in development, meaning to a certain extent a drawback. Starting from the model used in medicine to determine the degree of handicap according to the severity and the limitations generated by the existence of the disease concerning a status considered normal, the research aims to identify an aggregate index to determine the degree of territorial drawback.

The questions we aim to find answers for are:

- Could we evaluate a drawback rank that is acting as burden for regions to access even the convergence programs?
- Could the health model of drawback rank be applied to the region's development?

In our research, we paid special attention to the identification of territories that have characteristics that prevent the development of locations and have a permanent character, and we can classify them as areas with a drawback.

The territorial convergence analysis profile consists of differentiating characteristics and particularities that may have negative effects on development or that require specific actions to be removed or diminished. Three such distinguishing dimensions were considered in the pilot research:

- economic:
  - areas affected by the industrial transition;
  - regions affected by a permanent natural drawback;
- demographic:
  - regions affected by a severe and permanent demographic drawback;
- ethnic, multicultural:
  - regions with a heterogeneous ethnic composition: concentrations of ethnic Hungarians, Roma, other ethnic groups.

The result of this analysis comes to complete the profile of the counties with decisive characteristics in understanding the set of factors that act at territorial level. The

complex profiling of the territory is an element of novelty that allows the development of policies aimed at local needs, much more efficient and with a much greater potential for training, multiplication, with synergistic effects. Knowledge of this type of profile helps to adapt and increase the effects of sectoral policies. The drawback profile offers a unique character at county level, alongside other visible factors such as the cross-border position or the sectoral specialization profile of the county.

The methodology of profiling the counties according to the drawback characteristics represents a complex spatial analysis tool that allows obtaining results that meet the needs of decision-makers, especially those in public administration. Although this tool was designed as a useful component in the methodology for assessing the process of territorial cohesion at national level by measuring the variation of GDP/capita in the period 2010–2018, in the new context, it offers clear benefits and is welcomed. The result of applying the County Profiling Methodology by drawback characteristics reflects relevant differences for public policy areas. These differences are diagnosed at county level, respectively at NUTS 3 level based on the spatial statistical analysis of the indicators at NUTS5/LAU2 level.

The research question is: Which counties have economic, demographic, and ethnic differentiation and multiculturalism characteristics with negative effects on development or which require specific actions?

The research hypothesis is Counties with distinguishing characteristics (economic, demographic, and ethnic and multicultural) have low performance in terms of economic cohesion expressed by GDP/capita and require the development of personalized public policies with different degrees of impact.

2 Literature Review

Europe's Cohesion Policy is strongly linked to the 2030 Agenda for Sustainable Development Goals and has a tangible impact on the lives of millions of Europeans. More coherence between EU policies to build a tailored cohesion policy for all regions becomes an important issue [1].

Jouen [2] makes a policy and institutional review of the territorial cohesion concept and concludes that this concept is used a lot, even if it is a bit fussy. The author proposes a clear definition: "*territorial cohesion designates a state of the European space in which the differences between territories are reduced or are at least made acceptable, for all European citizens to be able to enjoy comparable lifestyles and sustainable development, and in which ties between territories are likely to create a sense of belonging to the Community*".

The tremendous importance of territorial cohesion is confined by the 174th article of the Lisbon's Treaty, namely: "Among the regions concerned, particular attention shall be paid to rural areas, areas affected by industrial transition, and regions which suffer from severe and permanent natural or demographic handicaps such as the northernmost regions with very low population density and island, cross-border and mountainous regions" [3].

Jouen [2] clearly specifies what is desirable and The Lisbon Treaty makes a list of territories with dissimilarities under the risk of drawback, especially with their peoples under the risk of marginalization or becoming vulnerable. The cohesion policy stands at the core of European strategies with focus on: rural development, transportation, smart specialization, and lately, on green economy [4]. The territoriality of the cohesion policy represents one of the main critics of cohesion policy. The greatest concern is regarding the success of cohesion policy if its result lead to economic convergence [4].

In this analysis, we used definitions and basic concepts established based on the legislation in force, such as counties with 1st degree drawback, counties with 2nd degree drawback, areas affected by the industrial transition, regions affected by a permanent natural drawback.

2.1 Defining Drawback Counties at First and Second Degree

We mark the presence of the drawback by creating an Aggregate Drawback Index (CDDI) with values from 1 to 100%. The higher the weight associated with the index, the higher the risk of problems, barriers in the development of the location and implicitly increases the demand for specialized actions and interventions to overcome them. For counties that have high aggregate weighting characteristics of differentiating features with negative effects on development or that require specific economic, demographic, or ethnic actions, we determined two drawback classes according to the ESDA classification method in Jenks natural intervals [5]:

- The counties with a 1st drawback are the counties that have the level of the CDDI with values included in the first class (class with the highest values).
- The counties with a 2nd drawback are the counties that have the level of the CDDI with values included in the second class (the class with relatively high values of the index).

