EUROPE'S CORE-PERIPHERY RELATIONS AND HORIZONTAL DISPARITIES

Boian Koulov

Sofia, 2020

Europe's Core-Periphery Relations and Horizontal Disparities

Author:
Boian Koulov

Reviewers:
Professor Boris Kolev, National Institute of Geophysics, Geodesy, and Geography at the Bulgarian Academy of Sciences

Professor Emeritus William H. Berentsen, University of Connecticut, Storrs, USA

"Az-buki" National Publishing House
www.azbuki.bg

ISBN 978-619-7065-30-5

To Bilyana

Acknowledgements

I gratefully acknowledge the competent and professional help of Dr. Velimira Stoyanova with the production of the GIS maps in this volume.

CONTENTS

PREFACE

Europe, along with North America and East Asia, are the most developed parts of the modern world. This is particularly true of the European continent and, especially, of the European Union - the world's second largest economy after the United States. The successful post-war integration of the six founding European states (Federal Republic of Germany, France, Italy, the Netherlands, Belgium and Luxembourg) gradually became a strong gravitational nucleus, which has been joined at various stages by a number of other countries from all parts of the continent. Even more states are willing to join. The collective development of such a unique continental formation cannot not always go smoothly. It includes countries with very different historical and geopolitical destinies, with great differences in their socio-economic development, and unequal living standards.

Of course, the main and most important goal of the development of our continent and of the European Union, in particular, is the gradual mitigation of the objectively existing differences, even if nothing more. Objectivity requires the admission, as well as the emphasis, that solution of problems of such scale is a long-term task, especially since the beginning, in the first decade of the XXI century, of the process of integration of a number of Eastern European economies, which have developed for decades in a strictly centralized, centrally-planned environment.

The analysis of real-life territorial, geoeconomic, and other differences (disproportions) has shown that no uniform and homogeneous socio-economic development exists among the regions of even the most developed countries in the world. Their verification

and further investigation are important issues, which go beyond the purely national interests. They transcend state borders, especially in a globalizing world. That is why such targeted research is very significant: it can and must become the basis for conducting a more adequate socio-economic policy, not only in the respective state, but also in the whole of Europe, and especially of the European Union.

I am especially pleased to present the current scientific work of Dr. Boian Koulov, entitled "Europe's Core-Periphery Relations and Horizontal Disparities". The author is a well-known specialist in the field of regional development and regional policy, cross-border cooperation, geo-economics, as well as in other areas and aspects of territorial analysis.

Boian Koulov has structured his investigation, as follows: Introduction, Theoretical background, three chapters (1. The European Socio-Economic Core: Geospatial Retreat; 2. Expansion of the European peripheries; 3. Europe's Deep Periphery: Geospatial Analysis), and Conclusions. The Introduction presents the goals and objectives of the research, as well as the methodological approach with relevant threshold criteria. The author's analyses are performed at four territorial levels - from European through NUTS 0 to NUTS 3. I recommend to the readers to use the enclosed map illustrations in parallel, while getting acquainted with the text.

The first chapter analyzes the main characteristics of the European Socio-Economic Core, which is formed by the founding countries of the European Union, as well as by some other neighboring states. This Core is a source of strong socio-economic gravity, which objectively, by virtue of its geographical neighborhood, as well as for other reasons, attracts a number of countries. Here I must note that, like any other nucleus, it is a pulsating entity, which may expand or contract during certain periods. This process is actually being observed in reality.

The second chapter identifies and proves the main territorial and geo-economic disparities that exist within the European Periphery, as measured by the GDP per inhabitant in Purchasing Power Parity of

the average for EU-28. The author objectively states that the number of the peripheral regions within the continent and the European Union is growing. Detailed multi-scale analysis of the Periphery's main features has been accomplished, as long as it is not a homogeneous territory either.

In the third chapter, the author analyzes, on the basis of rich information, the categories and types of territories, which have been classified as Periphery. Koulov divides it into three categories: "Upper", "Middle", and "Deep" Peripheries. Taking into account the existing differences among them, the author fairly and judiciously proves that the most difficult and slow to solve problems exist in the regions which he defines as "Deep Periphery". This type of periphery is largely a function of the gradual reduction of the economic gravity of the Core, as well as of problems, inherited from the past. This is especially true for countries which used to have centrally-planned state economies in Eastern and Southeastern Europe. Despite the fact that the book's title is about "horizontal disparities", the author also observes and analyzes a number of functional disparities. Getting acquainted with this work is facilitated by the conclusions at the end of each chapter.

In conclusion, I believe that the reviewed work of Associate Professor Boian Koulov, Ph.D. is one of the few scientific monographs that expand the heuristic view and horizon, regarding the modern territorial and geo-economic mosaic structure of our continent and, most importantly, the European Union itself.

I am convinced that the monograph is a research of both international and national significance and will be of interest to regionalists, geographers, economists, diplomats, Members of the European Parliament, students and PhD students, as well as to anyone else working in this field.

Sofia, August 11, 2020 Professor Boris Kolev, Ph.D.

INTRODUCTION

Creation of geospatially-balanced socio-economic opportunities and human wellbeing can hardly be listed among Europe's most apparent success stories. In fact, the large horizontal disparities, among European regions and among individuals living in these regions, are well-documented facts "that policymakers bear in mind" (Combes et al. 2013, 14; Pascariu et al. 2017). The same is true about the presence of significant geospatial positive autocorrelation in income, as well as in income per person, i.e., "rich" regions are geographically grouped together and so are "poor" regions.

The differences between the rich European Core and the much poorer periphery (Combes et al. 2008) are quite stark, but probably even more striking is this phenomenon's persistence in time. Maza's et al. (2004) study of regions across twelve EU countries confirms that "regional disparities across the EU are large and persistent" and points to their economic root: income polarization. Martin et al. (2015) focus on the facts that, despite almost ninety years of regional policies, the geospatial disparities in Great Britain, a leading economy, are greater than those found in any other European country and they have only intensified during the past three decades. The EU accession of thirteen new Member States with generally lower GDP per person since 2004, is likely to have made the existing regional disparities in the EU only more pronounced.

The continuous geo-demographic concentration and political centralization do not contribute to alleviation of this challenge of continental proportions. European population and political power continue to concentrate in large urban areas, mainly in search of

socio-economic opportunities and benefits. The process is most pronounced in Northern Europe - the four Scandinavian states, in addition to United Kingdom, Belgium, Netherlands, and Luxemburg – where the share of the population that lives in urban areas is above 80 percent (World… 2014; Combes et al. 2008). Many urban areas, and especially the largest of them, have at the same time become the most important geographic concentrations of socio-economic and political power on the continent: a phenomenon that further deepens urban/rural divisions, engenders greater geospatial disparities, breeds diverse conflicts, and negatively affects human overall wellbeing.

This research focuses on the core–periphery dichotomy on the European continent, as monitored by Eurostat, in an attempt to deepen the understanding of 'horizontal inequality', as per (Doyle and Stiglitz 2014), through identification of its geospatial elements, structure, outline their boundaries and analyze their dynamics. As long as there is no periphery without a core and vice versa, both interdependent subsystems of this geospatial system are vital to its existence and sustainability. Thus, the study of Europe's core-periphery characteristics and functions is significant, first, because, the core is the only other internal source of growth and benefits for the periphery and, therefore, the main contributor for its regional integration. Second, both subsystems are equally responsible for the cohesion of the system as whole. This study aims not only at a deeper understanding of Europe's core–periphery system and its disparities, but also to provide an instrument for designing more efficient policies, directed at maintaining the system's long-term geospatial equilibrium.

For the above purposes, this work sets forth several interrelated tasks. The first challenge is to model the European socio-economic space as a core-periphery construct, which would support an interrelated and interdependent approach towards it as the whole unit and then utilize a unified methodology for comparative and historical analyses. The second task of this research is to identify, locate, map, classify, and analyze the elements, geospatial structures, boundaries,

socio-economic status, and geospatial transformations of the two interdependent poles – Core and Periphery – at all relevant scales during the 2007-2017 period. The third task is to reveal any newly formed structures, regions, categories, patterns of distribution, and tendencies, which would produce new understanding and enable the prognostication of the Core–Periphery relations and directions of the geospatial transformations on the European continent. Finally, the latest information on the horizontal disparities in Europe, their origin, magnitude, and tendencies of development would be of particular interest, not only to scientists, but also policy makers and planning practitioners and, especially the public. Drawing attention to the some of the factors of peripheralization, the areas with specific geographic characteristics, as well as the socio-economic and geopolitical consequences of observed geospatial processes at different scales would facilitate evidence-based conclusions about policies, decisions, and instruments to confront and ameliorate them.

THEORETICAL BACKGROUND

In his studies of economic development after the Second World War, Brunet (1989) empirically identifies a West European "backbone", in reference to an urban corridor of industry, services, and superior transport infrastructure. This region has attracted and continues to attract the headquarters of many multinational corporations and important international organizations, including EU and NATO. The largest of these "active" urban areas are concentrated in and around the, what was later named, European Blue Banana or European Megalopolis, a discontinuous banana-shaped corridor in Western Europe, stretching from Northwest England through the Benelux and Western Germany to Northern Italy, with a population of around 111 million (Brunet 1989). Hospers (2003) calls the Blue Banana one of the world's highest concentrations of people, money, and industry and emphasizes its "regional realism", a.k.a. the importance of an area's past in assessing its perspective for the future in EU's regional policy. This author explores the likelihood that the structure of Europe's socio-economic geospatial system will change in the next decades and warns against policy attempts at creating "growth poles from scratch".

In the context of a 1991 research for the European Commission's Communication "Europe 2020", Kunzmann and Wegener also confirm the existence of an EU core, and emphasize its polycentric structure (Kunzmann et al. 1991). These authors, however, update this region's "banana" shape to a different fruit – bunch of grapes - and note an extension of its southern tip, which at that time ends at Barcelona, Spain. Faludi's critical analysis of the history of the

Blue Banana concept opposes the claim that the "bunch of grapes" proposition is a "radical alternative" of Brunet's original conception. Instead, he emphasizes the dynamism of European Union's territorial configurations, well represented by the area covered by the Blue Banana (Faludi 2015).

The core-periphery model has apparently been one of the most widely applied conceptual apparatus, particularly for geospatial purposes. Nobel laureate Paul Krugman also uses it widely during the last three decades, most importantly, to bring economic geography closer to economics and policy makers (Krugman 1991a; 1991b; 1998; 2010). In Europe, Keeble (1989) has analyzed the historical and geographic patterns of European Community's enlargement and integration since 1980, pointing that it takes place in a context of very marked core – periphery regional disparities in economic activity and social welfare. In 2013, Bennett underscores this model's importance to understand European Union's regional policy (Bennett 2013). Combes et al. (2013) study, from both theoretical and empirical point of view, the extent to which regional policy can reduce the disparities in economic activity levels that arise between regions which belong to an integrated trade area, such as the European Union. Bonatti et al. (2017, 2) also use a core – periphery model to address the deep-lying determinants of the "enduring competitiveness imbalances across Euro Area regions and in tackling the emerging clash between socio-economic fundamentals diverging across regions and people's aspirations for similarly high living standards, whose disappointment fuels discontent and populist animosity against the EU institutions and the Euro Area core." Another recent volume (Pascariu et al., eds., 2017), based entirely on the study of core - periphery patterns across the European Union, compares the macroeconomic imbalances and peripherality effects in Eastern and Southern Europe to draw important lessons about the extent to which the effect of peripherality determines the development of a great number of EU regions and offer better regional policy recommendations, soundly grounded in economic theory.

This work utilizes the core - periphery model for the ultimate purpose of fostering a more effective socio-economic integration of peripheral regions and relative geo-spatial equilibrium in Europe. To this end, the investigation applies the Systems Approach (Bertalanffy 1969) to conceptualize the core – periphery dichotomy as a system of two main subsystems – the European Socio-Economic Core and its Periphery – which should be designed to achieve 'emergent' characteristics. Thus, it is vital to understand the European Core Subsystem, identify its elements, structure, exact location and boundaries at different scales, and study its dynamics in geo-space and time. NUTS regions, as defined by the 2013 Eurostat's Nomenclature of Territorial Units for Statistics (Eurostat 2019, a), are the most relevant territorial units to serve as elements of both the Core and the Periphery subsystems, as long as the NUTS is a hierarchical system for socio-economic analysis and the NUTS 2 regions are basic regions for application of regional policies in the EU and the UK.

The study applies GIS-aided mapping and comparative multi-scalar and multi-aspect geospatial analysis to six geographic scales - from European through NUTS to LAU 1. The analysis of the geospatial dynamics of the Core and the Periphery, judged by the performance of the NUTS regions at all scales, provides more detailed information about their status, development tendencies, and directions and, thus, contributes to the effectiveness of Europe's regional integration and cohesion policies.

This research uses the Purchasing Power Standard (PPS) indicator to enable the comparison of the purchasing power per inhabitant across the European regions, while taking into consideration the different currencies and price levels in each state. For elements of the European Socio-Economic Core, the study designates the regions at each scale, which have GDP per capita (PPS) equal or above 100 percent of the EU-28 average. The Periphery elements are categorized in three categories – Upper, Middle and Deep – on the basis of quartiles of the same indicator – from 25 to 99 percent.

Scientific literature provides ample and well-founded criticism of the excessive use of the GDP indicator in economic and political economy analyses and, particularly, of its use in isolation of other relevant indicators (Stiglitz 2015). Stiglitz, Fitoussi, and Sen put forth the many dimensions of welfare, which are not well reflected in the GDP (Stiglitz et al. 2018; Stiglitz et al. 2010). Nevertheless, as long as the "GDP per capita in PPS" indicator is still used for the allocation of EU structural funds (Eurostat Regional... 2018), it remains almost unavoidable for the purposes of EU regional policy.

A simple 'disparity ratio' indicator has been selected to measure the magnitude of the horizontal disparities in the standard of living between the regions on each scale. These are estimated by comparing the standards of living offered by the 'top' and 'bottom' geospatial elements of the same scale within the Core, the Periphery, as well as between them.

Finally, the investigation uses comparative historical analysis to monitor the temporal dynamics of the European Core and Periphery, as well as the horizontal disparities within and between them, for the eleven years between 2007 and 2017. To better serve policy makers, the study period begins at the start of the 7th EU Framework Program and includes EU's territorial expansion in 2007 and 2013, as well as the 2018 financial crisis. It ends with the year for which most regional data is currently available.

1. EUROPE'S SOCIO-ECONOMIC CORE: GEOSPATIAL RETREAT

1.1 Geography of Socio-Economic Disparity Among Europe's Core Countries

The country scale (i.e., NUTS 0 regions) geospatial analysis of the GDP per inhabitant (PPS) indicator shows a group of fifteen European states, which, in both 2016 and 2017 (Eurostat 2019 b), are characterized by values above the EU-28 average (See Figure 1). For Norway, Eurostat only provides data for 2016 at the time of the investigation.

In addition to the higher than EU-28 average standard of living, compared to the states in the rest of the continent, these fifteen political units are geographically adjacent, which presents another argument to regard them as elements of the Subsystem of the European Socio-Economic Core at the NUTS 0 scale, due to their socio-economic and political geography characteristics.

Thus, the European Core is exclusively located in the Northwestern part of the continent, west of the Baltic Sea. Its geographic boundaries coincide with the southern borders of France, Switzerland, Austria, and the eastern borders of Germany, Finland and Norway. The Core includes all (four) members of EFTA (European Free Trade Association), plus eleven of the 28 EU Member States (The UK left the EU in 2020.). The EFTA group of states exhibits higher standard of living than most European Union Member States (See Table 1) and can, thereby, be classified in a "Super Core" category of economies with above 125 percent of the EU-28 average GDP per inhabitant (PPS). They have generally smaller populations: Switzerland - 8.4 million (Federal... 2018) - is the largest country among them.

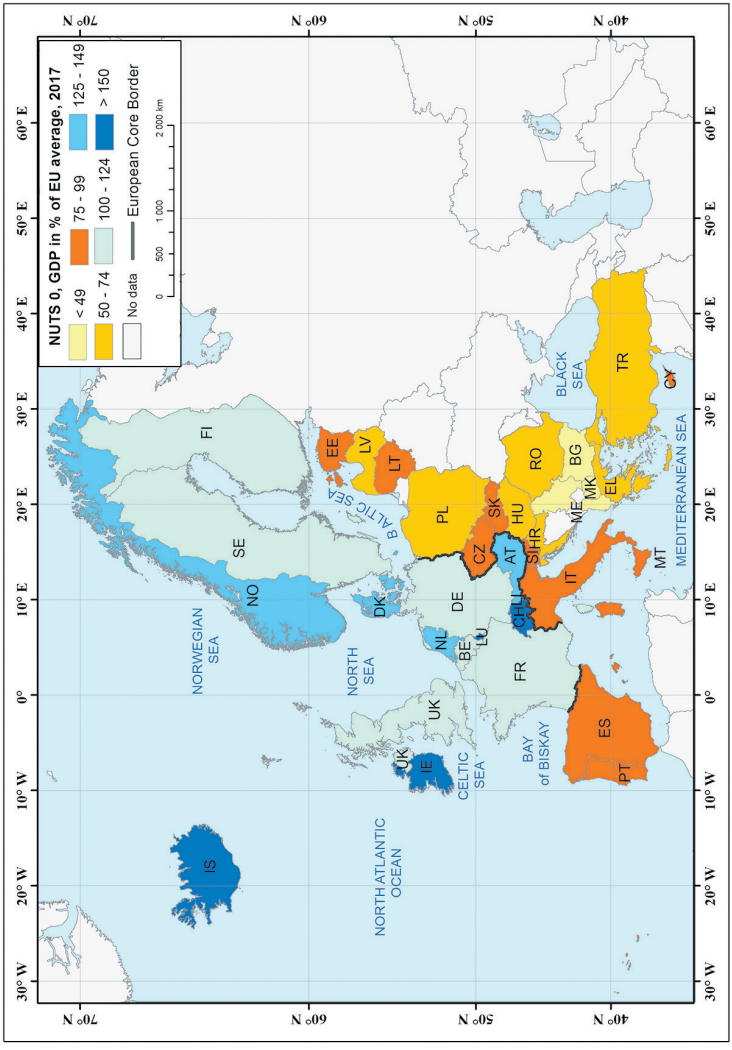

Figure 1. Gross Domestic Product (PPS) per inhabitant in percent of EU-28 average at the NUTS 0 Scale in 2017.

Table 1. EFTA_States_GDP_capita_PPS_2017

2017	GDP at market prices per capita in PPS in euro	GDP at market prices per capita in PPS %
Norway	43 800	146
Iceland	38 600	128
Switzerland	46 800	155
EU – 28	30 100	100

Source:
https://www.nsi.bg/sites/default/files/files/data/timeseries/ECP_4.1_EN.xls

Historically, the eleven European Union Member States of the Core are, either founding members of that organization, or acceded to it before 2004. They can be classified in two categories. Five states - Luxemburg, Netherlands, Denmark, Ireland, and Austria - fall in the above mentioned "Super Core" category of generally smaller states with above 125 percent of the EU-28 average GDP per inhabitant. Netherlands' population of 17 million is the largest in this category (Eurostat 2019b). The second, larger category of six EU Member States - Sweden, Finland, Germany, France, the UK, and Belgium – fall into the 100 to 125 percent of the EU-28 average GDP (PPS) category (See Figure 2). EU-largest countries in population and economy – Germany (with a population of 82.8 million and a GDP of 3.2 trillion euro - Eurostat 2019), France, and Great Britain – which politically dominate the European Socio-Economic Core are present in this category.

The categorization of the European Core elements at that scale proves meaningful, given the fact that, with the notable exception of Germany, all states, which succeeded to increase their standard of living, as measured by GDP per capita (PPS), during the study period, belong to the "Super Core" (namely, Ireland, Denmark, Austria, and Iceland).