2.2 Defining Economic Drawback Profile for Counties

- *The disadvantaged areas defined as areas affected by the industrial transition and the calculation of the economic drawback sub-index.*

The areas affected by the industrial transition are the areas that are characterized by high levels, rates, densities, agglomerations, and perennial unemployment. The areas characterized by high levels, rates, densities, agglomerations and perennial unemployment are the areas affected by industrial transition. We used the SOM101E and SOM101F indicators provided by TEMPO INS at the LAU2 level. This approach is based on Government Emergency Ordinance (GEO) 24/1998 on the regime of disadvantaged areas. This document defines:

1. *By the nature of the present GEO, the disadvantaged areas are represented strictly by* territorial geographical areas that meet at least one of the following conditions:
   a. "The share of unemployed people in the total labor resources of the area should be at least three times higher than the share of unemployed people in the total labor resources at a national level, in the last 3 months preceding the month of drawing up the documentation for declaring the disadvantaged area.
   b. the isolated areas without means of communication and areas with poorly developed infrastructure".
2. The share of unemployed people in the total labor resources is a statistical indicator, registered monthly, expressed as a percentage, and calculated by dividing the number of registered unemployed to the total population aged between 18 and 62.
3. Regarding the share of the unemployed people in the total labor resources, we used the number of the ones with a permanent residence in the respective geographical area, registered at the end of the reference month and the number of the stable population of the area, aged between 18 and 62.
4. At the national level, the share of the unemployed people in the total labor resources will be calculated using the same method, by dividing the number of unemployed people registered at national level to the total stable population aged between 18 and 62.
5. The share of the unemployed people in the total labor resources at the area and national level is established by the National Commission for Statistics, based on data regarding the number of unemployed, provided by the National Agency for Employment and Vocational Training.

The areas affected by industrial transition are identified in Table 1, being counties with the highest unemployment rate in 2019 (variable name rsom2019) in High-High (HH) clustered LAU2 locations (locations with high levels of unemployment rates surrounded by locations with high levels of unemployment rates) and were included in the calculation of the CDDI as the economic drawback Subindex.

- *The disadvantaged areas defined as regions affected by a permanent natural drawback and the calculation of the economic drawback sub-index.*

Regions affected by a permanent natural drawback are identified by using the terminology defined in the indicator Area of less-favored areas: code 1.4.5. (V_ZD_UAT_145) disadvantaged areas may be in the: Ministry of Development, Public Works and Administration (MDRAP) terminology represented by:

"Currently, the disadvantaged areas declared according to the agricultural criterion are divided into three categories (according to the National Rural Development Plan):

(1) Disadvantaged mountain area (DMA) overlaps almost entirely over the Carpathian Mountains and consists of 657 administrative-territorial units (county seat municipalities, municipalities, cities, and communes).

(2) Significantly disadvantaged area (SDA), completely overlapping the Danube Delta Reserve.
(3) Areas disadvantaged by specific natural conditions (ADS), the delimitation criterion being that of lands with a credit rating below a certain established threshold."

The indicator with the same name (Area of disadvantaged areas) is included in the calculation of the Drawback Index, as Economic Drawback Subindex marked in yellow in the Table 1.

2.3 Defining Demographic Drawback Profile for Counties

We also identified the regions affected by a severe and permanent demographic drawback, following an iterative process of ESDA—type spatial exploratory analysis and clustering Local Indicators of Spatial Autocorrelation LISA (Anselin, 2010).

The following 8 indicators were analyzed in detail at the LAU2 level:

(1) Population by residence on July 1, 2020 (Statistical Source is the Territorial Observatory of Ministry of Regional Development and Public Administration in short OT) (OT code 2.1.1.), Variable name: Pop/ESDA representation area.
(2) Population growth rate (OT code 2.1.3.), Variable name: rcrPop, ESDA density representation.
(3) Natural growth (clusters) (OT code 2.1.6.), Variable name: SporNat density. LISA analysis. Selection for concentrations of negative levels.
(4) Migratory spore (OT code 2.1.8.), Variable name: SpMigrNg. ESDA Density Representation and LISA Analysis. Selection for concentrations of negative levels.
(5) Home departures including external migration (OT code 2.1.10.) Variable name: Departures. ESDA Density Representation and LISA Analysis. Selection for concentrations of negative levels.
(6) Number of permanent immigrants (OT code 2.5.2.) Variable name: Immigrant. ESDA Density Representation and LISA Analysis. Selection for concentrations of positive levels.
(7) Birth rate (code OT 2.1.4.) Variable name: rnatalit. ESDA Representation and LISA Analysis. Selection for concentrations of negative levels.
(8) Mortality rate (clusters), (code OT 2.1.5.) Variable name: rmort. ESDA Density Representation and LISA Analysis. Selection for concentrations of positive levels.

The last six, out of these, iterated in Table 1 (marked in green) were included in the Drawback Index calculation, respectively were aggregated under the Demographic Drawback Subindex.

We remind you that demographic phenomena are deep and complex. This analysis is simplified but provides a referential territorial image. We specify that the

phenomenon of population aging is with a uniform degree at the territorial level (LAU2), an aspect reflected by the decrease of the population growth rate slightly differentiated at the territorial level, which determined us not to include this indicator in the model. In this context, when we analyzed the convergence indicators, we also took this aspect into consideration.