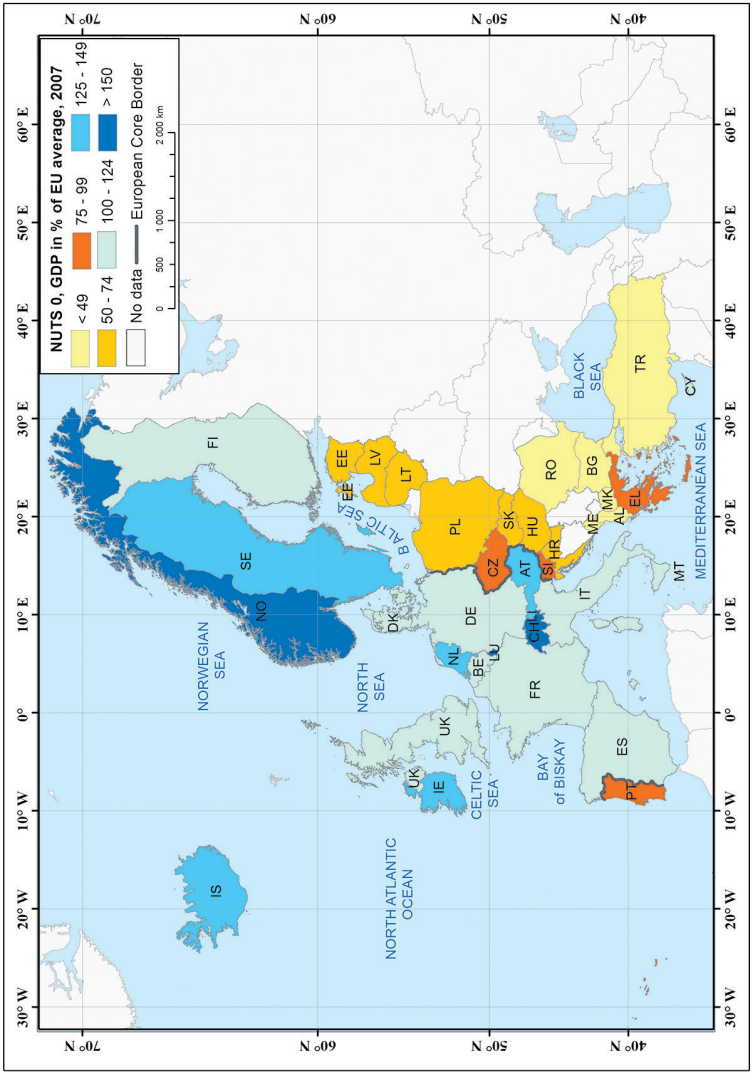

Figure 2. Gross Domestic Product (PPS) per inhabitant in percent of EU-28 average at NUTS 0 Scale in 2007.

The vast majority of EU Core economies have not been that successful. In fact, some countries have not been able to maintain their "membership" in the Core. The values of the GDP (PPS) per capita indicator of three countries in Europe's South – Cyprus, Spain, and Italy – have fallen the most during the 2008 financial crisis and presently stand below the EU-28 average. Until 2017, they have not been able to regain their Core element status, according to the criteria of this investigation. With the loss of the above-mentioned economies, the Core has shrunk in area and acquired the borders, delineated above. Thus, between 2007 and 2017, three geospatial elements of the European Socio-Economic System at the NUTS 0 scale moved from the Core to its Periphery, in spite of the EU-instituted regional development policies.

Another salient socio-economic geography characteristic of the Core Subsystem at country scale is the disparity between the values of the GDP per inhabitant PPS indicator of the socio-economic 'top' (Luxembourg - 253 percent of the EU-28 average in 2017 and 265 percent in 2007) and 'bottom' (France – 105 percent of the EU-28 average in 2017 and 108 percent in 2007) states. Thus, the standard of living between the top and bottom elements of the Core at the NUTS 0 (country) scale differs 2.4 times – a disparity ratio of 2.4 to 1. The comparison between the beginning of the studied period (2007) and its end does not show a noticeable change: while the richest country of the Core (Luxemburg) has moved, in 2017, somewhat closer to the EU-28 average, in the case of second richest (Ireland), the situation is just the opposite. Thus, the tendencies in the standard of living in the "top" European states do not provide sufficient evidence in support of the conclusion that the socio-economic divide has reacted positively to the regional development policies, implemented in the studied period of eleven years.

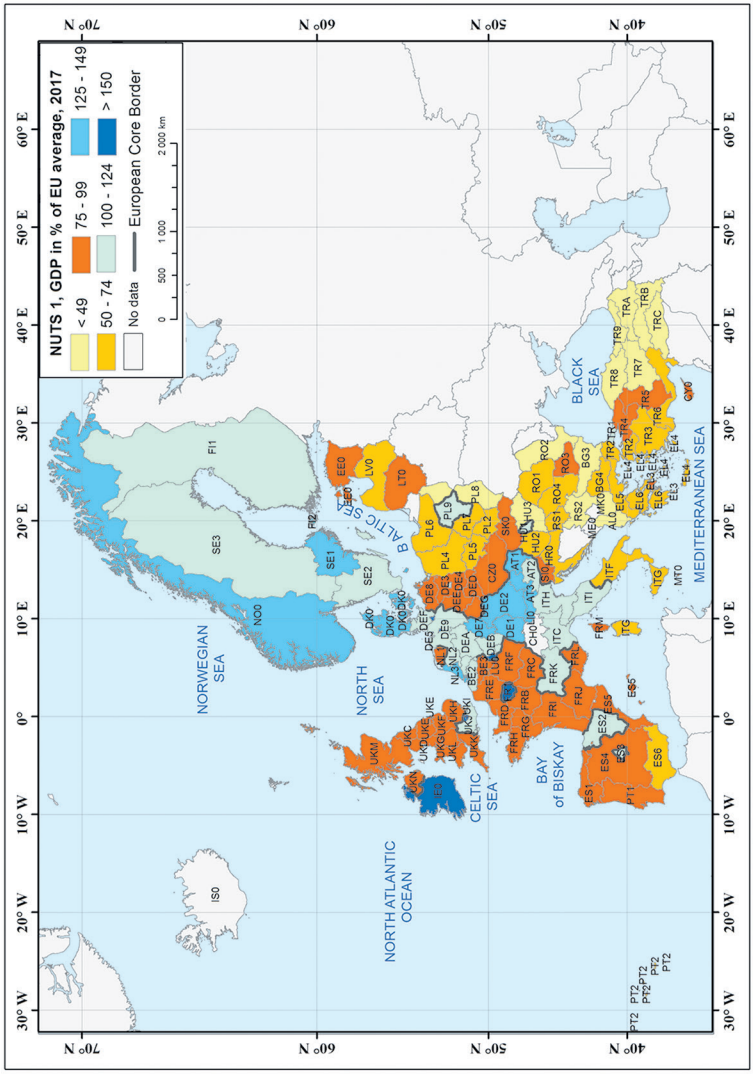

Figure 3. Gross Domestic Product (PPS) per inhabitant in percent of EU-28 average at NUTS 1 Scale in 2017.

1.2 Regional Disparities in Europe at the NUTS 1 to NUTS 3 Scales

1.2.1 NUTS 1 Regions

At the NUTS 1 scale, GIS-aided analysis reveals a group of congruous NUTS 1 regions, which belong to eleven states, in which the majority of regions are elements of the European Socio-Economic Core Subsystem (See Figure 3). This group makes up the most stable part of the Core's structure - its 'nucleus'. The countries which form this territorial pattern are the Nordic states, Ireland, Germany, Austria, Italy, and the Benelux, most of them predominantly concentrated in the continent's Northwest. Eurostat does not provide comparable data for Switzerland and Iceland at this and the lower scales.

In the Scandinavian countries, Ireland, Luxembourg, and Austria all NUTS 1 regions make up the Core. In each of Netherlands and Belgium, only one region is not a part of the Core at that scale, while Italy has two. These are Noord Nederland (NL1), which has, however, been a part of it until 2016, Region wallone (BE3) and Sud (ITF), and Isole (ITG), respectively. The majority NUTS 1 regions in the European Union's largest country – Germany – are also part of the above group of congruous regions that belong to the European Core subsystem. Interestingly, more than 30 years after the fall of the Berlin Wall, the core – periphery division here is still clearly oriented mainly along a West – East line. In a vivid demonstration of the long-lasting inertia of the politico-economic development processes, even in the highly developed economies, the relict economic boundary, only strengthened during the post- Second World War period.

GIS-aided analysis enables the identification of a second territorial pattern which involves a group of countries, in which all or most of their NUTS 1 Core regions are adjacent to, and therefore, a part of the nucleus at that scale: Italy's Nord-Ovest, Nord-Est, and Centro (ITH, ITC, and ITI), France' Auverne (FRK), and UK's London (UKI) and Southeast England (UKJ). Similarly, Spain's Noreste (ES2) region is also located in the Northeastern part of the country that is closest to the European Core at the NUTS 1 scale.

The European Socio-Economic Core acquires, at this scale, a more of a "bunch of grapes" shape, to use Kunzmann and Wegener's (1991) fruit comparison. Data from the year 2017 also supports the territorial pattern of the Core as "cluster", which results from the fact that almost all elements of the Core subsystem outside its nucleus, are capital city regions. These are Spain's Comunidad de Madrid (ES3) - with GDP per inhabitant (PPS) of 124 percent of the EU-28 average, France' Ile de France (FR1) - with 177 percent, and the capital city regions of Hungary and Poland - Kozep-Magyarorszag (HU1) - with 104 percent and Macroregion Wojewodstwo Mazowieckie (PL9) - with 112 percent, respectively. At the NUTS 1 scale, these regions already stand out as the most important socio-economic growth regions in their countries, as well as yet another piece of evidence that confirms the domination of the core–periphery model in geospatial politics and policies of the European type of state.

The comparative scale analysis between the NUTS 1 and NUTS 0 scales exhibits the dynamism, as well as the geospatial discrepancies of the structure of the European Socio-Economic Core Subsystem (See Figure 4). Three of the largest European economies – Great Britain, France, and Spain – contribute to the Core only two regions each at the NUTS 1 scale. Quite informative in this sense is also the historical comparison, which shows UK's East England and Scotland (UKH and UKM) regions exit the Core in 2009 and 2016, respectively. In Southern Europe, Greece has lost its only stake in the Core – its Capital City Region of Attiki (EL3) - since 2012 - while in Spain, the Core lost the Este (ES5) region in 2011.

At the same time, the historical comparison also points to the expansion of the structure of the European Socio-Economic Core during the study period to encompass NUTS 1 elements, relatively new to the Core. In 2011, one German region - Schlezwig-Holstein (DEF) – has been incorporated, together with Turkey's Istanbul (TR1) region, which became a part of the European Socio-Economic Core in 2013. Significant lack of data for the beginning of the study period at the NUTS 1 scale, which worsens at the NUTS 2 and 3 scales, precludes historical comparisons and multi-scalar analyses for a number of regions.

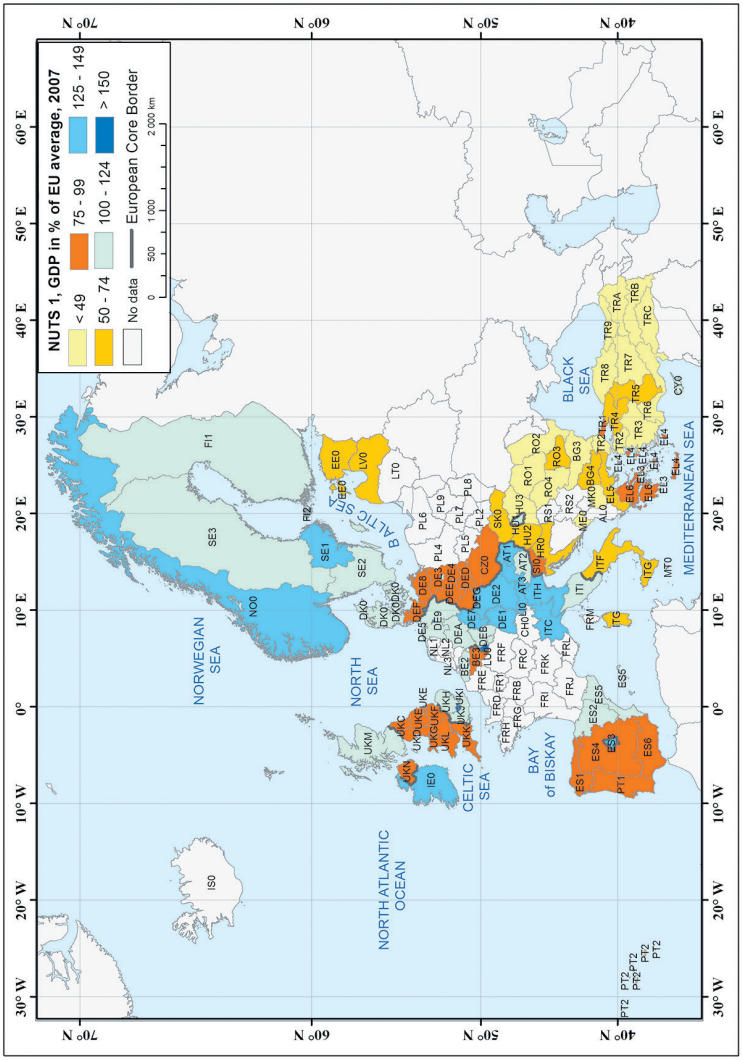

Figure 4. Gross Domestic Product (PPS) per inhabitant in percent of EU-28 average at NUTS 1 Scale in 2007.

Eurostat does not provide data for many, sometimes all, NUTS 1 and 2 regions in Ireland, France, Belgium, and Poland. Lack of data is a significant impediment for any kind of scientific investigation. More importantly however, it severely hinders the practice of science-based regional development planning or policy making at the European Union level.

1.2.2 NUTS 2 Regions

The NUTS 2 scale analysis enables an even more accurate identification, delineation, and description of the European Socio-Economic Core, as well as its dynamics. It also reveals - more prominently and in much greater detail – the regions, which are elements of the Core subsystem and, therefore, focus, and generate the socio-economic growth and wellbeing on the continent. Additionally, the NUTS 2 scale analysis outlines the directions of the subsystem's geospatial changes during the period under investigation and enables their forecasting. The use of this scale for regional planning at European Union level further emphasizes its scientific, as well as practical importance.

The combination of multi-scale and historical analyses identifies several geospatial patterns within the European Socio-Economic Core's structure. The first pattern concerns its 'nucleus' - the states, in which the majority of NUTS 2 regions are elements of the Core. Only eight to nine states, still concentrated in the Northwestern part of Europe continue to be the main contributors to the Core at this scale. These are Ireland, Norway, Sweden, Denmark, Netherlands, Luxemburg, Germany, and Austria (See Figure 5). (For Norway, data for 2008 and 2016 is used, due to the lack of available data for 2007 and 2017.) A rather strong argument can be made about Belgium also being a Core state, as long as half of its NUTS 2 regions are part of the Core, which is the situation in 2017. However, comparable regional data at that scale for the beginning of the study period is not available, so no direction of its region's development trends can be established.

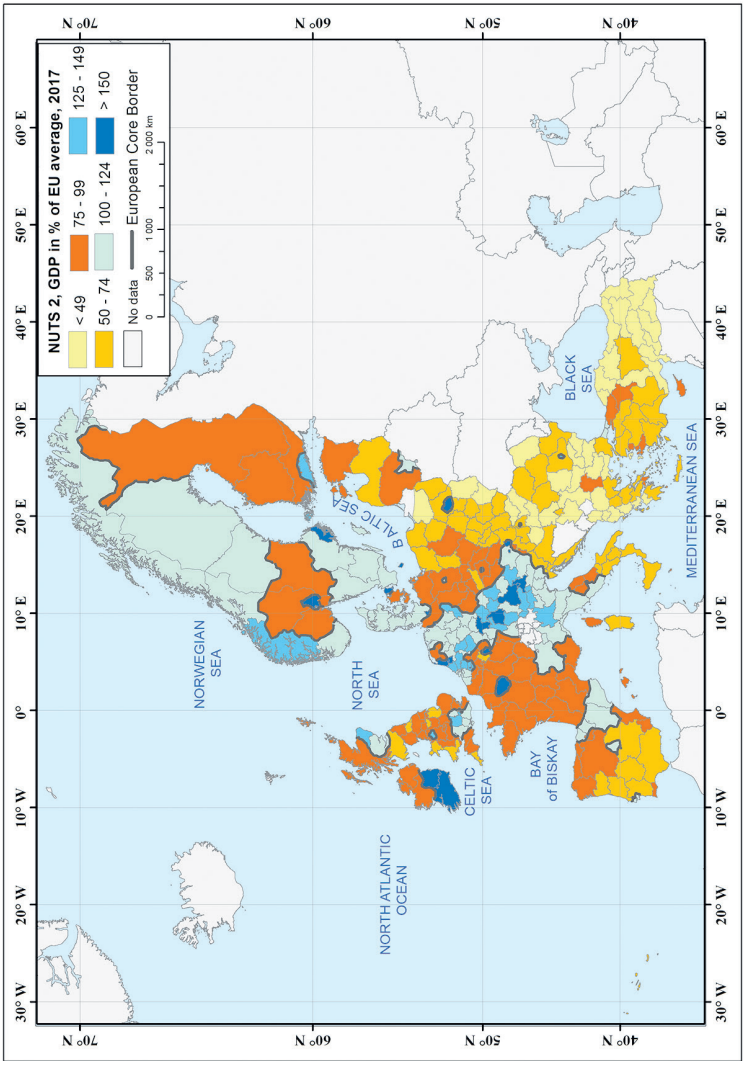

Figure 5. Gross Domestic Product (PPS) per inhabitant in percent of EU-28 average at NUTS 2 Scale in 2017

The lack of comparable regional-scale data for some states that are not European Union members, like Switzerland, Lichtenstein, and Iceland, also prevents a definitive conclusion on their level of participation in the European Socio-Economic Core. The second geospatial pattern concerns the structural dynamics of the Core at the NUTS 2 scale between 2007 and 2017 (See Figure 6).

In comparison to the NUTS 1 scale, the Core territorially advances most extensively in the central and eastern parts of the continent. At this time, the Core's structure already incorporates most capital city NUTS 2 regions in Central and Eastern Europe, such as Czechia's Praha (CZ01), which boasts in 2017 a standard of living of 189 percent of the EU-28 average GDP per capita (PPS), Slovakia's Bratislavsky Kraj (SK01) - 179 percent, Poland's Warszawski stoleczny (PL91) - 152 percent, Romania's București-Ilfov (RO32) - 144 percent, Hungary's Budapest (HU11) - 139 percent, Lithuania's Sostines regionas (LT01) - 112 percent, Slovenia's Zahodna Slovenia (SL04) - 102 percent. The southeastern direction of the Core's expansion includes Europe's largest city region Istanbul (TR10, which territorially coincides with the upper scale TR1 region).

Historical analysis reveals that in 2007, almost all of the above regions have already been elements of the Core. The easternmost outposts - Romania's and Lithuania's capital city regions – have been the only exceptions, that joined, respectively, in 2008 and 2012. The City of Istanbul has been a Core element since 2013. It is hardly a surprise that one of the very few countries, in which the Core regions actually increase in number and overall area at that scale is the largest European economy – Germany. Two regions have joined in 2010, both in Western Germany: Schleswig – Holstein (DEF0), the area of which coincides with the respective NUTS 1 region, and Koblenz (DEB1). A third region - Leipzig (DED5) from the Germany's eastern part - has joined, although only temporarily, during the 2013 - 2016 period.

The continuing eastern expansion of the European Socio-Economic Core at the NUTS 2 scale enriches its structure exclusively with the regions of the capital cities and one former capital, now largest city (the case of Istanbul).

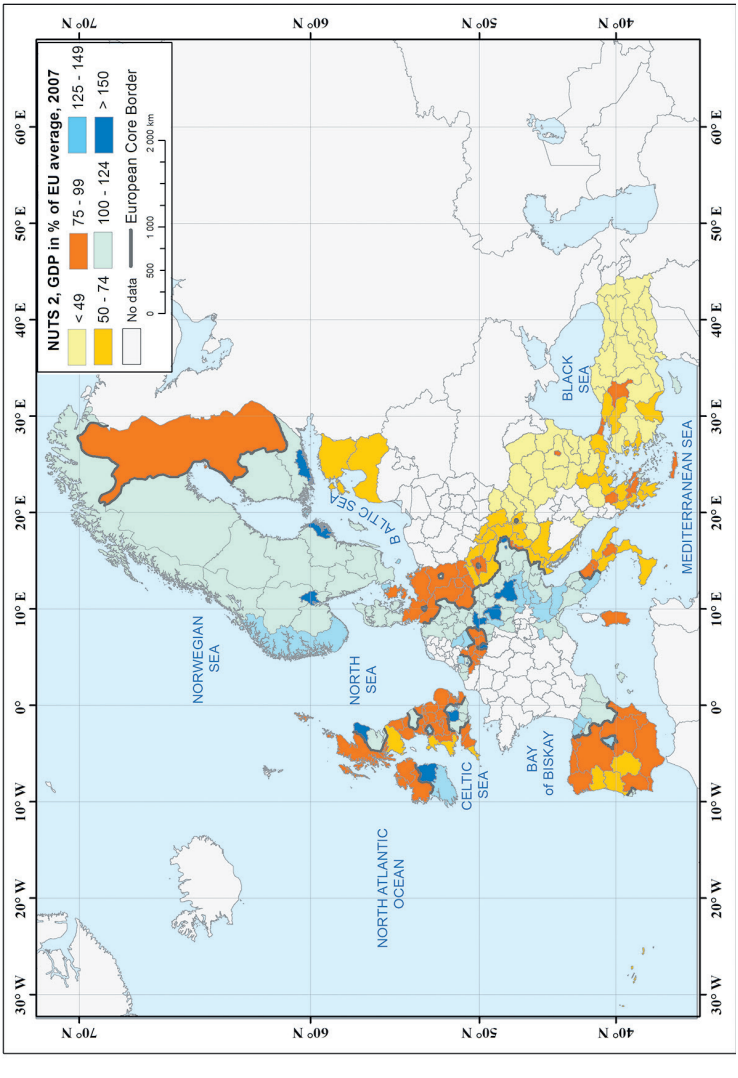

Figure 6. Gross Domestic Product (PPS) per inhabitant in percent of EU-28 average at NUTS 2 Scale in 2007.