2.4 Defining Ethnic and Cultural Differentiation Drawback Profile for Counties

In the analysis of the spatial distribution of the ethnic composition at the regional level, we used the indicator Stable population by ethnicity, (OT code 2.2.2.):

- Clusters of Hungarian citizens. Variable name: Magh. LISA analysis.
- Clusters of Rroma citizens. Variable name: Rroma. LISA analysis.
- Clusters of citizens of other ethnicities. Variable name: AltEtn. LISA analysis.

We, also, identified regions with a heterogeneous ethnic composition: concentrations of ethnic Hungarians, Roma, other ethnic groups, locations that host clusters with agglomerations of populations of another ethnicity. We applied the LISA method (Anselin, 2010). The 3 iterated variables in Table 1 (marked with light brick color) resulted and were aggregated in the Drawback Index under the Ethnic Differentiation Index.

2.5 Defining Development Through GDP/Capita at Territorial Level

To validate the chosen hypothesis, we used GDP/capita, the main indicator used in the analysis of territorial convergence. We use the indicator "Gross domestic product (GDP) at current market prices by NUTS 3 regions [NAMA_10R_3GDP__custom_1843659] provided by EUROSTAT, at current market prices in Euro, normalized, at NUTS3 level. For the calculation of GDP/capita, we weighted GDP/county with population by the indicator" Average annual population to calculate regional GDP data (thousand persons) by NUTS 3 regions [NAMA_10R_3POPGDP $ DEFAULTVIEW] also provided by Eurostat.

Cohesion is strongly linked with development, more visible than ever on the background to 2030 AGENDA [6] and of the Sustainable Development Goals [7]. The main objective of cohesion policy is to produce convergence, meaning that any European citizen should have access to a sustainable lifestyle, regardless the territory where he or she lives.

Especially in genetics literature, the "*similarity-based mating scheme to dynamically control the balance between the diversity of solutions and the convergence to the Pareto front*" is a topic of the evolutionary multi-objective optimization [8]. Convergence and diversity are two main goals in multi-objective optimization modeled through the optimization evolutionary algorithms (MOEAs) [9].

Even if the evolutionary concept is translated to evolutionary economy we identified by exploring the convergence gap versus diversity in the economy, regardless its branch. The cohesion policy is successful if it produces convergence (sustainable lifestyle for everybody) and the measure for diversity is the dissimilarity analyzed in our paper, in a synthetically manner under the Aggregate Drawback Index.

It's important to remember two theories when it comes to judging the sustainable lifestyle through a territorial lens: the center-periphery model and the evolutionary economy model. The core-periphery model of [10, 11] initial a monopolistic competition model, spring the new economic geography theory formulated by the famous trio Fujita, Krugman and Venables [12], developing the spatial version of the Dixt & Siglitz model.

Heblich [13] emphasizes that Ron Boschma and Ron Martin, synthetically defined the aim of evolutionary economic geography, as "the processes by which the economic landscape—the spatial organization of economic production, circulation, exchange, distribution and consumption is transformed from within over time".

Both theories explain the dissimilarities development and evolutions resulted from the interactions of natural completion processes. On the policy side, the failures of the "free economy" should be overpassed through policies interventions. But these policies interventions should optimize the *convergence* and *diversity*, under the cohesion desiderate of sustainable development.

3 Methodology

3.1 Exploratory Spatial Data Analysis (ESDA)

The preliminary data preparation suffers a spatial analysis of the indicators. From the ESDA techniques, we use the Choropleth Maps, which represents "Counterpart of Histogram, where are values/attributes for discrete spatial units with associate colors palette [14]. The maps use geocoded data provided by the OT.

As a first step, we analyzed the spatial pattern of the selected indicators used in the drawback concepts. We represented the variables using five classes Natural Breaks [5] Classification or Quantile representation to distinguish behaviors. Natural Breaks [5]

Classification technique is an optimization method for Choropleth Maps, minimizes variation in each group, applied in Arc GIS desktop 9.3." [15]. The persistency of the drawback is assured looking at the spatial distribution at two moments in time: in 2010 and in the most recent data in a Quantile representation (as we mentioned before). In a Quantile Class classification, each class contains an equal number of features. A quantile classification is also a classification technique, suited to linearly distributed data. Quantile assigns the same number of data values to each class" [15]. We use 5 classes and then the interval is 20% and it is called Quintile.

As a second step, we mapped the clusters in order to apply the Local Moran's I identified with the Local Indicators of Spatial Association (LISA) technique. With the help of this technique, we found the answer to the question whether the identified pattern is random or clustered [14]. We applied the Queen Contiguity weight rule of the first order. Moran's I Spatial Autocorrelation Statistic is a cross-product statistic with inference based on permutation estimation [14] knowing that a Moran's Index value near $+1.0$ indicates clustering, while an index value near -1.0 indicates dispersion. We selected only drawback indicators levels, that proved to cluster either LL (Low-Low: locations with low level of the attribute data having in neighborhood locations with low level of the same indicator) or HH (High-High: locations with high level of the attribute data having in neighborhood locations with high level of the same indicator), as a measure of the undesirable situation.

As a third step we overlaid maps build for selected indicators [16]. The map resulted spatial integrates the drawback index with the trans-frontalier and rural profile over the GDP/capita performance.

3.2 Building the Aggregate Drawback Index—CDDI

The process of identifying the NUTS3 level locations of the counties with drawback is the result of an ESDA analysis—Exploratory Spatial Data Analysis applied to LAU2 level indicators (NUTS5 equivalent) provided by MDRAP in the Romanian Territorial Observatory and TEMPO INS. Drawback locations are characterized by selecting a set of 12 indicators at LAU 2 level.

We used the Decision-Making Tools at Work steps from the Multi-Criterial Decision Analyse (MCDA) Methods according to [17] and apply the following 4 steps methodology:

M.1. Selecting the best value

*Each criterion has different values.

*Criteria analysis—scale representation for qualitative values.

We selected the indicators (Table 1) that reveal the presence of perennial and persistent disadvantages in 2010–2019, with spatial variability at the LAU2 level. This process is iterative and included ESDA by Quantile representations with 5 intervals—useful for comparison in time, in 2010 and the most recent year available

(2018 even 2020), class representations established in Jenks natural intervals, and verification of spatial autocorrelation by applying analysis LISA.

M.2. Building the Decision Matrix

Xij = performance value for alternative i to criterion j.

*Beneficial criteria the desirable values are the high values.

*Non-beneficial criteria the undesirable values are small values.

We built the decision matrix and allocated performance levels using the following drawback criteria: (see Appendix, Table 2):

– absolute or relative undesirable levels (high or low):

  - Unemployment rate 10,120 (rsom1020) as a share of unemployed people registered at the end of the month in total labor resources at LAU2 level with persistent values over 9.3% in 2010 and 2020. We have allocated the following points for counties at LAU2 that registered persistent levels of unemployment selected based on ESDA by Quantile representations with 5 intervals—useful for comparison over time: very critical 5; predominantly critical 4; criticism 3; partially critical 2; lower1.
  - Area of disadvantaged areas (Szndef)—we allocated the following points starting to the highest values of weights related to the total area: for 3.20% we allocated 4 points, for 2.70% we allocated 3 points, for 2.20% we allocated 2 points, and for 2% we allocated 1 point.
  - Home departures including external migration (Departures)—high departure rates from LAU2.
  - Number of immigrants (Immigr)—high rates of immigrants.

  Note: it seems that the last two indicators are in a logical contradiction and each other requires sustained efforts formalized through specific public policies: local development policy to maintain the population, including labor, and policy to attracting human capital, an especially high-human capital. This policy must be addressed not only to the individual, but also to his/her family.

– densities, represented by ratios between indicators and the surface of LAU2, with absolute or relative levels (rates) undesirable (high). The selection threshold is represented by the lowest level of the first class determined by Jenks natural intervals with 5 intervals, ESDA representation:

  - Migratory/surface increase (SpMigrNg): predominantly negative and constant migratory increase in 2019.
  - Change in the density of unemployed registered in 2019 compared to 2010 less than 5.15 unemployed/km^2 (Fdm_deficit)—1 point allocation for counties.

– perennial agglomerations or clustering phenomena—locations with high or low levels but undesirable surrounded by locations with high or low levels, similarly undesirable. LISA analysis was used to identify undesirable and persistent clusters/agglomerations [14].

- Natural growth (clusters), (SporNat)—selection of LL clusters: 2—points allocation for counties with locations characterized by low rates of natural growth, surrounded by locations with low rates of natural growth.
- Birth rate (rnatalit), LL agglomerations with very low birth rates.
- Mortality rate (rmort), HH agglomerations with very high birth rates.
- Population by Hungarian ethnicity (Magh) HH agglomerations, with high densities.
- Population by Roma (Rroma) HH agglomerations, with high densities.
- Citizens of another ethnicity (AltEtn), HH agglomerations with high densities.

M.3. Normalization of criteria's

$$\text{Drawback criteria} = \text{Xij}/\text{SUM(Xij)} \tag{1}$$

M.4. Building the standard drawback performance decision matrix

[Cij] with 3 drawback criteria's: Economic, Demographic and Ethnic is presented in Table 2 and is built as follows:

$$\text{Drawback Economic}_k = \text{Fdm\_deficit}_k + \text{rsom2019}_k + \text{Szndef}_k \tag{2}$$

$$\text{Drawback Demographic}_k = \text{SporNat}_k + \text{SpMigrNg}_k + \text{Plecari Imigr}_k + \text{rnatalit}_k + \text{rmort}_k \tag{3}$$

$$\text{Drawback Ethinc Differntiation}_k = \text{Magh}_k + \text{Rroma}_k + \text{AltEtn}_k \tag{4}$$

where $_k$ county, k simple aggregation of the scores

$$\text{Drawback} = \text{Drawback Economic} + \text{Drawback Demographic} + \text{Drawback Ethnic} \tag{5}$$

4 Results and Discussions

Based on these results, the identification of counties with drawback (economic, demographic, and ethnic), cross-border counties, and rural counties define the general socio-economic context. Because the cross-border counties are visible without special markings, in the synthesis maps provided, we marked in the legend the counties with 1st and 2nd degree drawback and rural counties (according to the three typologies of predominantly rural, intermediate, and predominantly urban character).