Thus, the Core overall geospatial pattern acquires, at this scale, an even more pronounced cluster shape. The mode of expansion, in which the capital regions are also the sole regions in the respective state that is part of the European Core Subsystem, can presently be considered typical for the former socialist countries in Central and Eastern Europe.

In the rest of Europe, only Portugal exhibits this characteristic, which generally serves as an indication of an intra-state socio-economic divide with significant negative consequences and implications that go beyond the specific country. In 2017, Portugal's metropolitan city region of Lisboa (PT17) barely qualifies for the European Core subsystem, with a value of the GDP per person (PPS) of 100 percent of EU-28 average. The analysis of this indicator's time series since 2007 (116 percent) supports the conclusion that it is rather unlikely that the Lisboa NUTS 2 region will remain in this category much longer, which will effectively end Portugal's participation in the Core at that territorial scale too.

Notwithstanding these geospatial advances, retreat generally dominates the structural dynamics of the European Socio-Economic Core at the NUTS 2 scale during the study period. While Central Europe exhibits no significant dynamics between the Core and the Periphery subsystems during the study period, the standards of living in some regions of the North and the South of the continent have relatively diminished. In terms of Northern Europe, the majority of Finland's regions – West Finland (Fl 19), South Finland (Fl1C), and North and East Finland (FL1D), two Norwegian - Hedmark og Opplandet (NO02) and Sor-Ostlandet (NO03), and one Swedish NUTS 2 region - Southeastern Sweden (SE31) - and one Irish region – Northern and Western (IE04) - no longer qualify for the Core subsystem.

Compared to the NUTS 1 scale, the UK NUTS 2 regions, that participate in the European Socio-Economic Core, are more widely spread out throughout its territory. Three NUTS 2 Core zones are identified – two of them in England and one in Scotland. The largest one is grouped around Great Britain's capital city region and consists of

the two Inner London regions (UKI3 and UKI4), Outer London West and Northwest (UKI7), three regions in UK's Southeast (UKJ1, UKJ2, and UKJ3), and Bedfordshire and Hertfordshire (UKH2), situated to the North of Greater London. The smaller English Core zone consists only of the Cheshire (UKD6) region, situated in the English North West and centered on the cultural and social services, manufacturing, and transportation services of the UK's third largest city of Liverpool. The third British NUTS 2 Core zone has formed in Scotland and consists of two NUTS 2 regions - Northeastern Scotland (UKM5) and Eastern Scotland (UKM5) - based on the oil industry and service sector in the cities of Aberdeen and Edinburgh, respectively. No NUTS 2 regions from Great Britain have joined the European Socio-Economic Core during the study period, except England's Herefordshire, Worcestershire and Warwickshire (UKG1) Region and Scotland's Highlands and Islands Region (UKM6), which have done that only temporarily between 2013 and 2015. Two regions however - North Yorkshire (UKE2) and Outer London–South (UKI6) - both from England, exit the Core at that scale in 2007 and 2009, respectively.

During the period of the investigation, the Core loses an almost equal number of territorial elements at the NUTS 2 scale in Southern Europe. Its structure retreats from two regions each in both Italy and Spain. Both Umbria (IT12), which exits in 2009 and Marche (IT13) - in 2011, are situated in the middle part of Italy. In Spain, La Rioja (ES23) and Illes Baleares (ES53) - withdraw from the Core in 2011 and 2010, respectively. Aragon (ES24) is still part of the Core at this time, however, it has temporarily retreated between 2011 and 2016. Spain's regional development experiences one of the few territorial advances of the European Core in this part of the continent: its NUTS 1 boundaries actually expand at the lower scale to include the Catalunya region (ES51). Since 2010, the Core withdraws from the only two Greek regions that have been part of it at that scale – Attiki (EL30), which territorially coincides with the NUTS 1 region of the same name, and Notio AIgaio (EL42).

Finally, a North-South divide characterizes the core – periphery distribution of the NUTS 2 regions at intra-state level in Italy, Spain, and Belgium. Only Northern regions in each country have been elements of the European Socio-Economic Core since before the beginning of the study period in 2007. The only exception in Northern Belgium - Limburg (BE22) - seems "compensated" by the Prov. Brabant-wallon (BE31) region from the southern part of the country. Two French regions only participate in the Core at the end of the study period - Ile de France (FR10) and Rhone-Alpes (FRK2). Historical data for France, Netherlands, and Poland is largely unavailable, which precluded their inclusion in this analysis.

1.2.3 NUTS 3 Regions

The NUTS 3 scale analysis of the European Socio-Economic Core is important, firstly, because it pinpoints the territorial units of growth in Europe and, thereby, provides information about their potential to transfer economic opportunities. Secondly, at this scale, the study supports the identification of, not only the "source", but also the "target", geospatial elements in the respective territory, reveals the locations and magnitude of the geospatial disparities between the different elements, and enables their assessment. Finally, the NUTS 3 scale provides information about the level of cohesion and regional policy efficiency, and facilitates inter-regional and inter-state comparisons, which also support European Union's regional planning and policy making.

The NUTS 3 scale, however, is plagued by lack of current and readily accessible data, to a much larger extent, than the scales above. This conclusion is particularly relevant for the beginning of this study period (See Figure 7). As far is the last year of the investigation is concerned, for most European states the latest NUTS 3 data available is for the year 2016, which is considered adequate for the purposes of this specific study (See Figure 8).

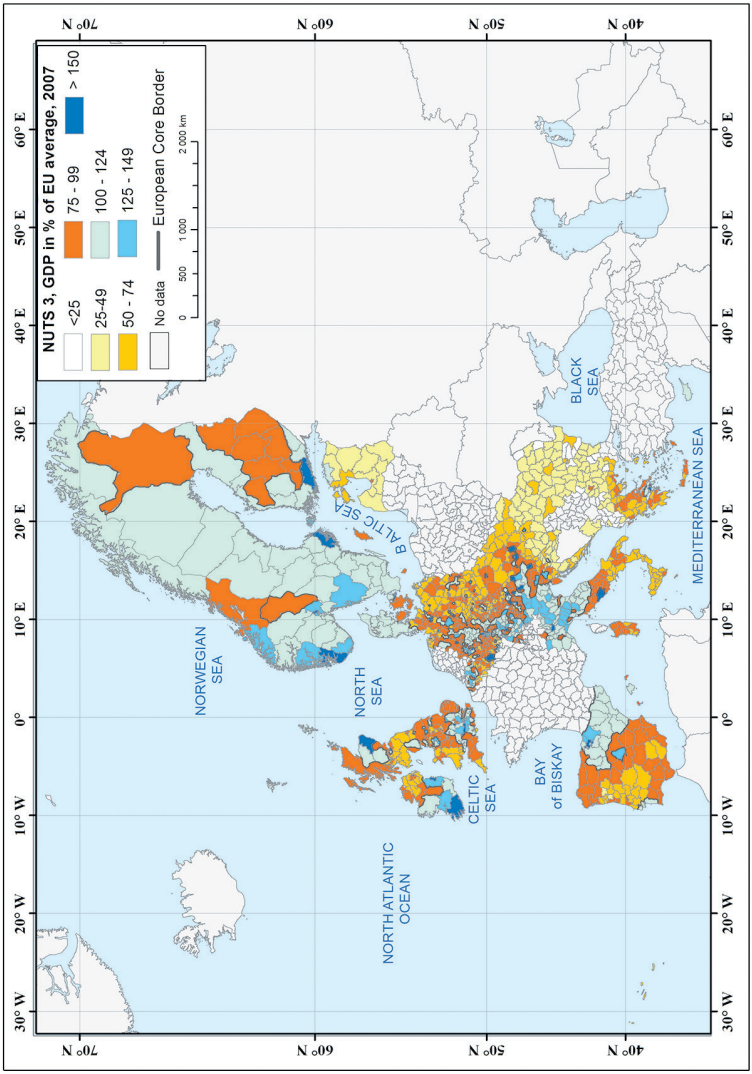

Figure 7. Gross Domestic Product (PPS) per inhabitant in percent of EU-28 average at NUTS 3 Scale in 2007.

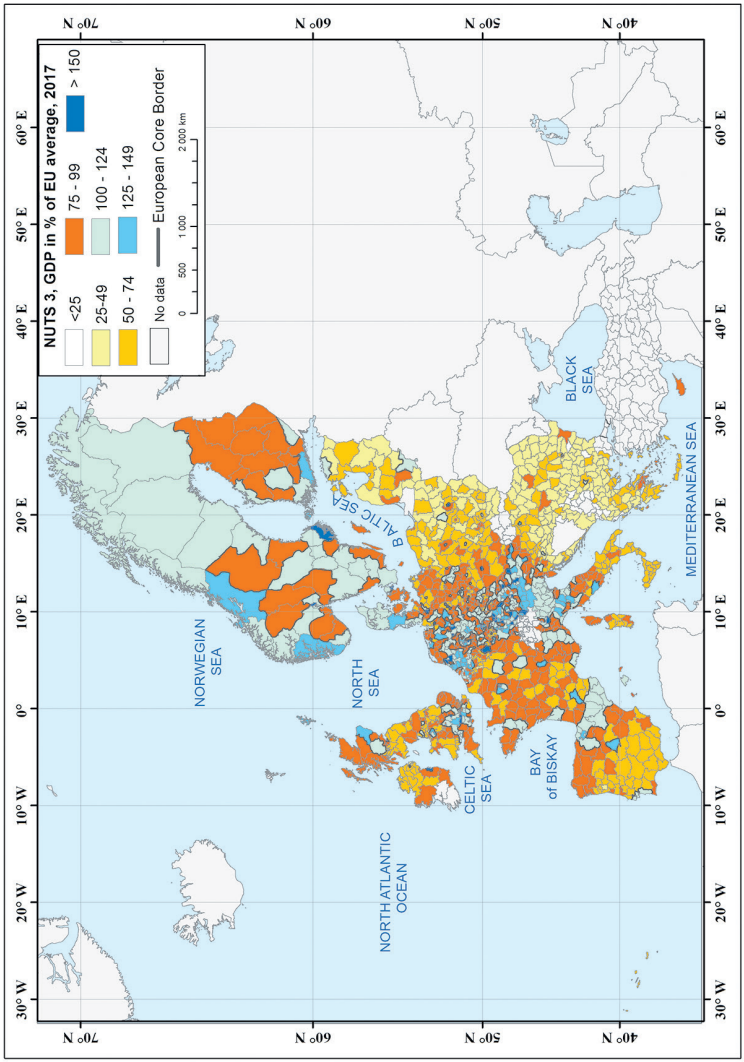

Figure 8. Gross Domestic Product (PPS) per inhabitant in percent of EU-28 average at NUTS 3 Scale in 2017.

The states, which provide the majority of the European Socio-Economic Core elements at this scale and, thereby compose its 'nucleus' (the majority of their NUTS 3 regions produce indicator values above EU-28 average), decrease to seven in number. These states are, as follows: Luxemburg, which is a one-region-only state, Norway, Sweden, Denmark, Netherlands, Austria, and Germany.

The majority of these countries are geographically located in Northwestern Europe. The sheer number and the share of Core elements that Germany provides, make it again the geospatial socio-economic 'pillar' of the European Core.

The territorial elements that make up the cluster shape of the Core Subsystem at this scale are significantly more in number and also more spread out throughout the individual states (e.g., Spain, Italy, France, the UK), as well as throughout the continent. The standard of living in Europe's regions, as expressed by the GDP (PPS) per inhabitant indicator, exhibits significant geospatial positive autocorrelation characteristics. This is especially evident in Italy, UK, France, Finland, Belgium, Spain, and Ireland. GIS visualizations at the NUTS 3 scale however, vividly show that most of their Core regions still group in a band around the Core 'nucleus' (See Figure 8).

The geospatial dynamics of the European Socio-Economic Core shows that at the NUTS 3 scale its eastern expansion continues. An even greater number, albeit not all, EU states contribute at least one element to the European Core and, without exception, these are their capital city regions. Relative 'newcomers' to the Core at this scale are the remaining EU Member States from Central and Eastern Europe. Historical comparisons show that Estonia's Pohja-Eesti (EE001) with 113 percent of GDP (PPS) per inhabitant of EU-28 average and Croatia's Grad Zagreb (HR041) with 107 percent (2016) have already been Core elements before the beginning of this research period in 2007. However, Latvia's Riga (LV006) (2016) with 106 percent of the EU-28 average enters the Core in 2003, and Bulgaria's Sofia (stolitsa) (BG412) with 104 percent succeeds to do

that in 2009, while the main Maltese island of Malta (MT001) with 100 percent - as recently as 2017.

Poland (2016) is undoubtedly, the largest Core contributor in Central and Eastern Europe at that scale. It is the only state in this part of the continent that has added to the European Socio-Economic Core another region, besides its capital. Poland's economic growth during the studied period has enabled it to participate with four new elements, in addition to its capital region of Miasto Warszawa (PL911) with 200 percent of GDP (PPS) per inhabitant of EU-28 average. These are Miasto Krakow (PL213) - 113 percent, Miasto Poznan (PL415) - 135 percent, Miasto Wrozlaw (PL514) - 112 percent, and Plocki (PL923) - 108 percent. At the NUTS 3 scale, however, the Core experiences its largest geospatial advance in Germany, in which forty-six regions joined during the period of this investigation. Austria also shows a positive balance of four regions in favor of the European Socio-Economic Core in the same period of time.

At the other end of the geospatial dynamics, the largest Core withdrawal at this scale has taken place between 2007 and 2017 in the North and South of Europe. The North lost Core elements predominantly in the United Kingdom, where sixteen regions exit the Core, in Sweden - eight regions, in Norway – five, and in Finland - four more elements moved to the periphery. Negative dynamics in Europe's South has experienced Central and Northern Italy, in which seventeen elements retreat from the Core during the study period. In Greece, seven Core elements move to the periphery and in Spain - six. The situation in Portugal and Malta has proven rather stable in this respect. Most vividly, the geospatial retreat of the Core's structure at the NUTS 3 scale, is expressed in the punctuated body of its "nucleus", which no longer continues uninterrupted throughout the territories of any country.

The NUTS 3 scale of the European Socio-Economic Core, also presents a much greater magnitude of the socio-economic disparities among its geospatial elements. In terms of GDP (PPS) per inhabitant

in 2017, the largest difference exists between the standard of living of the capital city region of Malta (MT001) with 100 percent of EU-28 average – a value as close to the periphery as possible - and that of top Core region in Europe - UK's Camden & City of London (UKI31) with 1,311 percent. A standard of living difference from one region to another in ratio of 13 to 1 is not very likely to bring about sufficient regional cohesion, solidarity, and cooperation for common action, even when it applies to regions of Europe's Core only. Decision makers should certainly bear in mind that this is hardly an isolated example or typical for a few regions only. The standard of living of the UK region, closest to Europe's top – Westminster (UKI32) – is 989 percent of EU-28 average. Germany also possesses regions of this kind: Wolfsburg, Kreisfreie Stadt (DE913) and Ingolstadt, Kreisfreie Stadt (DE211) have achieved, 590 percent and 420 percent, respectively. A total of 199, or about 15 percent, of the 1348 NUTS 3 (2016) regions in Europe, "boast" a GDP (PPS) per inhabitant of over 125 percent of EU-28 average. All them have been part of European Union regional policies for a number of planning periods.

1.3 Conclusion

The Socio-Economic Core Subsystem remains 'anchored' in Northwestern Europe at all four scales from NUTS 0 to NUTS 3, but important transformations have taken place during the 2007-2017 study period. The Core's structure consists of a geospatial 'nucleus' – a group of contiguous countries, in which the majority of regions at each scale qualify as Core elements. The nucleus contributes the most to the socio-economic status and stability of the Core. This investigation demonstrates that, during the study period, the nucleus of the European Socio-Economic Core has shrunk at all scales, in terms of number of participating elements. The process takes place, even when three of the EFTA Member States, namely Lichtenstein, Iceland, and Switzerland, are excluded at the NUTS 1 to NUTS 3 scales, due to lack of comparable Eurostat data.

Europe's regions, with Core standard of living characteristics, exhibit significant geospatial positive autocorrelation, which 'groups' most of them in a geospatial 'band', situated just outside the Core's nucleus. This band signifies the second element of the Core's structure. Rather than a banana shape, the European Socio-Economic Core in 2017, has assumed a clear-cut cluster form.

The geospatial structure of the European Socio-Economic Core exhibit high dynamism with the change of time and scale, reflected most explicitly in the shifting of its boundaries. Two processes with opposite directions are observed: advancement, by acquisition of new elements (regions at the respective scale) and withdrawal, by losing elements to the Periphery subsystem. Both processes are indicative of the general socio-economic status of Core structure, its stability, and at the same time, allow for prognostication of the Core–Periphery balance, potential magnitude, and directions of the geospatial transformations in the European continent.

Due to the relative speed of the socio-economic transformations in Europe, during the study period, Core advances have been observed mostly at the lower scales. Significant number of regions have moved between the Core and the Periphery, with all positive and negative implications for the continent's geospatial disparities. Thus, at the NUTS 3 scale, Germany proves to be the largest contributor to the Core's structure and Austria also affects positively its balance of regions. In Eastern Europe, the Core expands mainly through inclusion of present (or former) state capital city regions. Poland (2016) has undoubtedly become another geospatial 'pillar' in this part of the continent: It is the only state that joined the EU after 2007, which has added other regions, besides capital, to the Core. In fact, Poland contributes four regions, besides its capital.

The domination of the core–periphery model in the European type of state regularly 'promotes' the newcomer capital city regions to sole representatives of the European Core in their respective

states. On the one hand, such capital city regions unmistakably stand out, as the most important socio-economic growth regions throughout the continent. On the other hand, however, their relative position may point to significant intra-state socio-economic disparities with negative consequences, e.g., emigration, and implications, which go well beyond the specific country.

Notwithstanding the geospatial expansion of the European Socio-Economic Core Subsystem, the process of retreat dominates its structural dynamics at all scales of analysis during the study period. In addition to the geospatial shrinking of the Core's 'nucleus', the standard of living in a number of Core regions from both the North and the South of the continent has relatively decreased and their GDP per inhabitant (PPS) values have fallen below the EU-28 average. In 2017, the Core Subsystem has declined in number of structural elements, in favor of the European Periphery at all scales. Thus, at the NUTS 0 scale, three Core elements in Europe's South - Cyprus, Spain, and Italy – have left the Core between 2007 and 2017. At the NUTS 1 scale – Greece followed in 2012, losing its only Core region, while Great Britain, France, and Spain, after some Core geospatial 'losses' of their own, remain in its structure with only two regions each. At the NUTS 2 scale, Greece repeats again its complete abandonment of the Core Subsystem, while Portugal follows it very closely in the same direction. Two East European states – Romania and Lithuania - each contributed a capital city region to the Core, but the overall balance of geospatial accessions versus withdrawals has overwhelmingly been in favor of the latter. Most vividly, this process has taken place in Europe's North (See Figure 8). According to the available data, the situation at the NUTS 3 scale does not differ substantially: the geospatial advances, mainly in Central and Eastern Europe, are not able to compensate the opposite process of Core withdrawal in both the North and the South of the continent.

At NUTS 3 scale, which is the scale closest to the everyday experience of the European citizens, the analysis' results provide

probably the best illustration of the magnitude of the horizontal disparities within the structure of the European Socio-Economic Core. During the eleven-year period, the significant disparities within the Core increased, albeit relatively little. In 2007, the standard of living disparity ratio between the 'top' and 'bottom' elements of the Core has been 12.6 to 1, while in 2017, it raises to about 13.1 to 1.

Historically, the tendency is not positive. The horizontal dimension of Core Socio-Economic Subsystem is diminishing, while its vertical dimension – the overall standard of living - continues to grow, thus increasing, with justification that is very difficult to prove, the hierarchic character of the European Socio-Economic System as a whole. First, these findings speak to the level of effectiveness of trans-European regional cohesiveness and development policies. Second, such a disparity and level of policy efficacy deliver neither stability, nor harmony to the European Geospatial System. Such developments are hardly likely to bring about a sufficient level solidarity, and cooperation for common action, even when these apply to the regions of the Europe's Core only.

The investigation also indicates the source and locations of the geospatial potential for positive change in Europe, in addition to completely new technological and geospatial sources and centers of socio-economic growth. Fifteen percent of the 1348 NUTS 3 regions in the European Union (2016) belong to the 'Super Core' category (they possess a GDP (PPS) per inhabitant of over 125 percent of EU-28 average). Their resource potential is significant: it is rooted in the difference between 125 percent, for example, and 1311 percent of the GDP (PPS) per individual of EU-28 average – the measure of the standard of living of the top element of the Core in 2017. Mutually acceptable and sustainable solutions, negotiated in the socio-political sphere, will benefit all regions and their inhabitants through diminishing the current horizontal disparities and increasing the stability, cohesiveness, and harmony of the European Socio-Economic System.