4.1 Cross-Border Counties

We highlight the situation of the territorial profiles of the counties in Romania based on the two specific components mentioned above: cross-border and sectorial specialization. The cross-border position of the county is visible on the map, by overlapping the national state border over the territorial administrative border of the county. The consequences of geographical positioning are crucial in the plan of differentiation of political, administrative regime with direct economic effect and impact, manifested by various advantages (economic exchanges, access to resources, labor mobility, etc.) or difficulties (differentiated connection to global/regional markets, economic costs, a long distance from the center, etc.), not least the occurrence of exceptional situations (armed conflicts—the war in Ukraine, natural disasters, etc.).

Romania's territorial profile, according to the cross-border criterion, includes 20 counties that are Romania's border counties, out of which 12 counties are EU border counties. These present a risk of marginalization, the most exposed counties being Timiș, Suceava, Caras-Severin, Tulcea, Arad, Bihor, Dolj, Constanta and Maramureș (Fig. 1).

The effects of being at the border with the EU (12 counties), but also with non-EU states (8 counties) are now highlighted by the geopolitical context, which has become extremely tense due to the conflict in Ukraine, one of the neighboring countries.

The pressure for fast reactions as well as for strategic coherence resilience, when it comes to the level of public administration—no matter how high or low—increases enormously.

4.2 Economic Specialization Counties

The character of sectorial specialization is determined by the perspective of the existence within the territory, mainly based on some economic sectors. The specialization in agriculture/forestry/fish farming is specific to human settlements with low densities and corresponds to the EUROSTAT GISCO classification of counties with predominantly rural profile, named by new rural counties. (Fig. 2).

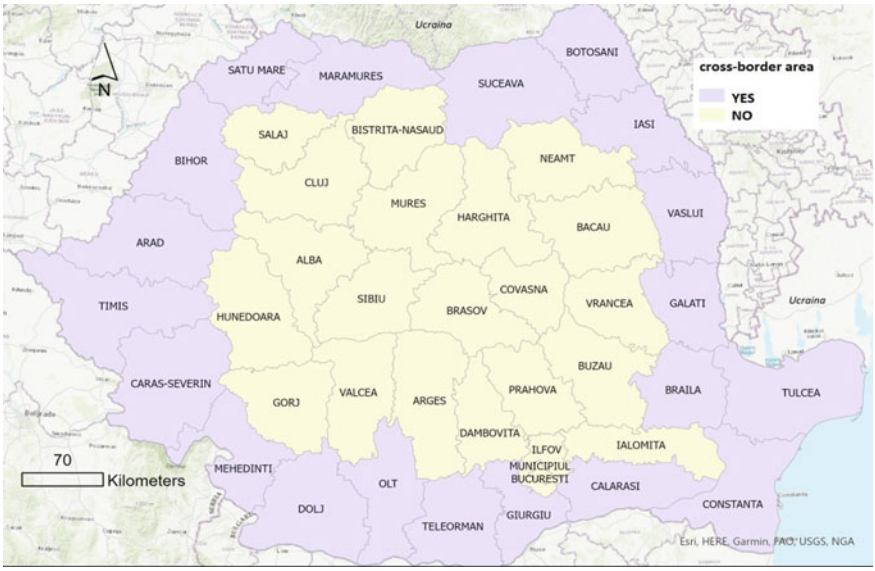

Fig. 1 Border counties**.** *Source* Map created by the authors in Arc GIS 9.3. *Data* MDRAP Territorial Observatory

The areas with sectoral specialization in agriculture/forestry/fish farming, respectively sectors of activity-dependent on extensive land use are rural counties. Recently, the OECD has cleared the errors induced by the statistical method by introducing the new typology of classification of regions at the NUTS3 level. This method is based on the share of the rural population at grid/cell level with an area of 1 km^2.[1] Thus, clusters of urban cells delimited according to the criterion of population density of, at least, 300 inhabitants/km^2 and a total population of at least 5000 inhabitants are identified. All cells outside these urban clusters are considered rural cells. The cells thus classified are grouped in areas less than 500 km^2. In this study we classified NUTS3 regions [18], using the same principle mentioned above. The criterion to be applied is represented by the share of the rural population, such as: predominantly urban (PU), regions that have a share of less than 20% of the population living in rural areas; intermediate (NI) regions with a share of more than 20% and more than 50% of the rural population; predominantly rural (PR) regions that have a share of more than 50% of the population living in rural areas.

[1] The 1 km grid^2 is already available for Denmark, Sweden, Finland, Austria, and the Netherlands (see European Geo-Statistical Forum (EFGS)), and the new typology is based on the actual grid in these Member States. For the other Member States, the new typology is based on the population breakdown grid (version 5) created by the Joint Research Center (JRC), based on the LAU2 population and the CORINE land cover. The 1 km grid^2 is likely to become the future standard and has the advantage that it can be easily replicated in non-EU countries.