2. EXPANSION OF THE EUROPEAN PERIPHERIES

The methodology of this investigation makes the selection of the objects of investigation exclusively dependent on the availability of Eurostat data, more concretely, regional data for the Gross Domestic Product per inhabitant (Purchasing Power Standard) indicator. For the beginning of the selected study period – the year 2007 – such data has been available and accessible for the following states and regions, that have not been identified as geospatial elements of the European Socio-Economic Core Subsystem and participate in the European Union's NUTS system: Estonia (EE), Latvia (LV), Lithuania (LT), Poland (PL), Czechia (NUTS, aliases Czech Republic, CZ), Slovakia (SK), Hungary (HU), Romania (RO), Slovenia (SL), Croatia (HR), Montenegro (ME), Malta (MT), Bulgaria (BG), Albania (AL) – available since 2008, Serbia (RS) – available since 2012, North Macedonia (MK), Greece (EL), Turkey (TR), and Portugal (PT). At the NUTS 0 scale, the nineteen states above have GDP per inhabitant (PPS) values that are below 100 percent of EU-28 average in 2007 or the closest year for which Eurostat data is available (Eurostat 2019b). Thereby, for the purposes of this study, they are classified as elements of the European Socio-Economic Periphery Subsystem at the NUTS 0 scale.

2.1 Socio-Economic Disparities Among the States of Europe's Periphery

During the period of the investigation, the Periphery Subsystem expands at the NUTS 0 scale in Southern Europe by adding three elements – Spain (ES), Italy (IT), and Cyprus (CY) – that have previously belonged to the Core Subsystem. With the exception of Portugal

and Malta, located in Europe's South West, the rest of the peripheral elements are situated to the East of the European Core Subsystem – in the Central to the South Eastern part of Europe, between the Baltic Sea and the Eastern Mediterranean - and form a North-South –oriented zone that separates Western Europe from the rest of Eastern Europe and South West Asia, including the Middle East (See Figure 1).

Historically, about half of these countries did not exist as sovereign states in the period between the end of the First World War and the early 1990s. With the exception of Portugal, Greece, Malta, and Turkey, all of the Periphery countries have been a part of the Soviet Union-dominated centrally planned economies until the late 1980s, while the three Baltic countries have even been a part of the former Soviet Union itself.

Most states, that are elements of the European Periphery Subsystem in 2007, are also European Union's members, however, none have entered the Community before the 1980s. Greece has been the first to join the EU in 1981, followed by Portugal in 1986. Most of these countries became EU Member States in 2004. Bulgaria and Romania have joined the European Union in 2007, at the very beginning of this study period, while Croatia acceded in 2013. Albania, Serbia, North Macedonia, Montenegro, and Turkey are EU applicants at this time. The global geopolitical importance of the European Periphery cannot be overstated, which speaks to the significance of the subject of this investigation.

Analogous to the socio-economic structure of the European Core Subsystem, the Periphery Subsystem has been shaped in quartiles, according to the same indicator: GDP per inhabitant (PPS) of the EU-28 average. In 2007, the Upper Periphery category of the Periphery Subsystem, featuring NUTS 0 elements with GDP per inhabitant (PPS) of 75 to 99 percent of EU-28 average, includes about 26 percent (five) of all Periphery states: Greece, Slovenia, Czechia, Portugal, and Malta.

The structure of the Periphery Subsystem has also proven to be quite dynamic: it varies widely during the eleven-year period

of the investigation, depending on the changes in the standard of living in the participating states. The Upper Periphery Subsystem expands between 2007 and 2017 based exclusively on the addition of elements from the European Core.

Spain, Cyprus, and Italy have joined the Periphery Subsystem between 2010 and 2013, and in the year 2017, they are also positioned in its Upper category, which at that time already includes a total of seven states. This number is due to the fact that, with the exception of Malta and Czechia, the values of the selected indicator in most NUTS 0 elements from the Upper Periphery category generally stagnate or decrease, similar to the situation in the Core Subsystem. Only Malta's indicator values have risen steadily and the most in this category – from 79 (2007) to 97 percent in 2017 – and the country is well positioned on the road to join the European Socio-Economic Core in a matter of a couple of years. Czechia's indicator value also rises from 82 (2007) to 89 percent in 2017. The situation in Greece deteriorates the most – by 26 percentage points. This NUTS 0 element is the only one in the group to move in 2010 down to the Middle Periphery category with 67 percent of the GDP per inhabitant (PPS) in 2017.

The Middle Periphery category also consists of EU Members States only, each of them with indicator values between 50 and 74 percent of the GDP per inhabitant (PPS) of EU-28 average. In 2007, the following seven countries belong to this category: Estonia, Latvia, Lithuania, Poland, Slovakia, Hungary, and Croatia. Eurostat does not provide comparable data for this indicator for Lithuania until the year 2000 and Poland until 2004. Notably, all NUTS 0-scale elements of this category increased their standard of living during between 2007 and 2017. Three of them – Estonia, Lithuania and Slovakia – succeed, in the middle of the studied period, to even cross over to the upper Periphery category, with 79 percent, 78 percent and 76 percent of the GDP per inhabitant (PPS) of EU-28 average, respectively. Lithuania has certainly been the highest achiever in this category with about 18 percent increase of the standard of living for the observed period.

The lowest category in the structure of the European Socio-Economic Periphery Subsystem contains, in 2007, NUTS 0 elements with indicator values between 50 and 25 percent of the EU-28 average. No NUTS 0 element is characterized by values of this indicator below 25 percent, however, this is certainly not the case for NUTS elements on the lower scales. Based on a study of the socio-economic characteristics of EU Member States only, Koulov (2016) groups the states with GDP (PPS) values per inhabitant of below 50 percent of EU-28 average in a category of their own and terms the group "EU's Deep Periphery" to bring attention to their special development needs, which have, until then, been overlooked by EU regional development and cohesion policies. For the same reason, this investigation uses 'Deep Periphery' for all the NUTS elements with GDP values within the abovementioned parameters.

In 2007, seven of the Eurostat-observed states with such indicator values in Europe - Romania, Bulgaria, Serbia, Montenegro, North Macedonia, Albania, and Turkey - are situated in the Southeastern part of the European continent. Romania is categorized in this group of states only because of the selection of 2007, as the beginning year of this study. This EU Member State starts from a relatively low position – 43 percent of GDP per inhabitant (PPS) of EU-28 average – but, in 2008, has moved to the Middle category of the Periphery Subsystem. By the end of the eleven-year period, Romania has succeeded to increase the standard of living of its population of 21 million people (2007) to 63 percent of EU-28 average. Similar to Malta and Lithuania, Romania has made the largest stride (twenty percentage points) in raising the standard of living, compared to the rest of the countries from any category of the Periphery Subsystem.

Turkey has also been exceedingly successful in this aspect, despite its relatively more difficult overall situation. This largest in area and population country in the European Periphery does not enjoy EU Membership status. Moreover, its population has risen from about 70 million in 2007 to close to 80 million in 2017. Starting from a

GDP of 47 percent per inhabitant (PPS) of EU-28 average, Turkey has also exited the lowest category of the European Periphery in 2010, to achieve, in 2017, a standard of living of 65 percent.

Thus, at the end of the study period, five NUTS 0 elements remain in the Deep Periphery category of the European Periphery Subsystem: Bulgaria, Albania, Serbia, North Macedonia, and Montenegro. Bulgaria is an example of an EU Member State, which, like its neighbor Romania, started the study period from a relatively low position: in 2007, its GDP per inhabitant (PPS) is about 40 percent of EU-28 average. Eleven years later, despite its population size – about three times lower than Romania's - Bulgaria's standard of living stands at below half (49 percent) of EU-28 average, which is the last position in the European Union.

In total, all NUTS 0 participants in the Deep Periphery category of the European Socio-Economic Periphery Subsystem, except for Serbia (since 2012), have succeeded to increase their standard of living during the eleven years of the studied period. Notwithstanding, their experiences necessitate further investigation, in order to devise much more effective regional development policies for this part of the continent. Eurostat does not provide information on the GDP per inhabitant (PPS) of two other geopolitical units in the Balkan Peninsula: Bosna and Herzegovina and the partially-recognized Kosovo (the latter is currently recognized as an independent state by 97 out of the 193 United Nations Member States).

The internal disparity between the values of the GDP per inhabitant PPS indicator of the socio-economic "top" - Greece with 93 percent of the GDP per inhabitant (PPS) of the EU-28 average in 2007 and Malta with 97 percent in 2017 - and the "bottom" - Albania with 25 percent of the GDP per inhabitant (PPS) of the EU-28 average in 2008 and 30 percent in 2017 - elements of the Periphery Subsystem at the NUTS 0 scale is an informative socio-economic geospatial characteristic, especially in terms of Pan-European regional policy making considerations. The comparison

between the beginning and the end of the studied period shows a positive general tendency towards closing of the disparity in the socio-economic standard of living in this category, without a significant 'leap' in this respect: The 2007 difference in the standard of living of the Periphery elements is 3.7 times in 2007 and slightly lower - 3.2 times - in 2017. Despite this tendency, the internal disparity at the NUTS 0 scale in the Periphery Subsystem is wider than that between the Core elements of the same scale.

2.2 Regional Disparities from the NUTS 1 to the NUTS 3 Elements of the European Periphery

2.2.1 NUTS 1 Scale

In 2007, the geospatial structure of the Periphery Subsystem in Europe at the NUTS 1 scale is already much more stable, in comparison with that of its Core: it is vastly dominated by fifteen states, which have no elements that belong to the Core. In 2011, Cyprus also joins the group, stabilizing its structure even further. In addition to this, the Periphery also dominates – in terms of majority of the elements each state possesses – the UK, Spain, Hungary, Greece, and most probably France and Poland. France, Poland, and, partially, Netherlands, Lithuania and Serbia, have to be mostly excluded from the investigation, due to lack of data for a significant period starting with 2007. The NUTS 1 regions of the Periphery have been in the minority only in Germany, Italy, and Belgium. Compared to the Core, mostly smaller - in area and population - political units reside in the Periphery, which causes, among other consequences, their NUTS 0- and NUTS 1-scale regions to coincide.

Data availability for the year 2017 bring evidence for the description of France and Poland as Periphery-dominated at the NUTS 1 scale: only two French and the Polish capital city region are the exceptions. Netherlands and Spain have each added a region - Noord-Nederland (NL1) and Este (ES5), respectively - to the Periphery, while Germany and Turkey have slightly decreased their contributions.

Structurally, in 2017, almost all NUTS 1 Periphery elements, that are situated in the West European states, fit into the Upper Periphery category (their GDP per inhabitant (PPS) is between 75 and 99 percent of EU-28 average). The few exceptions, which reside in the Middle Periphery category, are all situated in Southern Europe and, at the same time, furthermost from the European Core. These are the two most Southern Italian regions - Sud (ITF) and Isole (ITG), Portugal's Região Autónoma dos Açores (PT2), Spain's Sur (ES6), which moves to the lower category in 2010, and the Greek Voreia Ellada (EL5) that borders regions in the same or lower GDP per inhabitant (PPS) category in Albania, North Macedonia, Bulgaria, and Turkey. The observed indicator in all of the regions above has decreased in relation to the EU-28 average value.

Upper Periphery elements dominate this scale in Malta (MT0), and Cyprus' Kypros (CY0) in their entirety. The other two Portuguese regions - Continente (PT1) and Região Autónoma da Madeira (PT3) also fit in that category, as well as the vast majority of UK regions. In 2007, these include: North East (UKC), North West (UKD), Yorkshire and The Humber (UKE), East Midlands (UKF), West Midlands (UKG), South West (UKK), and UK's constituent political units - Wales (UKL) and Northern Ireland (UKN). Two more NUTS 1 scale regions - East England (UKH) and Scotland (UKM) - also join the Upper Periphery category of elements in 2009 and 2016, respectively. Notably, Scotland is the third constituent country that participates in the making of the United Kingdom and, at the same time, in Europe's Upper Periphery. In Greece, the Upper Periphery regions dominate in number too, after Attiki (EL3) has joined in 2012, while Spain of 2007 has an equal number of Periphery and Core regions, although its Periphery regions cover the majority of its territory (See Figure 3). During the period of study, a tendency of decrease of the observed indicator, in relation to EU-28 average, characterizes the majority of the regions in this category.

Periphery elements are in the minority in Germany and Belgium, however, all of them belong to the Upper Periphery Subsystem. Except for the capital city region of Berlin (DE3), all German NUTS 1 Periphery regions are situated exclusively in its Eastern part. These are: Brandenburg (DE4), Mecklenburg-Vorpommern (DE8), Sachsen (DED), Sachsen-Anhalt (DEE), Schleswig-Holstein (DEF) which has departed to the Core in 2011, and Thüringen (DEG). Germany and Turkey each can display the only Periphery NUTS 1 regions - Schlezwig-Holstein (DEF) and Istanbul (TR1) - that have raised their standard of living enough to become elements of the Core Subsystem during the period of this investigation – in 2011 and 2013, respectively.

While the standard of living in all of Greece' NUTS 1 regions has decreased substantially during the period of the investigation, the situation in most states that entered the European Union after 2004 is just the opposite. In 2007, all of their elements at this scale, with the exception of Czech Republic's Cesko (CZ0) and Slovenia's Slovenija (Sl0), which coincide with their respective NUTS 0 regions, belong to the Europe's Middle and Deep Periphery categories. Between 2007 and 2017, however, most NUTS 1 regions in Central and Eastern Europe, exhibit serious positive development, which should be interpreted as a success for EU Cohesion policy.

Thus, in 2007, the Baltic states' NUTS 1 regions – Eesti (EE0), Latvija (LV0), and Lietuva (LT0), Slovakia's Slovensko (SKO), and Croatia's Hrvatska (HR0), all of which coincide with their NUTS 0 regions, are elements of the Middle Periphery. In the same socio-economic category fall also the NUTS 1 capital city regions of Romania – Macroregiunea trei (RO3), which joins the category in 2011, Bulgaria - Yugozapadna i yuzhna tsentralna Bulgaria (BG4), Serbia – Srbija - sever (RS1), and Turkey - Bati Anadolu (TR5), as well as Hungary's Dunantul (HU2) and Turkey's Dogu Marmara (TR4) regions. All elements of the Middle Periphery Subsystem have increased their standard of living during the eleven years of the study period, which is yet another achievement for EU Cohesion

policy. (Eurostat-provided comparable data for Serbia starts in 2012.) Moreover, six of these NUTS 1 regions - Eesti (EE0), Lietuva (LT0), Slovensko (SKO), Bati Anadolu (TR5), Dogu Marmara (TR4), and Macroregiunea trei (RO3) have been able to upgrade their category to Upper Periphery. Most successful among them has been Romania's only NUTS 1 region in this category, the GDP per inhabitant (PPS) of which has risen by 31 percentage points to 91 percent of EU-28 average.

According to the available data, in 2007, the European Socio-Economic Deep Periphery category dominates completely the NUTS 1 regions in the following Western Balkans' states: Albania - Shqipëria (AL0), Montenegro - Crna Gora (ME0), and North Macedonia - Severna Makedonija (MK0), which coincide with their NUTS 0 counterparts. This category of regions also prevails, in terms of number of NUTS 1 regions, in 75 percent of the regions in Turkey and Romania, and includes one region in each of Hungary –- Alföld és Észak (HU3) and Bulgaria - Severna i yugoiztochna Bulgaria (BG3). For Bulgaria, this means that the standard of living of the inhabitants in 50 percent of its regions at that scale and for Hungary – in 33 percent of its regions, are categorized in the European Socio-Economic Deep Periphery category.

In 2017, all NUTS 1 regions improve their standard of living in this category, in some instances, quite significantly. For example, The Romanian region - Macroregiunea doi (RO2) – has raised the standard of living of its inhabitants during the study period by 15 percentage points to 45 percent of the GDP per inhabitant (PPS) of EU-28 average – more than any such elements in this category. No EU Member State is a part of the Deep Periphery in its entirety. Notably, Hungary, Romania, and Bulgaria each still own a NUTS 1 element that has not managed to upgrade their Deep Periphery category.

Turkey has the highest number of NUTS 1 regions in the Deep Periphery. However, this country also exhibits an important regional development success. It has brought their number down to

six, which is exactly 50 percent of their overall number in the state. All of the Deep Periphery NUTS 1 regions in Turkey are located in its Eastern part.

In summary, the significant lack of comparable data at this scale, particularly, for the beginning of the study period, makes historic and geographic comparisons close to impossible. A limited and conditional assessment of the geospatial dynamic of the different categories of the Socio-Economic Periphery Subsystem in Europe at the NUTS 1 scale leads to the conclusion that, compared to Western Europe, the Upper and Middle Periphery categories have gained more elements in Central and Eastern Europe and, most of the gains in the 2007 – 2017 period have been at the expense of the Deep Periphery. Nevertheless, Deep Periphery elements continue to persist in the Eastern and, particularly, the South Eastern parts of the studied territory, including in the following European Union Member States: Poland, Hungary, Romania, and Bulgaria. The few Periphery gains in Western Europe have been at the expense of the Core. No Deep Periphery elements exist in that part of Europe and only very few Middle Periphery elements can be found in Southern Europe.

2.2.2 NUTS 2 Scale

The NUTS 2 scale of the European Socio-Economic Periphery Subsystem is most important for the purpose of this research, since it is used in the EU for application of regional development policies, including the Cohesion Policy, which targets mainly the periphery areas. Despite that, the paucity of Eurostat data for the beginning of the studied period that exists for EU Member States, like France, Netherlands, and Poland, does not bode well neither for decision making, nor for public policy transparency.

All German Periphery regions during the period of the study belong to its Upper category and invariably reside in the Eastern part of the country. Malta participates entirely in the Upper Periphery category throughout the period of investigation, while Cyprus has become part of it since 2010.

In 2007, the Periphery Subsystem penetrates for the first time at this scale some of the Scandinavian countries, like Finland – by including the Pohjois- ja Itä-Suomi (FI1D) region and Denmark - Sjælland (DK02), but also Ireland - Northern and Western (IE04). In all of the above cases, however, these 'intrusions' take place at the level of the Upper Periphery category only. The standard of living in the Finish and Irish Periphery regions drops during the period of study but stays within the limits of the Upper category. All NUTS 2 regions in France of 2017, besides two that are part of the European Core, are elements of the European Upper Periphery. Netherland also possesses three Upper Periphery elements at the NUTS 2 level in 2017.

In 2007, Belgium displays five NUTS 2 regions in the Upper Periphery category. With the exception of Prov. Limburg (BE22), which shows no change in the standard of living of its inhabitants between 2007 and 2017, all Belgian elements of at that scale show declines in this indicator. In 2016 and 2017, Prov. Luxembourg (BE34), drops to the Middle Periphery category. In Spain, the standard of living in all Periphery regions at the NUTS 2 scale also declines. In 2007, Spain has only one NUTS 2 region in the Middle Periphery - Extremadura (ES43). Eleven years later, four more Spanish regions join the Middle Periphery at the expense of the Upper category: Castilla-la Mancha (ES42), Andalucía (ES61), Ciudad Autónoma de Ceuta (ES63), and Ciudad Autónoma de Melilla (ES64).

The vast majority of regions at the NUTS 2 level in the UK in 2007 are part of the Upper Periphery. In the overwhelming majority of Upper Periphery NUTS 2 regions in the UK, the standard of living moves down during the period of this study. The only exceptions are: Lancashire (UKD4) and Herefordshire, Worcestershire and Warwickshire (UKG1). The UK exhibits for the first time at the NUTS 2 scale regions in the Middle Periphery category. UKK3 - Cornwall and Isles of Scilly – down, UKL1 - West Wales and The Valleys-down, UKM9 - Southern Scotland- up slightly. In 2017, the number of Middle Periphery regions doubled, due to the addition of Tees Valley and Durham (UKC1), South Yorkshire (UKE3), Lincolnshire (UKF3), and Outer London - East and North East (UKI).

The Italian part of the Periphery Subsystem on that scale is split between Upper and Middle category elements. Three NUTS 2 regions in Italy's South - Abruzzo (ITF1), Molise (ITF2), and Basilicata (ITF5), belong in 2007 to the Upper Periphery category. During the same year, the Middle Periphery encompasses the following regions: Campania (ITF3), Puglia (ITF4), Calabria (ITF6), and Sicilia (ITG1). During the period of the investigation, the standard of living in all Periphery regions in Italy has declined. In 2017, only Abruzzo (ITF1) remains in the Upper Periphery with 83 percent of the GDP per inhabitant (PPS) of EU-28 average.