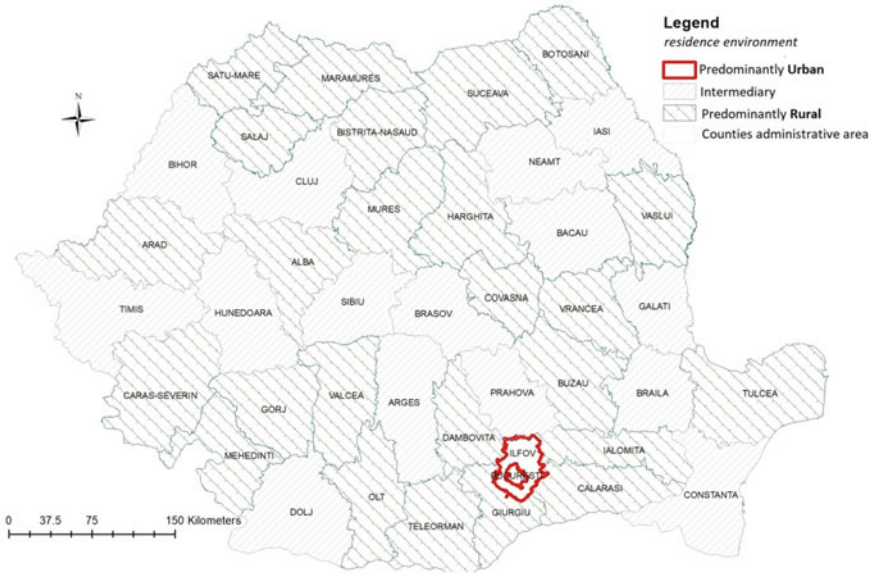

Fig. 2 Counties specialization. *Source* Map created by the authors in Arc GIS 9.3. *Data* GISCO EUROSTAT

4.3 First and Second-Degree Drawback Counties

In Fig. 3 we are synthetically presenting, the results of the multi-criteria analysis with equal weights by which we aggregated the three Subindexes: Economic, Demographic and Ethnic in a generic index, an Aggregated Drawback Index, named CDDI. Based on this map we will make a layer in Arc Gis Pro in which we will keep the perimeters of the counties that have large aggregate weights of the differentiation characteristics with negative effects in development: Counties with 1st drawback degree and Counties with 2nd degree drawback.

* The counties with values between [4.04–7.26%] in the CDDI are the counties with 1st degree drawback, represented with red in Map 1: Caraş-Severin, Mehedinți, Teleorman, and Tulcea.

* The counties with values between [2.43–4.03%] in the CDDI are the counties with 2nd degree drawback, represented with orange in Map 1: Alba, Suceava, Harghita, Buzău, Călărași, Vaslui.

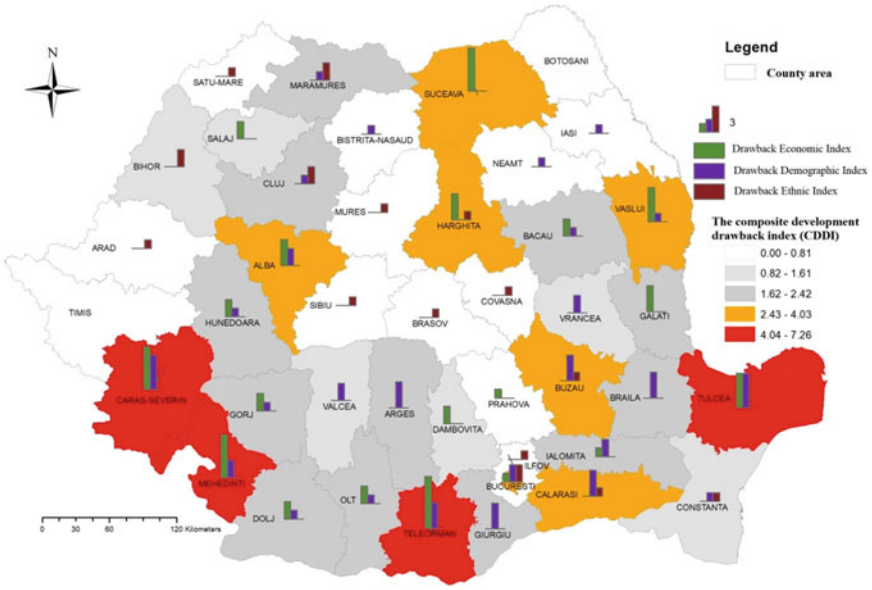

Fig. 3 The composite development drawback index (CDDI) for Romanian counties using three sub-components: economic development, demography, multiculturalism. *Source* Map created by the authors in Arc GIS 9.3

4.4 The Spatial Overlay of the Counties Profile's Drawback and GDP

We turn again to map draw by Quantile classes representations to be able to compare the evolution of the counties by income classes. Given the limits of comparability in dynamics as a level, we propose a visual exploration of the spatial distribution of GDP/capita using ESDA techniques of representation by Quantities in 5 quintile classes in 2010 and 2018.

The absence of convergence is signaled by maintaining the level of GDP/capita in the same quantile (we used GDP/capita data at current prices). Particular attention is paid to the counties that persistently position themselves in the smallest 1st Quintile (counties with the lowest average GDP/capita), in 2010 and 2018, (Fig. 4a, b). These counties are:

- Botoșani, Suceava (county with 2nd degree drawback), Neamț, Vaslui (county with 2nd degree drawback) and Vrancea, most of the Northwest region of Romania.
- Teleorman (county with 1st degree drawback) and Giurgiu (county with demographic disaster) in the Southern Region.