In 2007, the South European EU Member States of Portugal and Greece exhibit a very similar territorial pattern of a Core capital city region and Middle Periphery –dominated countryside. In the same year, the number of regions in both the Middle and the Upper Periphery in Portugal has been three at the NUTS 2 scale. At the end of the period of the investigation, however, with the tendency of standard of living decline in all, but one Periphery region, the ratio changes in favor of the Middle Periphery. The NUTS 2 region Norte (PT11) shows no change at 65 percent of the selected indicator, while two Upper Periphery regions - Região Autónoma da Madeira (PT30) and Alentejo (PT18) – move down to the lower category. Only Algarve (PT15) remains in the Upper Periphery in 2017, despite the decrease of its relative standing from 87 to 83 percent of the GDP per inhabitant (PPS) of the EU-28 average.

In 2007, the Middle Periphery regions predominate in Greece at the NUTS 2 scale. The Greek government debt crisis (2009), however, has largely devastated its regional economies and standards of living. The GDP per inhabitant (PPS) of EU-28 average has declined in all regions. During the eleven years of the investigation, the capital city region of Attiki (EL30) – until then an element of the Core Subsystem - has lost 33 percentage points and currently is in the Upper Periphery. The only other Core element at that scale - Notio Aigaio (EL42) – has moved to the Middle Periphery category. All four 2007 Upper

Periphery regions - Dytiki Makedonia (EL53), Ionia Nisia (EL62), Sterea Ellada (EL64), Kriti (EL43) – move down, in some instances quite significantly - by 20 percentage points, to the Middle Periphery. A group of Deep Periphery category of regions has formed in the North and West of the country, which presently includes three NUTS 2 elements - Anatoliki Makedonia, Thraki (EL51) Ipeiros (EL54), and Voreio Aigaio (EL41).

The Eurostat-available data for 2007, describes a North-South zone of Periphery regions in Eastern Europe that starts with the only NUTS 2 Periphery region in East Finland - Pohjois- ja Itä-Suomi (FI1D) –classified in the Upper Periphery category with 96 percent of the GDP per inhabitant (PPS) of the EU-28 average. During the period of the investigation, the standard of living in all Finnish NUTS 2 regions declines and the state acquires two more Upper Periphery elements at the expense of its Core - Länsi-Suomi (FI19) and Etelä-Suomi (FI1C). To the south, the zone includes the three Baltic states – Estonia, Latvia, and Lithuania – in which, due to their relatively small territory, the NUTS 0 through NUTS 3 regions territorially coincide. In 2007, these belong to the Middle Periphery category. The standard of living in the Baltic states increases in the 2007-2017 period from 10 in Estonia and Latvia to 18 percentage points in Lithuania (since (2000 only). As a result, both Estonia and Lithuania are classified in the Upper Periphery category. The only Danish Periphery NUTS 2 region - Sjælland (DK02) 86-88 - and the eleven East German Periphery regions also raise their standard of living during the eleven-year period of the investigation. Two of the latter have even risen to Core status, while the rest remain in the Upper Periphery category.

South of the Germany, all the way until Greece in Europe's South, the category of the Periphery regions changes to Middle and they are situated in a relatively narrow strip of regions that directly border the European Core. The further East and South a given region is situated, the more likely it is to be classified to the Deep Periphery category (Figure 5).

In 2007, there are virtually two NUTS 2 regions in the Upper Periphery category between Germany and Greece. The first is Střední Cechy (CZ02), which completely surrounds the capital city region of the Czech Republic - Praha (CZ01) - which is a part of the European Core. The other six NUTS 2 regions of the Czech Republic are a part of the Middle Periphery. During the period of the investigation, all of this country's regions increase their standard of living, besides Severozápad (CZ04), which stretches along the Sudetes Mountain Range. This is also the only region in the Czech Republic where the standard of living has fallen, in spite of the fact that it directly borders the European Core to the West. Hopefully, Second World War considerations no longer influence regional economic development in Europe.

Data for Poland at the NUTS 2 scale is available for the end of the investigation period only. The country is vastly dominated by Middle Periphery elements, but has two Upper Periphery and three Deep Periphery regions too. The NUTS 2 elements that are characterized by higher standard of living - Wielkopolskie (PL41) and Dolnoslaskie (PL51) - are contiguous to each other and the latter borders to the West regions of the same Periphery category in Germany and the Czech Republic. The Deep Periphery regions - Warminsko-Mazurskie (PL62), Lubelskie (PL81), and Podkarpackie (PL82) are situated in the Eastern part of the country. Their GDP per inhabitant (PPS) of EU-28 average indicator values are within one to two percentage points below the Middle Periphery criterion of 50 percent.

South of the Czech Republic– in Slovakia and Hungary – the territorial pattern of the NUTS 2 regions follows closely the one described above, except at an overall lower level of the GDP per inhabitant (PPS) that corresponds to the Middle and Deep Periphery categories. The standard of living of the two westernmost regions, situated closest to the Core - Západné Slovensko (SK02) and Stredné Slovensko (SK03) - is higher than the easternmost - Východné Slovensko (SK04). The former regions belong to the Middle Periphery in 2007, while the latter crosses from the Deep to the Middle Periphery

in 2010. As a result of the increase in the standard of living in all Slovak NUTS 2 regions, in 2017, all of the Periphery elements remain in its Middle category.

The same geospatial pattern repeats itself in Hungary: The Middle Periphery comprises of the two westernmost NUTS 2 regions, which are closest to the European Core - Közép-Dunántúl (HU21) and Nyugat-Dunántúl (HU22). The third and last region in this category - Pest (HU12) – surrounds completely and serves as a functional extension of Hungary's capital city region, which belongs to the Core. Apparently, this geographic position does not have a positive influence the standard of living of its inhabitants, since this is also the only region in the country with a standard of living decrease of about 3 percentage points during the 2007-2017 period. The two Eastern NUTS 2 elements – Észak-Alföld (HU32) and Észak-Magyarország (HU31) and the two Southern region - Dél-Dunántúl (HU23) and Dél-Alföld (HU33) belong to the European Deep Periphery category with GDPs per inhabitant (PPS) of the EU-28 average between 38 and 40 percent in 2007 and, in 2017 – 43 to 48 percent. No region in Hungary has experienced any movement between categories during the eleven years' period of the investigation.

In 2007, Europe's Periphery at the NUTS 2 scale stretches without any interruption to the South and East of Slovenia's capital city region - Zahodna Slovenija (SI04) - which is a part of the European Core. This country's only Periphery Subsystem NUTS 2 element - Vzhodna Slovenija (SI03) is unsurprisingly situated to the East of the capital city region at the same scale. Both have slightly decreased their standard of living between 2007 and 2017, without changing their Periphery category.

The southernmost economy, which borders directly the European Socio-Economic Core Subsystem in Central and Eastern Europe is Croatia, which is also the last country to accede to the EU in 2013. The NUTS 2 region adjacent to the Core - Jadranska Hrvatska (HR03) - as well as the second and last NUTS 2 region, which is situated

to the East, but is the capital city region – Kontinentalna Hrvatska (HR04) - are both elements of the Middle Periphery category. Neither region changed its category during the study period, however, the former slightly decreased its standard of living from 61 to 59 percent of the GDP per inhabitant (PPS) of EU-28 average during the period of study, while the latter increased it from 61 to 63 percent. The more rapid development of the capital city region is yet another evidence of the dominance of the core – periphery model in the regional socio-economic development of European states.

Romania and Bulgaria are case studies of European Union Member States that are located further away in the Southeastern direction from the European Core. In 2007, both countries are overwhelmingly dominated by the Deep Periphery at the NUTS 2 scale, with the exception of their capital city regions. Nevertheless, Romania's NUTS 2 capital city region - RO32 - Bucuresti - Ilfov - is the second, after the Czech Republic's Střední Cechy (CZ02), and last region between Germany and Greece, that is classified in the year 2007 in the Upper Periphery category with 98 percent of the GDP per inhabitant (PPS) of EU-28 average. At the same time, Bulgaria's NUTS 2 capital city region – Yugozapaden (BG41) - is an element of the Middle Periphery category with only 66 percent of the EU-28 average. In 2017, Bulgaria's NUTS 2 capital city region has moved up - to the Middle category of Europe's Periphery. However, the difference in the growth of the standard of living per inhabitant between the two capital city regions during the eleven years' period of the study is quite large: 13 versus 42 percentage points in favor of the capital city region, situated to the North.

The remaining seven Romanian NUTS 2 regions are parts of the Deep Periphery with GDP per inhabitant between 26 percent (Nord-Est - RO21) to 46 percent (Vest - RO42). Even among these same-category regions, the Eastern and the Southern situations are generally less favorable in terms of standard of living than their opposites. All NUTS 2 Regions in Romania increase their standard of living

during the 2007-2017 period of the investigation and the majority of them (five) have moved in the higher Middle Periphery category. Bulgaria's five regions of the same category start in 2007 with GDPs per inhabitant (PPS) of EU-28 average that vary from 27 to 34 percent. All of them increase their standard of living during the study period, however, none have been able to exit the Deep Periphery category.

The 2007 geospatial structure of Turkey at the NUTS 2 scale is also characterized by very significant dominance of the Deep Periphery category of regions. Out of a total of 26 regions, two (about 8 percent) – the capital city region of Ankara (TR51) and the megalopolis of Istanbul (TR10) - belong to the Upper Periphery. Another five regions (19 percent of the total) - Antalya, Isparta, Burdur (TR61), Kocaeli, Sakarya, Düzce, Bolu, Yalova (TR42), Bursa, Eskisehir, Bilecik (TR41), Izmir (TR31), and Tekirdag, Edirne, Kirklareli (TR21) - are elements of the Middle Periphery. All of the Upper and Middle NUTS 2 regions are situated in Western Turkey. The rest of the regions at this scale – 73 percent of the total – are parts of the Deep Periphery category.

Turkey's overall transformation at the NUTS 2 scale during the period of the investigation is not just positive, in terms of the upward tendency of the population's standard of living, but in this aspect exemplary, compared to the rest of Europe. All regions improved their standing, according to the selected indicator, most of them - impressively. Istanbul (TR10) has joined the European Core, three regions - Ankara (TR51), Kocaeli, Sakarya, Düzce, Bolu, Yalova (TR42) and Izmir (TR31) – have become part of the Upper Periphery, and eight NUTS 2 regions –- Kayseri, Sivas, Yozgat (TR72), Antalya, Isparta, Burdur (TR61), Konya, Karaman (TR52), Bursa, Eskisehir, Bilecik (TR41), Manisa, Afyonkarahisar, Kütahya, Usak (TR33), Aydin, Denizli, Mugla (TR22), Balikesir, Çanakkale (TR32), Tekirdag, Edirne, Kirklareli (TR21) - have joined the Middle Periphery category by 2017. While in 2007, the indicator values of four NUTS 2 regions - Van, Mus, Bitlis, Hakkari (TRB2) with 17 percent of the GDP per inhabitant of EU-28 average (PPS), Agri, Kars, Igdir, Ardahan (TRA2)

with 18 percent, Sanliurfa, Diyarbakir (TRC2), with 19 percent, Mardin, Batman, Sirnak, Siirt (TRC3) also with 19 percent - do not even qualify for the Deep Periphery quartile, all of them do so in 2017. The clear division, between the Deep Periphery in the Eastern part of Turkey, and the Middle and Upper Peripheries in its Western part, however, remains quite stark in 2017.

Eurostat provides NUTS 2 scale data for the indicator selected for this study - GDP per inhabitant (PPS) of EU-28 average - for most states in the Western Balkans. In both North Macedonia and Montenegro (2016), the NUTS 0 through NUTS 2 regions coincide; They remain a part of the European Deep Periphery Subsystem throughout the 2007 – 2017 period. The increase in the standard of living of their population has been quite moderate: from 5 to 6 percentage points for the period of the study. Albania (2008) and Serbia have three and four NUTS 2 regions respectively, however, comparable data for the latter state has been provided since the year 2012 only.

Comparable to the poorest regions in Turkey, the standard of living values for 2007 in two of the Albanian NUTS 2 regions - Veri (AL01) with 19 percent and Jug (AL03) with 21 percent - feature below the boundary of the European Deep Periphery quartile. Only the capital city region - Qender (AL02) - with 34 percent actually qualify to be a part of it. All Albanian regions show an increase in the GDP per inhabitant (PPS) of EU-28 average for the period between 2007 and 2017. Similar to the situation in North Macedonia and Montenegro, the increase is quite insufficient and these NUTS 2 elements barely manage to fulfil, in 2017, the lowest Deep Periphery criteria, selected for this study – 25 percent of the indicator above.

The relatively scant data at the NUTS 2 scale for Serbia prevents a sound scientific analysis. All of its four NUTS 2 regions fit within the Deep Periphery quartile criteria, some of them - barely. Between 2012 and 2017 at least, its socio-economic regional development follows the almost traditional geospatial pattern in this part of the continent: the capital city - Beogradski Region (RS11) - with 65 percent of the GDP

per inhabitant (PPS) of EU-28 average, the Northernmost - Region Vojvodine (RS12) - ranks second with 38 percent, and its Southeastern - Region Juzne i Istocne Srbije (RS22) - with 25 percent is on the verge of dropping off from the Deep Periphery category, despite recent European Union support for the trans-border infrastructure of the region. Political uncertainty in Bosnia and Herzegovina and Kosovo does not support the socio-economic standing of their regions, nor their development.

2.2.3 NUTS 3 Scale

Throughout the period of the investigation, the Scandinavian countries - Sweden, Denmark, and Norway - remain the only region in Europe at the NUTS 3 scale where the Core still dominates and Periphery regions belong only to its Upper category. In the case of Norway and Sweden, Periphery penetrates for the first time at the NUTS 3 scale. In 2007, Sweden participates in the Periphery with one region only - Gotlands län (SE214). Towards the end of the first decade of the 21th century, the situation worsens and, by 2017, this region is joined by seven more: Jämtlands län (SE322), Gävleborgs län (SE313), Värmlands län (SE311), Hallands län (SE231), Blekinge län (SE221), Kalmar län (SE213), and Södermanlands län (SE122).

The situation in Norway and Denmark is quite similar. In 2007, the Periphery claims two regions in Norway - Nord-Trøndelag (NO062) and Hedmark (NO021). By 2017, they more than double in number by the addition of the following elements: Oppland (NO022), Østfold (NO031), Vestfold (NO033), Telemark (NO034), and Aust-Agder (NO041). The trend in all of the Periphery regions is negative, with the exception of Nord-Trøndelag (NO062). Periphery regions are in the minority throughout the period of research in Denmark too, in the ratio of 7 to 4. In contrast to Norway, however, almost all them - Bornholm (DK014), Østsjælland (DK021), and Vest- og Sydsjælland (DK022) – exhibit a positive trend in their standard of living, except for Fyn (DK031) – which shows no change in this respect.

In Finland of 2007, the Periphery regions are in the minority. However, eleven year later, it is the only Scandinavian country, in which they already dominate. All, but one of the Periphery regions, decrease their standard of living during the investigation period. The exception of Lappi (FI1D7), which has not only increased its standard of living, but also joins the Core. In addition, a number of Core regions decrease their GDP per inhabitant (PPS) of the EU-28 average and fall under the Core threshold. Thus, Keski-Pohjanmaa (FI1D5), Pohjois-Pohjanmaa (FI1D9), Kymenlaakso (FI1C4), and Satakunta (FI196) join the Periphery too.

In 2007, the rest of the European states possess NUTS 3-scale regions in the Middle Periphery category too, in different proportions to the Upper Middle regions. In Germany, Upper Periphery category regions dominate throughout the investigation period and the vast majority of the Middle Periphery regions increase their standard of living and decrease in number. One German Deep Periphery region in 2007 rose almost immediately to the Upper category.

The situation in Austria is rather similar: Upper Periphery regions dominate in 2007 and most increase their standard of living, as do the four Middle Periphery regions. The latter decrease in number to one - Weinviertel (AT125) with 70 percent of the GDP per inhabitant (PPS) of EU-28 average. Netherlands provides data at the NUTS 3 scale for 2015 and 2016 only. For the end of the period of investigation, its Periphery situation is very close to that of the previous two countries: The Upper Periphery regions dominate strongly and only one region is in the Middle Periphery category - Oost-Groningen (NL111) with 66 percent of the selected indicator.

In Belgium of 2007, the regions in the Upper Periphery category dominate the Middle Periphery regions by almost twice. One region exists in the Deep Periphery category - Arr. Thuin (BE326) with 49 percent GDP per inhabitant (PPS) of EU-28 average. Its standard of living has not demonstrated any change throughout the 2007-2017 period. Compared to the regions in the Upper Periphery, three times more

Middle Periphery regions in the country have stagnated or decreased their standard of living during the period of the investigation. Similar to Belgium, in the UK of 2007, the regions in the Upper Periphery also dominate the Middle Periphery. One region of the Deep Periphery category exists - Ards and North Down (UKN09) – with 45 percent of the GDP per inhabitant of EU-28 average, which actually falls to 39 percent by the end of the period of this research. The vast majority of the Periphery regions have stagnated or decreased their standard of living during the period of the investigation.

Data is missing for the last period in a small number of regions in Ireland. Nevertheless, it presents a case study of a country, in which some regions exhibit trends in significant opposition to the generally quite positive development of its general standard of living. In 2007, Ireland is dominated by Core regions. It possesses only two regions in the Upper Periphery - Midland (IE063) and Border (IE041). Between 2007 and 2016, the standard of living of these regions fell by 25 and 22 percentage points of the selected indicator, respectively, and both descend to the Middle Periphery category. In the meantime, at least one Core region joins the Upper Periphery and data for another region is still missing. A different island state, but situated in South Europe – Cyprus, at the NUTS 3 scale: Kypros (CY000) - has been an element of the European Socio-Economic Core Subsystem in 2007. Eleven years later, however, the socio-economic standard of living of its 'average' inhabitant decreases by nineteen percentage points to 85 percent of the GDP per inhabitant (PPS) of EU-28 average and this one region state moves to the Upper Periphery category.

Spanish Periphery in 2007 is also dominated by its Upper category of regions. Only four elements of the Middle Periphery category are present: Cáceres (ES432), Granada (ES614), Jaén (ES616), and Badajoz (ES431). The standard of living in all Periphery regions has stagnated or decreased by 2016. As a result, the number of regions in the Middle Periphery category drastically increases and by the end of the research period the category is clearly dominant in this country of the European South.

During the 2007 - 2016 period of the investigation, the Upper and the Middle Periphery categories of NUTS 3 regions in Italy are split almost equally. The Upper Periphery barely dominates at the beginning of the period. Despite the fact that almost all Periphery regions exhibit a decline in their standard of living throughout the same period, the Middle Periphery category regions slightly dominate in number at its end, due to the influx of regions from the Core.

In 2007, Malta's both NUTS 3 regions reside in the Periphery. The capital city region - Malta (MT001) - is an element of the Upper Periphery category with a GDP per inhabitant (PPS) of 81 percent of EU-28 average, while the other regions belongs to the Deep Periphery category with 49 percent of the same indicator. Eleven years later, only one of Malta's regions still resides in the Periphery - Gozo and Comino / Ghawdex u Kemmuna (MT002). It is, however, a part of its Middle category.

The Middle Periphery category dominates among the NUTS 3 of Portugal throughout the period of the investigation. In 2007, there have been six Upper Periphery regions - Área Metropolitana do Porto (PT11A), Algarve (PT150), - Região de Aveiro (PT16D), Região de Leiria (PT16F), Baixo Alentejo (PT184), and Região Autónoma da Madeira (PT300) – and all of them follow the general trend of decline of the standard of living that has prevailed during the period of this research. The two regions of the Deep Periphery category however - Alto Tâmega (PT11B) and Tâmega e Sousa (PT11C) - have increased their GDP per inhabitant (PPS) of EU-28 average indicator. The former region has even succeeded to join the Middle Periphery group of geospatial elements at the NUTS 3 scale.

Another South European state - Greece - has also been heavily dominated by the Periphery throughout the investigation period. In 2007, the Middle Periphery category of regions already dominate Greece – the ratio to the Upper Periphery regions is 25 to 22. By 2016, the general tendency of severe socio-economic decline brings

significant regional changes. On the one hand, it strengthens the domination of the Middle Periphery regions. On the other, while in 2007, no elements of the Deep Periphery category exist in Greece, in 2016, there are already nineteen, situated mostly in the Northern and Western parts of the country. Finally, the situation in the Upper Periphery category has been quite the opposite: out of the twenty-two regions in 2007, only seven remained in the category: Zakynthos (EL621), Voiotia (EL641), Notios Tomeas Athinon (EL304), Anatoliki Attiki (EL305), Dytiki Attiki (EL306), Peiraias, Nisoi (EL307), and Andros, Thira, Kea, Milos, Mykonos, Naxos, Paros, Syros, Tinos (EL422). Eleven years earlier, all of them have belonged to the European Socio-Economic Core.

Significant lack of comparable data at the NUTS 3 level in Central and Eastern Europe precludes historical and geospatial comparative analyses for a number of states in the region. In Poland (data is available since 2014), the Middle Periphery regions are the most numerous regions in 2016. In the Czech Republic of 2007, the Middle Periphery regions dominate in ratio of 10:3. The regions in the Upper Periphery category – Jihomoravský kraj (CZ064), Plzenský kraj (CZ032), and Stredoceský kraj (CZ020) – increase their standard of living in the 2007 – 2017 period. The same trend is observed in the regions in the Middle Periphery category, except for two regions - Karlovarský kraj (CZ041) and Ústecký kraj (CZ042) – situated in the country's Northwest. Generally, the structure of the Periphery in the Czech Republic has been quite stable: only one region - Zlínský kraj (CZ072) - moves to the Upper Periphery category.

Slovakia's Periphery structure has been even more stable. Despite the fact that all NUTS 3 regions increased their standard of living, neither the number of regions in each category, nor the regions themselves exhibit any movement across categories throughout the period of the study. The country possesses one region - Trnavský kraj (SK021) - in the Upper Periphery category and one – in the Deep Periphery - Presovský kraj (SK041). Similar to the Czech Republic, it is also dominated by the Middle Periphery regions.

In 2007, the regions in the Middle Periphery category prevail in Slovenia, in ratio of 6:5 over the regions from the Upper Periphery. A tendency of standard of living decline prevailed, since, at the end of the investigation period, the Upper and Middle category regions are equally split: The GDP per inhabitant (PPS) indicator of the Zasavska (SI035) region decreased to 45 percent of EU-28 average. Thus, Slovenia has acquired a geospatial element of the NUTS 3 scale in the European Deep Periphery.

In 2007, the majority NUTS 3 regions in Croatia belong to the Deep Periphery category. The standard of living in most of them declines or stagnates during the study period. Most exceptions are from the Deep Periphery category, where three regions increase their GDP per inhabitant (PPS) of EU-28 average - Medimurska zupanija (HR046), Bjelovarsko-bilogorska zupanija (HR047), and Sisacko-moslavacka zupanija (HR04E). The first of these regions even succeeds in joining the Middle Periphery category. On balance, however, the number of regions in all Periphery categories in the country does not change throughout the 2007 – 2016 period of investigation. Only one region from the Middle Periphery - Primorsko-goranska zupanija (HR031) - shows a slight increase in its standard of living. Conversely, the single Upper Periphery region at the NUTS 3 scale in Croatia - Istarska zupanija (HR036) - exhibits a small decline.

In 2007, Hungary has been a country, without any regions in the Upper Periphery category, and largely dominated by Deep Periphery regions. The ratio between Deep- to Middle-category regions the same year is 14:5. During the period of study, all regions increase their standard of living and several change their category. For example, the Gyor-Moson-Sopron (HU221) has a 68 percent GDP per inhabitant (PPS) of the EU-28 average, which rises to 87 percent and, respectively, to the Upper Periphery category in 2017. Five regions from the Deep Periphery follow this example: Veszprém (HU213), Zala (HU223), Borsod-Abaúj-Zemplén (HU311), Bács-Kiskun (HU331), and Csongrád (HU333) and enter the Middle

Periphery category. Notably, however, the NUTS 3 region with the lowest standard of living in the country - Nógrád (HU313) – raised its standard of living in the course of eleven years by one percentage point only - to a paltry 29 percent! This is yet another piece of evidence that points to the fact, that, first, the socio-economic 'trickle-down' effect does not seem to be very efficient exactly in the case of the regions that are most in need of regional support, and, second, that the European Union's regional policy has been quite 'blind' to this particular type of regions.

At the beginning of the study period, Estonia is dominated by its three Deep Periphery regions. All of them have increased their standard of living by the end of the period. The GDP per inhabitant (PPS) of the only Middle Periphery element has not changed in respect to EU-28 average between 2007 and 2017. Since one region in Estonia - Lõuna-Eesti (EE008) - has been able to elevate its standard of living and enter the Middle Periphery category, the numbers in the two categories have equalized. In Latvia, all Periphery regions belong to the Deep Periphery – a situation that has not changed throughout the period of investigation, despite the increase in the standard of living in them all. Eurostat provides comparable data for Lithuania since the year 2000 only. At that time, its regional structure is dominated by the regions from the Deep Periphery category. This situation is unchanged at the end of the period; however, the structure has somewhat diversified: Three of its regions reside in the Middle Periphery category, while two – in the Upper Periphery.

In 2007, the vast majority of the NUTS 3 regions in Romania belong to the Deep Periphery category. No regions can be classified as Upper Periphery. The country possesses five regions in the Middle Periphery category - Cluj (RO113), Brasov (RO122), Constanta (RO223), Ilfov (RO322), Timis (RO424) – and they have all increased their standard of living substantially (with over 23 percentage points on average). Three of them - Cluj (RO113), Constanta (RO223), and

Timis (RO424) have succeeded to raise their standard of living to the Upper Periphery category during the period of the investigation. The only Middle Periphery region, which has actually decreased its GDP per inhabitant (PPS) of EU-28 average by four percentage points, is Ilfov (RO322), which surrounds Romania's capital city region that belongs to the European Socio-Economic Core Subsystem and serves as its functional extension. Another five Deep Periphery regions have also been able to elevate their standard of living to enter the Middle Periphery: Sibiu (RO126), Arges (RO311), Prahova (RO316), Gorj (RO412), and Arad (RO421). Their average increase of the GDP per inhabitant (PPS) of EU-28 average is close to seventeen percentage points. At the same time, the 'average' inhabitant of a third group of five NUTS 3 regions in Romania has existed, in 2007, under the threshold for the Deep Periphery category in Europe. The group includes: Botosani (RO212) and Vaslui (RO216), which are situated at the Eastern border with Moldova, and Calarasi (RO312), Giurgiu (RO314), and Ialomita (RO315), which are located between two Middle Periphery regions - Ilfov (RO322) and Constanta (RO223). The last three regions are also in close proximity to Romania's capital region, part of the European Core and at the border of the European Union Member State of Bulgaria.

All five of the above Romanian regions have joined the Deep Periphery by 2017. However, the increase of the standard of living of the 'average' inhabitant of the five regions, is 13 percentage points, which is almost two times smaller than the rate of the increase in the regions of the Romanian Middle Periphery category. Similar to the previously mentioned example in Hungary, this is one more example of the conclusion, that, first, these are not isolated cases for some European Union Member States, second, the socio-economic 'trickle-down' effect is, in some places, substituted by a 'sucking out' effect, often in regions that are most in need of regional support, and, third, EU regional policy has completely overlooked such type of regions, which exist in Bulgaria too.

In 2007, all NUTS 3 scale regions in Bulgaria, with one exception, are part of the European Periphery. In fact, the overwhelming majority of them are elements of the Deep Periphery category. The only NUTS 3 scale element in the Upper Periphery category is the capital city region of Sofia (stolitsa) (BG411) with GDP per inhabitant (PPS) of 90 percent of EU average. No region fits within the criterion for the Middle Periphery category. Seven regions have not been able to even qualify for the Deep Periphery category: Vidin (BG311), Montana (BG312), Silistra (BG325), Dobrich (BG332), Sliven (BG342), Yambol (BG343), and Kardzhali (BG425). The vast majority of the NUTS 3 regions increase their socio-economic standard of living during the eleven-year period of the investigation. In two Bulgarian regions only - Lovech (BG315) and Pazardzhik (BG423) - the standard of living between 2007 and 2017 has remained without change, compared to the EU-28 average, while in Pernik (BG414) it declined from 30 to 27 percent of the GDP per inhabitant (PPS). In 2017, the number of NUTS 3 regions which still remain unqualified even for the European Deep Periphery, diminishes to two: Silistra (BG325) and Sliven (BG342). At the same time, Bulgaria can point to two regions which participate in the Middle Periphery category - Stara Zagora (BG344) which has GDP per inhabitant (PPS) of EU-28 average of 61 percent and Sofia (BG412) the region, which surrounds the capital city region, which shows 54 percent of the same indicator.

In 2007, the number of NUTS 3 regions of the Deep Periphery in North Macedonia equals the number of regions that do not qualify to enter this Periphery category. The socio-economic standard of living, however, increase during the period of the investigation in all regions. Thus, in 2016, only two regions - Poloski (MK006) and Severoistocen (MK007) - remain below the Deep Periphery threshold, while the capital city region - Skopski (MK008) – has increased its GDP per inhabitant (PPS) of EU-28 average to 53 percent and becomes a part of the European Middle Periphery category.

The majority of Albania's NUTS 3 regions do not qualify for European Deep Periphery. However, all of them increase their standard of living during the period of study. While in 2007 the country has only three Deep Periphery elements, eleven years later their number doubles to reach the number of the regions below that category. The European Deep Periphery category includes the capital city region of Tiranë (AL022), which has, in 2017, the highest GDP per inhabitant (PPS) of EU-28 average (42 percent) in the country. North Macedonia's neighbor, Montenegro is a state of only one region - Crna Gora (ME000) – which has risen from 39 to 44 percent of the GDP per inhabitant (PPS) of EU-28 average and also belongs to the Deep Periphery.

Eurostat provides data for the selected socio-economic indicator for Serbia during the last period of this research only. Thus, in 2016, the NUTS 3 regions from the Deep Periphery category constitute the majority in the country. Its capital city region - Beogradska oblast (RS110) - exhibits a GDP per inhabitant (PPS) of 65 percent of EU-28 average, which qualifies it for the European Middle Periphery category. The rest of Serbia's regions – ten in number – feature below the criterion for the European Deep Periphery category - GDP per inhabitant (PPS) of 25 percent of EU-28 average.

2.3 Conclusion

Following the methodology of the investigation of the European Socio-Economic Core, in 2007, its Periphery is larger, in terms of number of elements, and consists of nineteen countries. This NUTS 0 –scale classification takes place on the basis of Eurostat-provided regional data for their standard of living, measured as the GDP per inhabitant (PPS) values that are below 100 percent of EU-28 average (Eurostat 2019b). During the 2007 – 2017 period, the Periphery Subsystem experiences geospatial expansion at all four NUTS (2016) scales, predominantly by adding elements from the Core Subsystem, mainly in Southern and Eastern Europe. The Periphery elements,

situated to the East of the European Core Subsystem, form a specific geographic pattern - North-South –oriented zone - between Western Europe and its Eastern parts, plus the Near/Middle East.

Analogous to the European Core Subsystem, the structure of the Socio-Economic Periphery Subsystem consists of 25 percentage points -large categories, modeled on the abovementioned indicator in the following manner: Upper (75 to 99 percent), Middle (50 to 74 percent), and Deep Periphery (25 to 49 percent), as well as those Periphery elements that do not qualify for the latter category, since their GDP per inhabitant (PPS) falls below 25 percent of the EU-28 average. The structure of the Periphery Subsystem has proven to be quite dynamic: The number of the geospatial elements in each category varies, often significantly, during the eleven-year period of the investigation, depending on the changes in the standard of living in the respective elements.

Similar to the situation in the Core Subsystem, the standard of living in most NUTS 0 elements of the Upper Periphery category, with the exception of Malta and Czechia, generally stagnates or decreases between 2007 and 2017. On the basis of time series analysis, his research forecasts that Malta is on the road to join the European Socio-Economic Core in the next few years. The elements in the Middle Periphery category also consist of EU Members States only. All of them, however, increase their standard of living during the 2007-2017. in the middle of the study period, Estonia, Lithuania, and Slovakia have crossed over to the Upper Periphery category, which also supported its geospatial expansion.

In 2007, all countries from Europe's Deep Periphery are situated in the European Southeast. Except for Serbia (data since 2012), they also increase their standard of living by the end of the research period. Romania and Turkey even move up to the Middle Periphery category. Thus, in 2017, the Deep Periphery remains with a smaller number - five – of NUTS 0 elements, including the only one EU Member State – Bulgaria (BG).

Internal disparity (disparity ratio of 3.2 in 2017) at the NUTS 0 scale of the Periphery Subsystem is larger, than that between the Core elements of the same scale - 2.4. The tendency of the disparity's change in the case of the Periphery Subsystem, however, is positive: The gap in the socio-economic standard of living between the top and bottom countries tends toward closing between 2007 (disparity ratio of 3.7) and 2017.

At the NUTS 1 scale, the geospatial structure of the Periphery Subsystem in 2007 is also much more spacious, in comparison to European Core. It involves fifteen states, which are completely void of elements that belong to the Core. In addition, the Periphery also dominates – in terms of majority of the elements each state possesses – four to six more countries (Great Britain, Spain, Hungary, Greece, and, probably, given extrapolation of the available data, France and Poland).

Structurally, in 2017, almost all NUTS 1 Periphery elements, that are situated in the states of Western Europe, fit into the Upper Periphery category. The few exceptions, that reside in the Middle Periphery category, are all situated in Southern Europe, furthermost from the European Core. The observed indicator in all of the regions above has decreased, in comparison to the EU-28 average value. Germany and Turkey can present the only Periphery NUTS 1 regions - Schlezwig-Holstein (DEF) and Istanbul (TR1) - that have raised their standard of living enough to become elements of the Core Subsystem during the period of this investigation.

In 2007, all NUTS 1 elements at this scale in the states that entered the European Union after 2004, with the exception of Czech Republic's Cesko (CZ0) and Slovenia's Slovenija (Sl0), belong to the Europe's Middle and Deep Periphery categories. Between 2007 and 2017, however, most NUTS 1 regions in Central and Eastern Europe, exhibit serious positive development, which can be interpreted as a success story of EU Cohesion policy. All NUTS 1 elements of the Middle Periphery Subsystem increase their standard

of living during the eleven years of the study period, including six of them which upgrade to the Upper Periphery category.

In 2007, the European Socio-Economic Deep Periphery category dominates completely the NUTS 1 regions in Albania (AL0), Montenegro (ME0), and North Macedonia (MK0), which coincide with their NUTS 0 counterparts. This category also prevails, in terms of number of NUTS 1 regions, in 75 percent of the regions in Turkey and Romania, and includes one region in each of Hungary (HU3) and Bulgaria (BG3). By 2017, all of these NUTS 1 regions improve their standard of living in this category, in some instances, quite significantly. No EU Member State resides in its entirety in the Deep Periphery.

In summary, a limited and conditional assessment of the geospatial dynamic of the different categories of the Socio-Economic Periphery Subsystem in Europe at the NUTS 1 scale leads to the conclusion that, compared to Western Europe, the Upper and Middle Periphery categories have gained more elements in Central and Eastern Europe and, most of the gains in the 2007 – 2017 period have been at the expense of the Deep Periphery. Nevertheless, Deep Periphery elements continue to persist in the Eastern and, particularly, the South Eastern parts of the studied territory, including in the EU Members: Poland, Hungary, Romania, and Bulgaria. In Western Europe, the few Periphery gains have taken place at the expense of the Core. No Deep Periphery elements are present in this part of Europe.

In 2007, the vast majority of the NUTS 2 regions in Western Europe's Periphery fall into its Upper category. South European EU Member States of Portugal and Greece exhibit a very similar territorial pattern of a Core capital city region and Middle Periphery –dominated countryside. Despite the overall tendency of decline in the standard of living of their inhabitants, the majority of the regions did not change their category. The category transformations have taken place mostly in Southern Europe, however, Great Britain, Sweden, and Finland, among others, have also been affected.

In Eastern Europe of 2007 exists a North-South zone of Periphery regions that starts with the only NUTS 2 Periphery region in East Finland. During the period of the investigation, the standard of living in all Finnish NUTS 2 regions declines and the state acquires two more Upper Periphery elements at the expense of its Core. To the south, the zone continues with the three Baltic states, which, in 2007, belong to the Middle Periphery category. The standard of living in the Baltic states, however, increases in the 2007-2017 period and, by the last year of the research both Estonia and Lithuania are classified in the Upper Periphery category. The only Danish Periphery NUTS 2 region and the eleven East German Periphery regions also raise their standard of living during the eleven-year period of the investigation. Two of the latter even rise to Core status, while the rest remain in the Upper Periphery category.

South of the Germany, all the way until Greece, the category of the Periphery regions changes to Middle and their situation is extremely beneficial, since the relatively narrow strip they form directly borders the European Core. The further East and South a given region is situated, the more likely it is to be classified to the Deep Periphery category. In 2007, there are only two NUTS 2 regions in the Upper Periphery category between Germany and Greece.

Throughout Central and Eastern Europe, the NUTS 2 elements with a higher standard of living are contiguous to each other and the regions of the same or higher Periphery category to the West. The Deep Periphery regions are situated in the Eastern part of the countries. The other characteristic geospatial pattern, is due to the influence of the capital regions, which (Poland, Czechia, Hungary, Slovakia, Slovenia) belong to the Upper Periphery or the Core. The NUTS 2 regions, which border such regions, serve as their functional extensions and their standard of living places them in the Middle Periphery. The more rapid development of the capital city regions is yet another evidence of the dominance of the core – periphery model in the regional socio-economic development of European states.

Romania and Bulgaria are case studies of European Union Member States that are located further away in the Southeastern direction from the European Core and their geospatial patterns of socio-economic development are good illustrations of this fact. In 2007, both countries are overwhelmingly dominated at the NUTS 2 scale by the Deep Periphery, with the exception of their capital city regions. All of their NUTS 2 Regions increase their standard of living during the 2007-2017 period. The majority of Romanian regions, however, have succeeded to move in the higher Middle Periphery category, while the Bulgarian regions, except for the capital, remained in the Deep Periphery.

Last, but not least, Turkey's overall transformation at the NUTS 2 scale during the period of the investigation is exemplary, compared to the rest of Europe, in terms of the upward tendency of the population's standard of living. Most regions improved their standing impressively. Nevertheless, the clear division, between the Deep Periphery in the Eastern part of the country, and the Middle and Upper Peripheries in its Western part, remains quite stark in 2017.

At the NUTS 2 scale of the Periphery Subsystem, the internal disparity ratio in 2017 between the top and bottom elements - Etelä-Suomi (FI1C) with 98 percent and Van, Mus, Bitlis, Hakkari (TRB2) with 25 percent - is 3.9. The tendency of the disparity's change in the case of the Periphery Subsystem at the same scale is positive: The gap in the socio-economic standard of living between the top and bottom countries tends toward closing, since in 2007, the disparity ratio has been 5.8 [East Anglia (UKH1) with 99 percent and Van, Mus, Bitlis, Hakkari (TRB2) with 17 percent].

Europe's North, more specifically, Sweden, Denmark, and Norway, remains the only region in Europe where the Periphery regions are in the minority, even at the NUTS 3 scale. Additionally, all of them have been a part of its Upper category throughout the period of the investigation. In fact, in Norway the Periphery penetrates for the first time at this scale during this study period. By 2017, Finland is the only Scandinavian country, in which the Periphery begins to

dominate, in terms of number of NUTS 3 regions. All, but one of its Periphery regions, decrease their standard of living between 2007 and 2017.

The Upper Periphery regions also dominate throughout the research period in Germany, Austria, and Netherlands. Spanish and Italian Peripheries are also dominated by its Upper category regions, but only at the beginning of this investigation. In Western Europe, the general tendency during the 2007-2017 period is towards stagnation or decrease of the standard of living of their 'average' inhabitant in the vast majority of the Periphery regions. As a result, by the end of the studied period, the number of regions in the Middle Periphery dramatically increases and clearly dominates in the European South (Portugal, Spain, Italy, and Greece). While no elements of the Deep Periphery category exist in Greece in 2007, by the end of the study period, there are already nineteen, situated mostly in the Northern and Western parts of the country.

The Middle Periphery category also dominates the NUTS 3 regions of the Czech Republic, and Slovakia throughout the period of the investigation. In Poland, the Middle Periphery regions predominate in 2016, while in Estonia, the numbers in the Middle and the Deep Periphery categories during the same year are equal. In the rest of the countries in Central and Eastern Europe predominates the Deep Periphery category and the tendencies in the standard of living vary widely.

Romania provides yet another piece of evidence for the conclusions, that, first, the Deep Periphery regions with GDP per inhabitant (PPS) of EU-28 average below 50 percent are not isolated cases in the European Union Member States, but EU regional policy has until recently completely overlooked them (Koulov 2016) and, second, the socio-economic 'trickle-down' effect is, in some places, substituted by its opposite - 'sucking out' - effect that often takes place in regions that are most in need of regional support.

In 2007, five NUTS 3 regions in Romania (and seven in Bulgaria) have not been able to pass the threshold for even the Deep Periphery category (GDP per inhabitant (PPS) of 25 percent of EU-28 average).

Nevertheless, the increase of the standard of living of the 'average' inhabitant of the five Romanian regions, is almost two times smaller than the rate of the increase in the regions of the Romanian Middle Periphery category. In 2017, Bulgaria can still point to two regions at this scale, which do not qualify for the Deep Periphery category. Despite the increase in the socio-economic standard of living in all regions during the period of the investigation, North Macedonia also has two regions in the same GDP quartile. In Albania, half of the NUTS 3 regions do not qualify for European Deep Periphery, while Serbia has ten such regions.