In 2018 compared to 2010 we notice counties that:

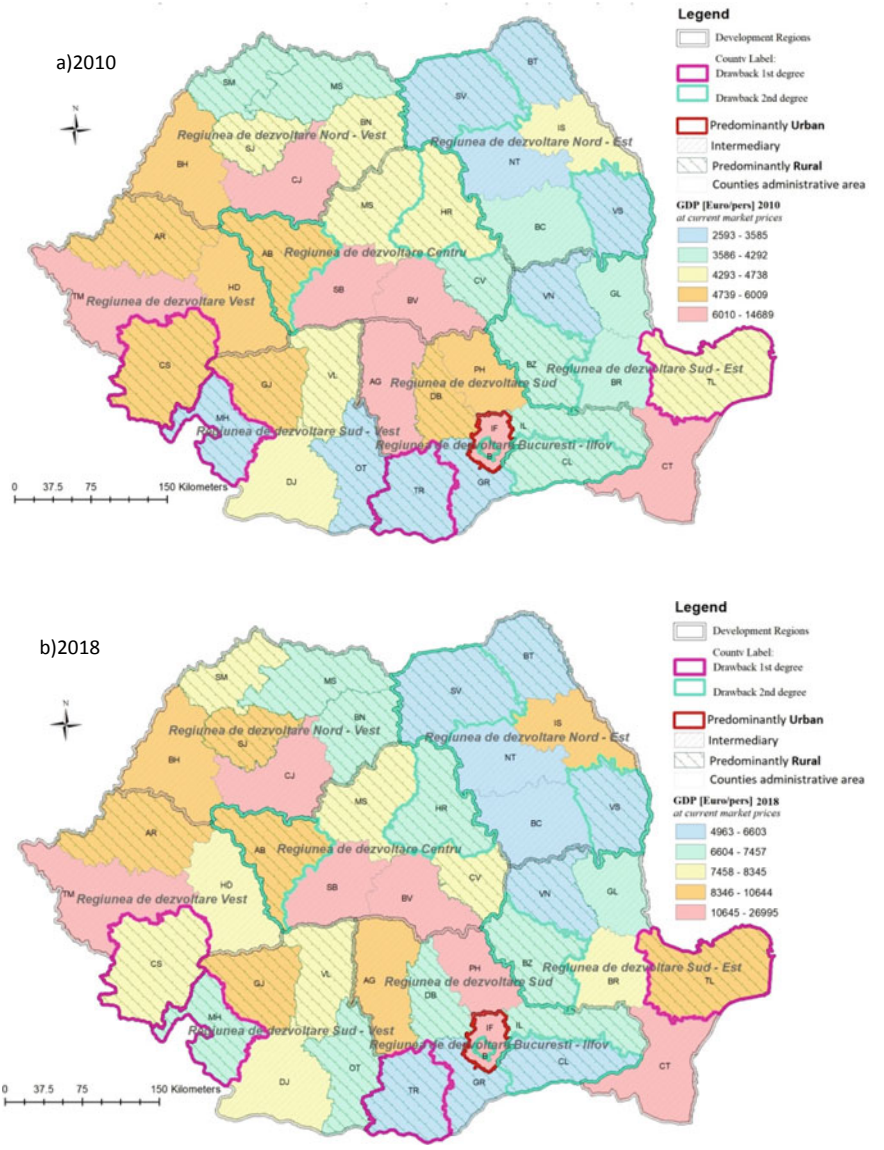

Fig. 4 Mapping CDDI counties, with lowest and lower potential of implementing tools of economic development and convergence on the background of spatial distribution of GDP/capita in 2010 and 2018. *Source* Map created by the authors in Arc GIS 9.3

- They ascended: from 1st Quintile to 2nd Quintile, Mehedinți and Olt; from 2nd Quintile to 3rd Quintile: Tulcea (county with 1st degree drawback).
- They descended from 2nd Quintile to 1st Quintile: Călărași, Bacău; from 3rd Quintile to 2nd Quintile: Caraș-Severin (county with 1st degree drawback), Harghita (county with 2nd degree drawback).

5 Conclusion

Mehedinti, Tulcea and Prahova counties have registered great success, increased by one class their performance in terms of relative GDP/capita. We remind you that Mehedinți and Tulcea counties are both classified by us with a 1st degree drawback. These counties may become subject of good practices studies.

Călărași and Bacău counties require a focused analysis in order to identify divergence factors materialized by negative transitions from 2nd income class in 2010 to 1st class, the lowest in 2018.

The special geographical positioning of Călărași county could be explained by:

(a) The proximity to the Capital—Bucharest, on the one hand, the strong metropolis that attracts resources and labor; the proximity, in this case, is not an advantage, it has the effect of a "black hole".
(b) The fact that, belonging to rural environment of Romania, the economic and social development are delayed, on the other hand.

The special geographical positioning of Bacău county could be explained by the fact that this county belongs to intermediate regions (NI) dominated by old industries facing socio-economic challenges, trying to improve their economic structure in the new context of EU.

Caraş-Severin, Mehedinți, Teleorman, counties with 1st degree drawback index justify the development of public policies profiled by their specific characteristics.