At the NUTS 3 scale of the Periphery Subsystem, the internal disparity ratio in 2017 between the top and bottom elements - Fyn (DK031) with 99 percent and Kukës (AL013) with 18 percent - is 5.5. The tendency of the disparity's change in the case of the Periphery Subsystem at the same scale is positive: The gap in the socio-economic standard of living between the top and bottom countries tends toward closing, since in 2007, the disparity ratio has been 7.1 [Ebersberg (DE218) with 99 percent and Dibër (AL011) with 14 percent].

3. EUROPE'S DEEP PERIPHERY

Under EU's Regional policy Convergence Objective (Directorate… 2016), the Cohesion policy classification and the related funding criteria during the 2007-2013 period 'lump' together regions with standard of living from 75 to less than 30 percent of the GDP per inhabitant (PPS) of EU-28 average, which has placed at a disadvantage the territorial units with the lower indicator values. This investigation supports the proposition that improvement of priority setting in regional policy planning and decision making goes through placing greater emphasis on the areas in which peripheralization is most intense. Koulov (2016) terms such areas Europe's 'Deep Peripheries". This study draws attention to their origin and puts forth additional evidence that they form in areas where multiple peripheries of different nature and scale overlap. On this basis, it suggests a method for their identification, analysis, and forecasting, called 'overlap of peripheries'.

3.1 Types of Peripheries: Scales and Aspects

The conceptualization of the European core–periphery relations as interdependencies and interactions within a hierarchical European Geospatial System enables the description, analysis, and deeper understanding of its Core and Periphery subsystems. At the NUTS 0 (country) scale, both subsystems are generally perceived to consist of one element each (See Figure 1). At the lower hierarchical scales, however, the geospatial compositions of the Core and Periphery subsystems become increasingly complex, in terms of number of elements, as well as in diversity of their characteristics. First, each Periphery element creates and, at the same time, is created by its

own Core. Second, each Periphery element characterizes and is characterized by its Core. Last, but not least, each Periphery element influences, interacts, and depends on its Core for its existence and - vice versa. Thus, in reality, at most scales, multiple cores cause, define, depend, and interact with multiple peripheries.

Peripheries come in different types. First, one and the same type of periphery, e.g., economic, can appear on different scales: state, regional, local, etc. Second, peripheries have different aspects: political, economic, social. A state's politico-administrative hierarchy of scales offers probably the best opportunity to understand the formation of Deep Periphery areas, due to the well-defined and overlapping borders of its geospatial units. For example, the NUTS 0 scale borders of Bulgaria, partially serve, at the same time, as boundaries of regional and local politico-administrative units of lower rank. At each scale, the core and periphery elements are clearly defined. Therefore, most often, as long as the borders of geospatial units of different scale coincide, some of their periphery areas necessarily overlap too. (Case specificity, however, is always present and should never be underestimated.) For example, the borders of a state coincide with the administrative borders of some of its regions and localities, which means that some pf the peripheries, that form in such areas, belong to three different scales. The proposition here is that their characteristics can reasonably be expected to be more intense.

The core-periphery modeling of the European Geospatial System approaches reality a bit closer, than the above example. This work uses not only multiple scales, but also other aspects of the System, in addition to the politico-administrative one. In this study, they are limited to geodemographic, socio-economic and physical geography characteristics of the periphery, but, ultimately, their number and variety are essentially limited by nature only. Koulov (2013, 90) observes that, in some geographic areas, peripheries of diverse nature, e.g., physical, economic, political, do overlap. An area can be peripheral because it is situated far from the core, but, at the same

time, to possess the lowest economic status or to be very sparsely populated. The phenomenon, in which areas are peripheral in more than one aspect and/or scale, are called 'overlap of peripheries' and their boundaries can be identified by overlaying the boundaries of the respective periphery types and describing the borders of the resulting area, which fulfills all selected criteria.

This investigation uses the 'overlap of peripheries' method and applies GIS-developed overlays to identify the areas which are, elements of the Deep Periphery category at all six geospatial scales from EU through NUTS 0, 1,2 and 3 to local (LAU 1 in Bulgaria). In addition, the resulting units at all of these scales are also part of the external EU border, mountain regions, and their standard of living in 2017 is characterized by GDP per inhabitant (PPS) below 50 percent of the EU-28 average. Furthermore, given the ultimate aim of this study – inform the public and regional policy makers - the objects of the investigation here are administrative territorial units. Thus, the overlay of peripheries of different scale and nature serves for geospatial identification of Deep Periphery areas and provides significant insights in their development status, potential characteristics, and magnitude of the socio-economic issues. The comparative analysis and forecasting of the areas, which exhibit the highest development needs, enables better geospatial targeting of development policy measures and is, therefore, of significant value to regional governance and border security.

On the basis of the Core – Periphery model and the Systems approach, this work tests whether the 'overlap of peripheries' method could identify Deep Periphery elements and provide sufficient information about their structure, functions, and other specific features, which would improve territorial 'targeting' of regional policy measures. Finally, it aims at bringing the attention of policymakers and the public to the specific type of peripheral areas, the factors that sustain them, and, ultimately, enable the design of working policies to bring them closer to the respective cores.

Added value can be achieved on a number of geospatial scales – from the global to the local. With respect to EU policy making, this work suggests that the European Union should cooperate with national, pan-regional, and global organizations on coordination of their regional development strategies, specifically to recognize and prioritize the development of the Deep Periphery elements. This study intends to support and upgrade Koulov's (2016) proposition for creation of a separate 'Deep Periphery' category of regions, which should be included in the policies that target the Regions with Special Geographic Characteristics and provided with separate funding. Significantly, such results would also be of value to the practice of regional development and governance, and support the geospatial aspect of the United Nations' Sustainable Development Goals: 1. 'End poverty in all forms everywhere' and 10. 'Reduced inequalities' (UN General ... 2015).

3.2 The Case Study of Bulgaria

The investigation will use the case study of Bulgaria to present further evidence in support of the argument that, for example, mountain areas situated along its EU's South-eastern external borders should be prioritized in regional development policy making (Koulov 2016). The case study of Bulgaria has been selected due to this country's diverse peripheral characteristics on a number of scales. Since its EU accession in 2007 at least, the new EU Member State has invariably been a part of both Europe's and EU's Deep Peripheries. Aspects of political peripheries, which include the European Union's security-sensitive external border areas, have also been added as objects of the analysis. This section applies GIS-aided mapping, overlays, visualization, and analysis, comparative historical and multi-scalar analysis at six geographic scales - from continental and European Union, through NUTS 0 to LAU 1. It examines socio-economic, politico-administrative, physical geographic, and geodemographic impact factors in their roles and interactions as periphery determinants.

3.2.1 Rural Peripheries: Geodemographic Change and Peripheralization of the Bulgarian Countryside

Demographic changes are essential to understanding whether diverse rural areas are prospering or in distress. Quite often, the assumption is that urban areas offer a higher standard of living, than the rural way of life, although this is definitely not a rule, even less in the economically more developed countries.

The term 'rural' is regularly understood and explained within the framework of a core–periphery dichotomy, in which 'rural' is associated with the periphery. Thus, rural is the area which is not urban: it is the area, which does not coincide with cities and large towns. The researchers at the Economic Research Service of the United States Department of Agriculture and others who analyze conditions in "rural" America most often study conditions in nonmetropolitan areas, defined on the basis of counties (Cromartie 2019). Eurostat, which generally does not fail to present the positive characteristics of living in rural environments (Statistics … 2017), also defines the rural through its opposite – the urban: "…'rural areas' are all areas outside urban clusters" (2018)**.** The Eurostat regional yearbook (2019) evaluates differences between people living in rural areas and those living in urban areas, based on an analysis by 'degree of urbanization'. De Souza's (2017) excellent treatment of the peripheral and the rural, in both scientific and popular contexts, provides ample evidence of the marginalization of the countryside, in favor of the urban, in discussions of economic and societal development. His work discusses stereotyped areas (structures and processes) that seem to 'carry' negative tendencies or profiles and aims to stimulate debate and re-evaluation of how the concepts of the rural, peripheral, and marginal are treated in academia and policy.

Rather than a clearly defined and identifiable opposition, this investigation conceptualizes the urban-rural dichotomy as a territorial continuum. For many practical reasons, however, e.g., land and housing property planning, economic and regional development, territorial administration, and statistics, among others, the territorial boundaries

of rural areas acquire particular significance. In such cases, the concrete purpose for defining the 'rural', as well as the geographic characteristics of the respective territory and population, play a decisive differentiating role (Cromartie and Bucholtz 2008).

Koulov et al. (2019) mark the wide variances in the institutional "rural area" definitions, which create very significant differences between Eurostat's, the World bank's and national, including Bulgaria's, official statistical estimates of the rural population numbers and preclude scientific comparisons and limit the efficiency of international policy making. Eurostat's definition severely underestimates the rural population in Bulgaria. For example, in 2017, rural population, according to the national definition is 2.7 million people, while Eurostat counts only one third of them (0.9 million). World Bank data estimates, based on the United Nations Population Division (World … 2014), are much closer to the official Bulgarian account of its rural population World Development Indicators. It places Bulgaria's rural population increase at minus 34.8 percent for the 1992-2016 period, after the Netherlands and Malta, but still way ahead of Lithuania and the EU average of about minus 9 percent.

Taking into consideration the definitions of the UN and OECD, Eurostat introduces, in 1991, the "degree of urbanization" method to identify rural *areas* on the basis of population density, settlement size, and the territorial boundaries of contiguous administrative units at the local (LAU 2)-level. Since then, different variants of the population grid (cells with resolution of 1 km^2) tool have been applied to compensate for the different sizes of the local units among different countries (Dijkstra and Poelman 2014: 2, 7). The initial OECD method is still used to define rural areas, but, at this time, Eurostat's (2013) urban-rural typology uses an updated variant of the contiguous population grid cells approach (OECD Regional … 2011, Updated 2018).

The wide differences in the geographic conditions and the increasing dynamics of all aspects of human development explain the relatively frequent changes in the definitions of rural areas, which are not

privy to the EU or Bulgaria only. The Eurostat typology still seems controversial, since, on one hand, it defines as 'rural' *all* areas outside 'urban clusters', but on the other, at the NUTS 3 level, an 'intermediate' category between 'predominantly rural' and 'predominantly urban' is also introduced (2018) for no clearly stated purpose. This three-category division does not go along well, first, with the two-way UN split in urban versus rural regions. Dijkstra and Poelman (2014: 3) correctly point out that "the degree of urbanization needs to be simplified to a two-way split". Such an amendment to the EU urban-rural typology would be especially valuable for the policy making purposes, since it would benefit the clear and accurate definition of the rural regions, including their territorial boundaries. Currently, for statistical and policy making purposes, both the UN and the EU rely almost entirely on data, collected as per the national definitions of rural regions, which seriously undermines cross-national comparisons, as well as the adequacy of the respective policy measures. The problem is of particular significance for the EU, since it concerns the relevant distribution of one of the largest shares of its funding.

In the case of Bulgaria, the Eurostat urban-rural typology of the NUTS 3 regions (Eurostat version 2016) classifies the vast majority of NUTS 3 regions (twenty in number) in the 'intermediate' class (See Figure 9).

One region only is classified as 'predominantly urban' – the capital city region of Sofia (BG411), while seven regions - as 'predominantly rural': Vidin (BG311), Razgrad (BG324), Silistra (BG325), Targovishte (BG334), Sofia (BG412), Smolyan (BG424), Kardzhali (BG425). Given the methodology of Eurostat's urban-rural typology, which emphasizes mainly population density and geographical contiguity, the predominantly rural regions are classified as such, to a large extent, because of the relatively small population size of largest town in the respective region. The largest urban centers in the rural NUTS 3 regions in the Bulgaria vary between 43.6 thousand inhabitants (in Kardzhali, BG425) to 25 thousand (in the Town of Samokov, Sofia, BG412).

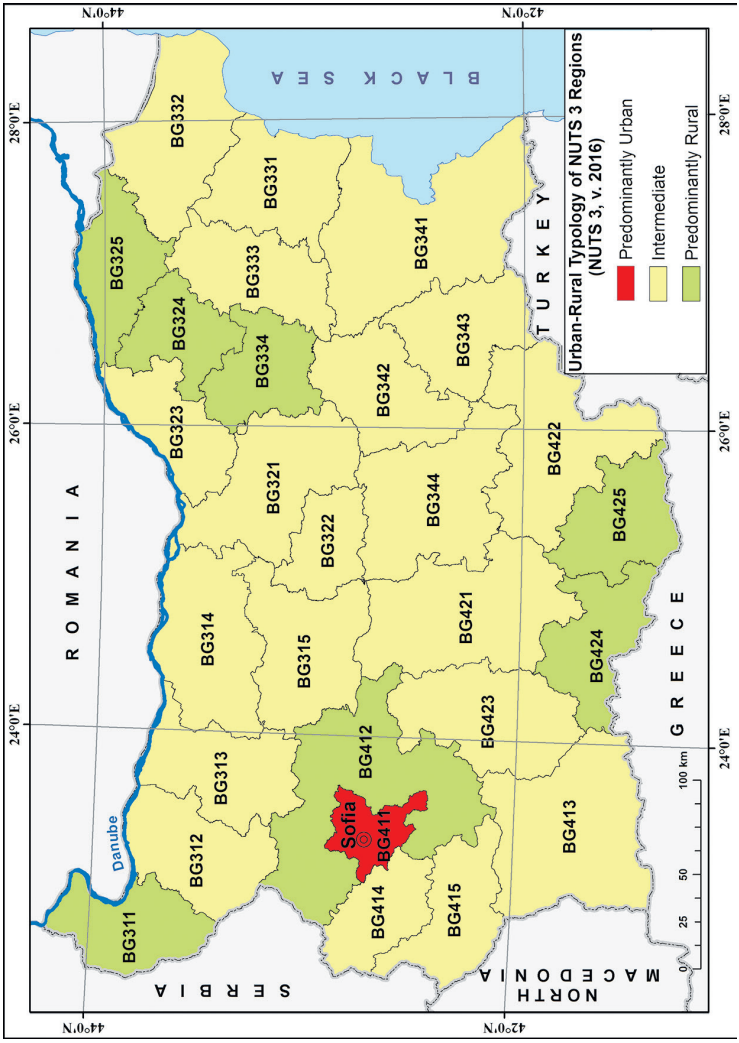

Figure 9. Urban – Rural Typology of the NUTS 3 regions (Eurostat version 2016) in Bulgaria.

During the last three decades, the ongoing global tendency of urban decline, sometimes rather inaptly called, urban "shrinkage" (Bontje 2004; Pallagst 2008 and 2009; Martinez-Fernandez et al. 2012; Yovcheva 2012; Olsen 2013; Simeonova et al. 2020), has also affected most Bulgarian towns. On the one hand, this tendency ensures the stable position of the above-mentioned NUTS 3 regions in the 'predominantly rural' class. On the other hand, however, a continuous decrease of the 'degree of urbanization', which may also be termed 'ruralization', can be forecasted with a very high degree of certainty for significant areas in Bulgaria on the basis of the above tendency. Thus, a geospatial expansion of the rural area in the country is taking place, which can be measured at this scale by the increase of the number of NUTS 3 regions of the 'predominantly rural' class. At the present time, the largest urban centers of three NUTS 3 regions from the 'intermediate' degree-of-urbanization class, number below 40 thousand inhabitants. These are: Kyustendil (BG415) – 39.3 thousand, Montana (BG312) – 38.3 thousand, and Lovech (BG315) – 31.7 thousand. As long as these population numbers are practically within the range of the largest town centers in the current 'predominantly rural' class of NUTS 3 regions, the above regions at the oblast – NUTS 3 - scale can be reasonably expected to soon join the same class.

Abundant research (Mitrică et al. 2019; Bański 2007, 2004; Jordanova 2006; Grykień 2005; Kovacs 2005,1999; Mladenov 2000, 2001, 2002; Petrov et al. 2002; Kulikowski 2001; Maurel 2000; Nagy 2000; Csatari 2000; Berenyi 2000; Yarnal 1998, 1994; Turnock 1998; Rey et al. 1998; Nagy 2000; Meurs et al. 1998; Bański et al. 1998; Begg 1993) and the above chapters have proven that such ruralization processes are not uncommon in a number of EU Members and other states, particularly in Eastern and Southern Europe. They carry the potential to widen the geographic core-periphery disparities and convey increasing risks for the stability and sustainability of the respective societies. Eurostat data shows that the risk of poverty or social exclusion in 2015 has been higher for rural population in

Eastern, Baltic, and Southern EU Member States, i.e., in the European Union Periphery (Statistics … 2019). For the same year, about 57 percent of Bulgaria's rural population– the highest value among the EU-29 Member States - experiences such risks. Of course, ruralization is not to be necessarily equated to peripheralization. Nevertheless, not just national measures and regulations, but EU Cohesion and Regional policies as well, need to do more at specifically targeting the peripheralization of rural areas.

The transformations in the Bulgarian countryside in the last several decades have invariably been one of the major topics of discussion in Bulgarian geography (Boyadjiev 1997, 2006a, 2006b, 2011; Patarchanova et al. 2009; Ilieva 1998, 2000, 2001a, 2002, 2002b, 2005, 2006, 2008; Ravnachka 2006; Iliev 2002, 1998; Ilieva and Mladenov 2003; Mladenov 2001, 2006; Mladenov et al. 2000; Koulov 2018; Koulov et al. 2019). Investigations focus on the impacts and consequences of the structural changes in land ownership, including on the labor market, rapid rural depopulation and its consequences, the drastic decrease in size and number of the rural settlements, the diverse influences of EU funding on Bulgarian agriculture and food industry, as well as environmental and land use challenges. Koulov et al. (2019) notes that Bulgaria's rural area transformations have been among the most important changes since 1989, mainly, due to the scope of their geospatial and societal impacts.

Bulgaria is faced with a pronounced process of continuing multi-faceted and multi-scale peripheralization of its rural regions. The transformations in the geo-demographic structure and dynamics of the countryside in the last thirty-year period feature significantly worsening values of all studied indicators. Probably most apparent is the process of "geodemographic depletion", which is typical for the majority of the rural settlements and in a number of municipalities has approached catastrophic proportions (Koulov 2018).

Mladenov (2015) observes that the average number of inhabitants of the Bulgarian villages has been constantly decreasing since the

1940s. According to data from the National Statistical Institute (2018), Bulgaria's rural population decreases in the last thirty years by nearly 35 percent. The ongoing depopulation of the countryside is overwhelmingly due to the negative natural increase rate, which is more than three times higher than in urban areas, and the role of this factor will only increase in the future. This process has a negative impact not just on the size, but also on the age structure of the rural population, thus, influencing the share of the working population, and respectively the quantity and supply of the labor force.

The decade of Bulgaria's European Union membership has stabilized some of the negative geodemographic processes, but not being able to stop or reverse them. Eurostat (2018) ranks Bulgaria second in the EU (with minus 22.8 percent), after Lithuania (minus 24.5 percent), in population decrease in the predominantly rural regions in the 25-year period between 1992 and 2017. Relevant data for all EU Member States is still unavailable, but it is worth pointing to the other extreme, where the population in the Irish rural regions has increased for the same period by 23.1 percent. Mortality rate in Bulgaria is one of the highest among the European Union members. The country leads the EU in reduction of the number of its smallest settlements - a process of 'village abandonment', which contributes to the rural depopulation, loss of local resources, and socio-economic opportunities. Average population density in the rural regions in Bulgaria is 34.7 per km^2, which is significantly lower than the average for EU-28 (52.6 per km^2) (National Statistical Institute 2020).

Rural regions' peripheral characteristics are becoming more prominent. The polarization in the geospatial distribution and demographic characteristics of the Bulgarian population and, especially, the widening urban-rural split, take the forms of, first, ongoing territorial expansion of the rural municipalities with the worst natural increase values beyond the typical units with special geographic features (border and mountain municipalities) and, second, a notable increase of disparities among the rural regions

themselves. The urban-rural discrepancies in the country have grown to the extent that generally renders much of the national averages' data nearly meaningless (Koulov 2019).

The geodemographic transformations in the Bulgarian countryside, and, most vividly, the diminishing population numbers, depend on and are influenced by all other peripherization aspects – socio-economic, political, public policy, and environmental. For example, many local - LAU 1 – administrative units lack the capacity to finance - often - their most basic activities. Notwithstanding, the number of units at this territorial scale continues to grow, which prompts reasonable calls for 'turning the tide' in the direction of a sharp decrease in their number, which will, however, further increase administrative territorial centralization.