The present research has some major limitations resulted from the big data amount tendency aggregation through subjective score allocation for the chosen criteria. This is the first iteration and could suffer in the future some improvements through extensive data analysis using another statistical method for indicators selection i.e., PCA (Principal Component Analysis) but integrating the results into space.

The hypothesis is validated—the counties that have a high Drawback Index require personalized public policies, as is the case of Tulcea county which benefited from this approach for the Danube Delta ITI area.

The main criterion of GDP/capita used in the convergence analysis as a result of cohesion policy is not enough to provide a clear analysis. Complementary application of the Drawback Index allows a better understanding of the context in which public policies are applied, and finally a better targeting of them—in the case of Tulcea.

One of the main contributions of authors was to fill the gap between the convergence theory and policy optimizing the convergence, measured through the GDP//capita similarity in a diverse framework. The drawback is a measure of the

Table 1 Selected indicators for criterion analysis with qualitative representation

The characteristic that indicates the existence of a continuous and critical drawback	Variable name	Type of drawback / peculiarities	Aggregate variable name level II	Generic feature	Level I aggregate variable
Deficient labor force	Fdm_deficit	Economic	*Hp_ec*	Drawback	*Drawback*
1029 unemployment rate (TEMPO INS)	rsom2019				
Surface disadvantaged areas	Sndef				
Natural growth (clusters)	SporNat				
Migratory/surface increase	SpMigrNg				
Home departures including external migration	Plecari				
Number of immigrants	Imigr				
Birth rate (clusters)	rnatalit				
Mortality rate (clusters)	rmort				
Population by Hungarian ethnicity	Magh	Etnic	*Etnic*		
Population by Roma ethnicity	Rroma				
Citizens of another ethnicity	AltEtn				

Source of indicators MDRAP, Territorial Observatory and TEMPO INS, degree of disaggregation LAU2
Source Authors' own research

diversity of the territory. Better management of the territory is essential to assure the success of the cohesion policy. This three-dimensional index applied to Romanian regions is a study pilot that opens the opportunity to develop future models and methodologies more complex to be applied at European regions.

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Appendix

Table 2 Building the standard drawback performance decision matrix

	Jud	Fdm_deficit	Rsom1020	Szndef	SporNat	SpMigrNg	Plecari	Imigr	rnatalit	rmort	Magh	Rroma	AltEtn	Hp_ec	Hp_dem	Etnic	Drawback	Hand2	rang
1	Caraş Severin		2	3	2	1			1					5	4	0	9	7.3	1
2	Teleorman	1	5			1			1	1				6	3	0	9	7.3	2
3	Tulcea			4	2	1			1					4	4	0	8	6.5	3
4	Mehedinţi		5		2									5	2	0	7	5.6	4
5	Alba		2	1	1				1					3	2	0	5	4.0	5
6	Suceava		3	2										5	0	0	5	4.0	6
7	Vaslui		4					1						4	1	0	5	4.0	7
8	Bucureşti	1					1	1				1	1	1	2	2	5	4.0	8
9	Călăraşi				2					1		1		0	3	1	4	3.2	9
10	Harghita			3							1			3	0	1	4	3.2	10
11	Buzău				2					1		1		0	3	1	4	3.2	11
12	Olt		2							1				2	1	0	3	2.4	
13	Argeş				2					1				0	3	0	3	2.4	
14	Bacău		2			1								2	1	0	3	2.4	
15	Brăila				2	1								0	3	0	3	2.4	
16	Dolj		2							1				2	1	0	3	2.4	
17	Galaţi	1	2											3	0	0	3	2.4	
18	Giurgiu				2					1				0	3	0	3	2.4	
19	Gorj		2						1					2	1	0	3	2.4	
20	Cluj						1				1	1		0	1	2	3	2.4	
21	Maramureş					1					1		1	0	1	2	3	2.4	
22	Hunedoara			2					1					2	1	0	3	2.4	
23	Ialomiţa		1			1				1				1	2	0	3	2.4	
24	Constanţa						1						1	0	1	1	2	1.6	
25	Bihor										1	1		0	0	2	2	1.6	
26	Dâmboviţa	1	1											2	0	0	2	1.6	
27	Sălaj		2											2	0	0	2	1.6	
28	Vâlcea					1			1					0	2	0	2	1.6	
29	Vrancea				2									0	2	0	2	1.6	
30	Braşov										1			0	0	1	1	0.8	
31	Bistriţa-Năsăud					1								0	1	0	1	0.8	
32	Mureş										1			0	0	1	1	0.8	
33	Neamţ								1					0	1	0	1	0.8	
34	Prahova	1				0								1	0	0	1	0.8	
35	Arad										1			0	0	1	1	0.8	
36	Covasna										1			0	0	1	1	0.8	
37	Iaşi						1							0	1	0	1	0.8	
38	Satu-Mare											1		0	0	1	1	0.8	
39	Sibiu											1		0	0	1	1	0.8	
40	Ilfov										1			0	0	1	1	0.8	
41	Botoşani													0	0	0	0	0.0	
42	Timiş													0	0	0	0	0.0	
	Total	5	14	6	10	10	4	2	8	8	9	7	3	42	42	42	42	124	

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