The dwindling population numbers in the countryside are also used as an argument to prove the 'necessity' of re-organization of the country's administrative territorial division as a whole, but, most of all, its NUTS 2 regionalization scheme. Heated public policy, media, and scientific discussions invariably focus on cutting the number of the NUTS 2 regions, while most often ignoring the experience of many EU Member States and Article 3 (5) of Regulation (EC) 1059/2003, which provides ample grounds to stick to Bulgaria's current six-region scheme: "... separate non-administrative units may, however, deviate from these restrictions due to specific geographic, socio-economic, historical, cultural or environmental circumstances ...'. The last place in GDP per inhabitant among the other areas of the same rank in the EU-28 for the last 12 years certainly counts for a 'specific' circumstance in social, not to mention economic, terms. At the same time, top-down decrease of the number of territorial units at any scale only statistically 'improves' the average indicators, while increasing political centralization and territorial peripheralization processes. On its turn, such processes disproportionally and negatively affect rural areas, and increase regional disparities in income, wealth, and opportunities.

3.2.2 Socio-Economic Peripheries

Between 2007 and 2017, Bulgaria's socio-economic performance has consistently placed the country (NUTS 0 scale) at the bottom of the EU Member States ranking, in terms of standard of living, measured by GDP per inhabitant (PPS) of the EU-28 average. In 2007, it features in the European Deep Periphery (40 percent GDP per inhabitant, PPS, of the EU-28 average), together with Romania (43 percent) and three non-EU Member States from Southeastern Europe, for which Eurostat provides comparable data (See Figure 2). By the end of the study period, Bulgaria's standard of living increases by nine percentage points, which has not been unusual among the 13 countries that joined the EU since 2004, but insufficient for it to leave the Deep Periphery in 2017, according to the 50 percent criterion of the indicator, selected in this study (See Figure 1).

In 2007, the two NUTS 1 scale regions in Bulgaria already exhibit a clear 'core – periphery' socio-economic dichotomy (See Figure 10).

The standard of living in the capital city region - Yugozapadna i yuzhna tsentralna Bulgaria (BG4) – 'starts', in 2007, at 50 percent of the GDP per inhabitant (PPS) of the EU-28 average – the lowest possible value the Middle Periphery category, but still - an element from it. The standard of living in the second geospatial element at this scale - Severna i yugoiztochna Bulgaria (BG3) – in the same year shows a value of 31 percent, which assigns it to the lower part of the European Deep Periphery. During the period of the investigation, the significant (nineteen percentage points) socio-economic disparity between the two NUTS 1 scale elements - the Core and the Periphery of the Bulgarian Geospatial System - increases to reach 24 percentage points (See Figure 11).

At the NUTS 2 scale, the 'core – periphery' model of socio-economic development is not only confirmed in the Bulgarian context, but elevated to the new level. In 2007, all Bulgarian regions, except the one that contains the capital city - Yugozapaden (BG41) – remain elements of the Deep Periphery (See Figure 12).

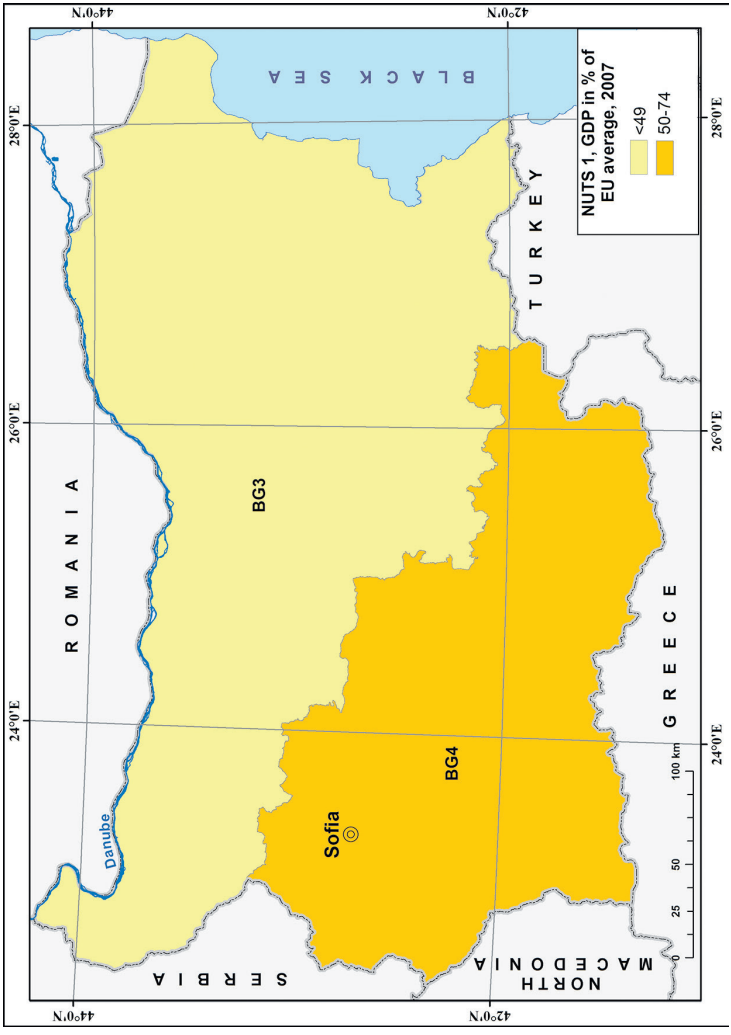

Figure 10. Gross Domestic Product (PPS) per inhabitant at NUTS 1 Scale for Bulgaria in percent of EU-28 average in 2007.

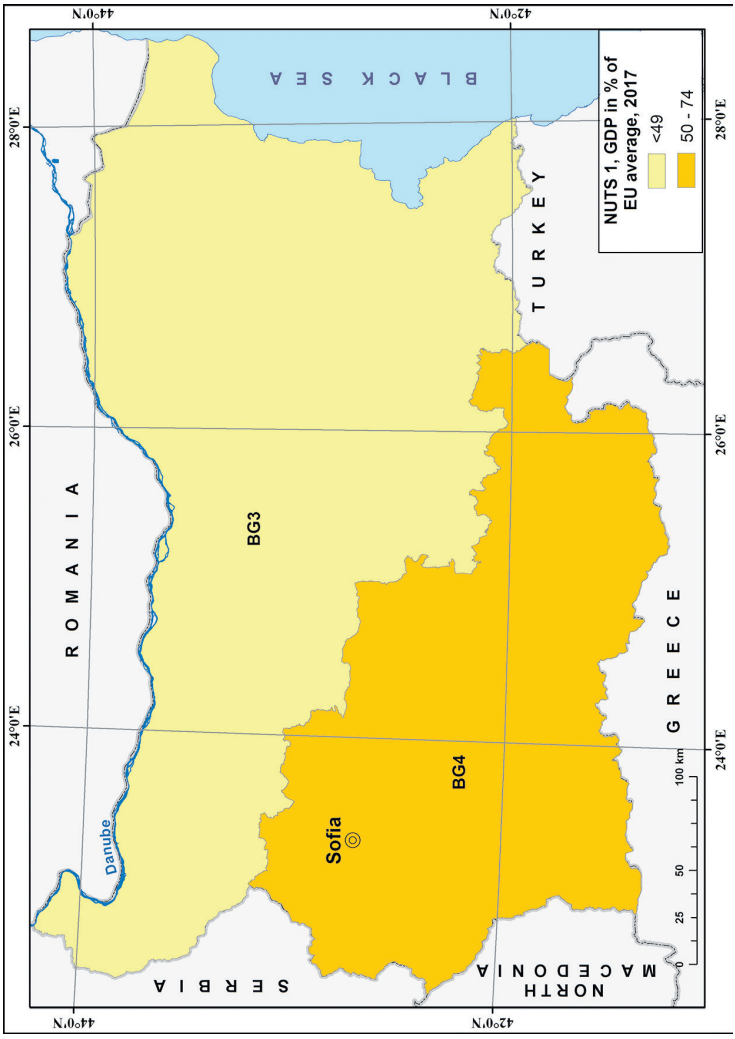

Figure 11. Gross Domestic Product (PPS) per inhabitant at NUTS 1 Scale for Bulgaria in percent of EU-28 average in 2017.

They rank between 34 percent for the Severoiztochen (BG33) region and 27 percent of the GDP per inhabitant (PPS) of EU-28 average for the Severozapaden (BG31). The same year the capital city region stands at 66 percent – still within the criteria for the Middle Periphery category.

In 2017, however, the Bulgarian region that leads in its socio-economic standard of living, already joins the European Upper Periphery with 79 percent of the selected indicator (See Figure 13).

At the end of the period of the investigation, the remaining NUTS 2 regions in Bulgaria are still parts of the Deep Periphery. Significantly, while the regional element with the highest indicator value within the category - Yugoiztochen (BG34) - with 43 percent of EU average GDP (PPS) per inhabitant has changed, the geospatial element with the lowest indicator value is the same - Severozapaden (BG31) region with 31 percent. During the 2007 – 2017 period, i.e., after eleven years of EU-supported and funded regional development policies, the 39 percentage points the 'scissors' of the standard of living regional imbalance between the 'top' and 'bottom' NUTS 2 scale elements in Bulgaria spreads nine percentage points wider - to 48 percentage points. Compared to an 'average' EU inhabitant, an 'average' person from Bulgaria's poorest NUTS 2 region - Severozapaden (BG31) - has, in 2017, over three times lower standard of living. The difference between the 'average' person from the inhabitant of the poorest region with that of an 'average' inhabitant of the Bulgarian capital city is over 2,5 times.

The main object of this section is the Deep Periphery, i.e., the areas, 'most far away' from the Core. The use of multiple indicators will better fulfill this purpose. From this point of view, another geospatial 'distance' indicator, which measures the difference between the element with the highest GDP per inhabitant (PPS) of EU average and the average of the values of the other geospatial elements, is an essential indicator which illustrates how much the capital has succeeded to 'extract' itself from its socio-economic geographic context and its socio-economic 'distance' from the rest of the country at the main scale at which regional policy is implemented. In 2007, this difference has been about 35 percentage points, while in 2017, it already amounts to 43 percentage points.

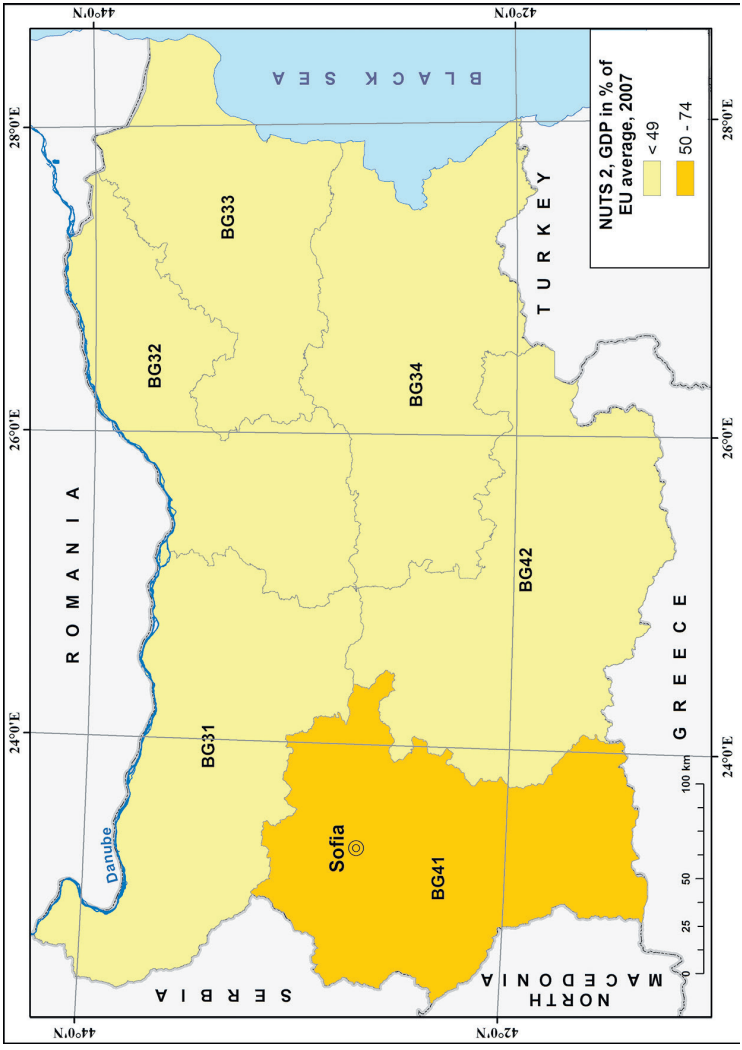

Figure 12. Gross Domestic Product (PPS) per inhabitant at NUTS 2 Scale for Bulgaria in percent of EU-28 average in 2007.

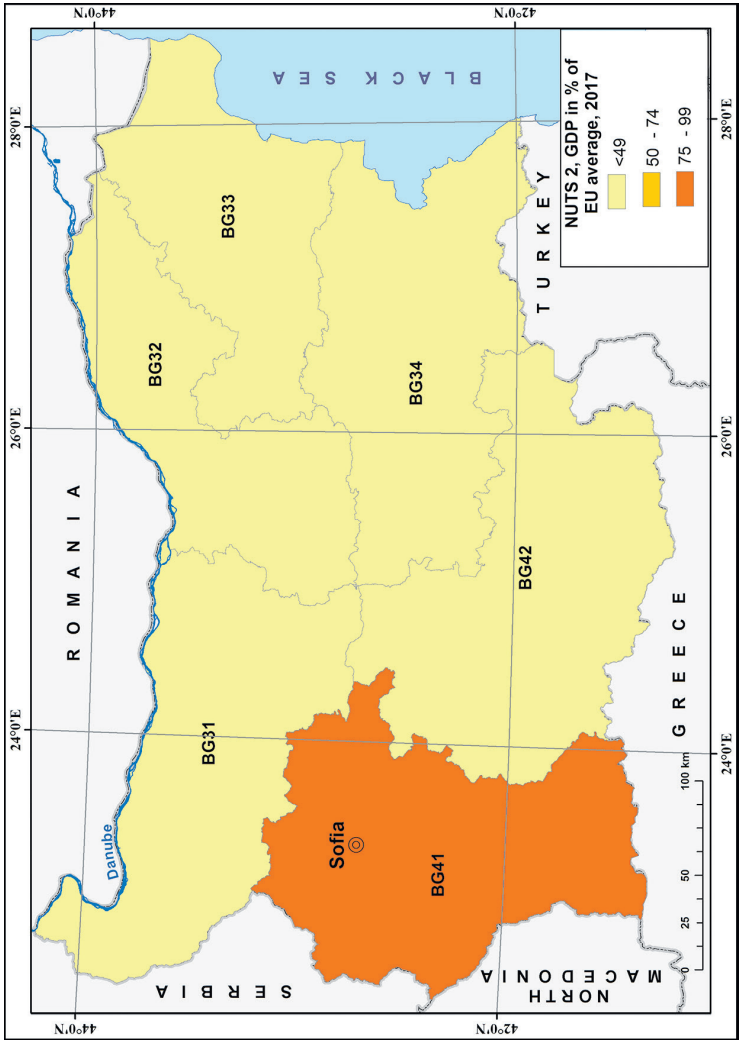

Figure 13. Gross Domestic Product (PPS) per inhabitant at NUTS 2 Scale for Bulgaria in percent of EU-28 average in 2017.

A third geospatial 'distance' indicator can be used to measure the difference between the element with the highest GDP per inhabitant (PPS) of EU average and the one with the second highest. This indicator points, first, to the possible presence or absence of a secondary core in the examined geographic space, and, second, provides information about its capacity to influence the standard of living in its hinterland. Thirdly, the measurement of the 'gap' between the first and second order geospatial elements also informs about the level of integration of the most important (or any other) geospatial elements of the studied area, as well as the possible disparities between them. In the NUTS 2 scale elements of Bulgaria, in 2007, the 'distance' between the first - Yugozapaden (BG41) and the second - Yugoiztochen (BG34) – region is 32 percentage points, while eleven years later it has widened to 36 points. Thus, the NUTS 2 regions in Bulgaria are moving away from each other in terms of socio-economic standards of living, which does not bode well for level of this country's cohesion.

At the NUTS 3 level, the regional situation in Bulgaria becomes (See Figure 14) completely clear: in 2007, the smallest region in the country - Sofia (stolitsa) (BG411) – enjoys a GDP per inhabitant (PPS) of 90 percent of the EU-28 average and is, therefore, categorized in the Upper Periphery category.

Most probably, this is a result of the fact that this region is the capital city of the country and the main national-level decisions, including the ones that concern regional policy, are taken from within its boundaries. At the same time, the standard of living in all other regions at the NUTS 3 scale is categorized as European Deep Periphery. The value of their average standard of living in 2007 is 28 percent of EU-28 average. The region with the second highest standard of living – Varna (BG331) – is 45 percent or exactly half of that of the capital city region. It still falls within the Deep Periphery category.

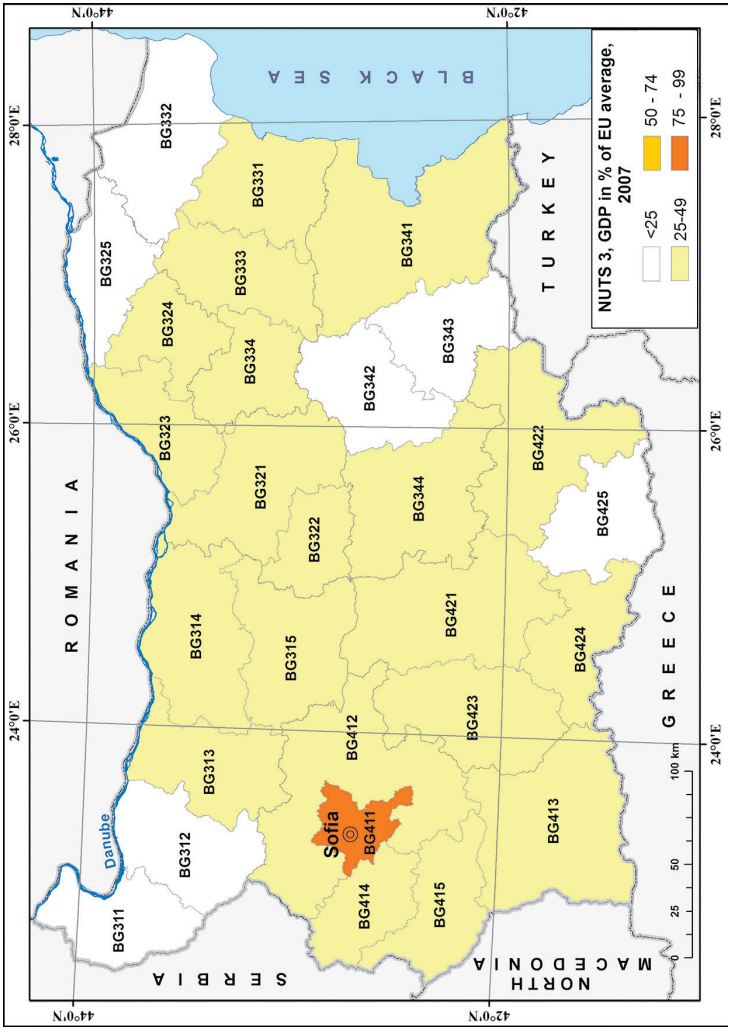

Figure 14. Gross Domestic Product (PPS) per inhabitant at NUTS 3 Scale for Bulgaria in percent of EU-28 average in 2007.

In 2007, the standard of living in 25 percent (seven) of the NUTS 3 regions in Bulgaria does not even qualify for the quartile of the Deep Periphery category (25 to 49 percent of Gross Domestic Product (PPS) per inhabitant of EU-28 average). These regions, in which the selected indicator varies between 21 and 24 percent, are the following: Kardzhali (BG425), Dobrich (BG332), Montana (BG312), Vidin (BG311), Silistra (BG325), Yambol (BG343), and Sliven (BG342). They are spread out among five different NUTS 2 scale regions.

After eleven years of EU membership, the capital city region is not only at the very top of the socio-economic pyramid in Bulgaria, but has also entered the European Core category with GDP (PPS) per inhabitant in 2017 of 104 percent (See Figure 15).

In addition to the capital city region, two more NUTS 3 elements, out of a total of 28, have also been able to rise to the next category – the Middle Periphery. One of them is the capital city's own hinterland – Sofia (BG412) region, while the other is, in fact, the region with the second highest standard of living in the country - Stara Zagora (BG344) with 61 percent of the EU-28 average GDP per inhabitant in PPS). Its main industry is open-pit lignite mining and electricity production. It is still a positive that there is, apparently, some form of 'competition' for the second-place region in terms of standard of living.

The remaining 89 percent (twenty-five NUTS 3 regions) of the regions form Bulgaria's Deep Periphery with an average GDP per inhabitant (PPS) of the EU-28 average of 32 percent. The socio-economic 'winners' of the 'small regions for specific diagnoses', according to the Eurostat (2015a) definition of the NUTS 3 regions, are: Varna (BG331) with 48 percent of the EU-28 average GDP per inhabitant (PPS), Gabrovo (BG322) with 43 percent, Plovdiv (BG421) and Burgas (BG341) with 42 percent each, and Vratsa (BG313) with 40 percent.

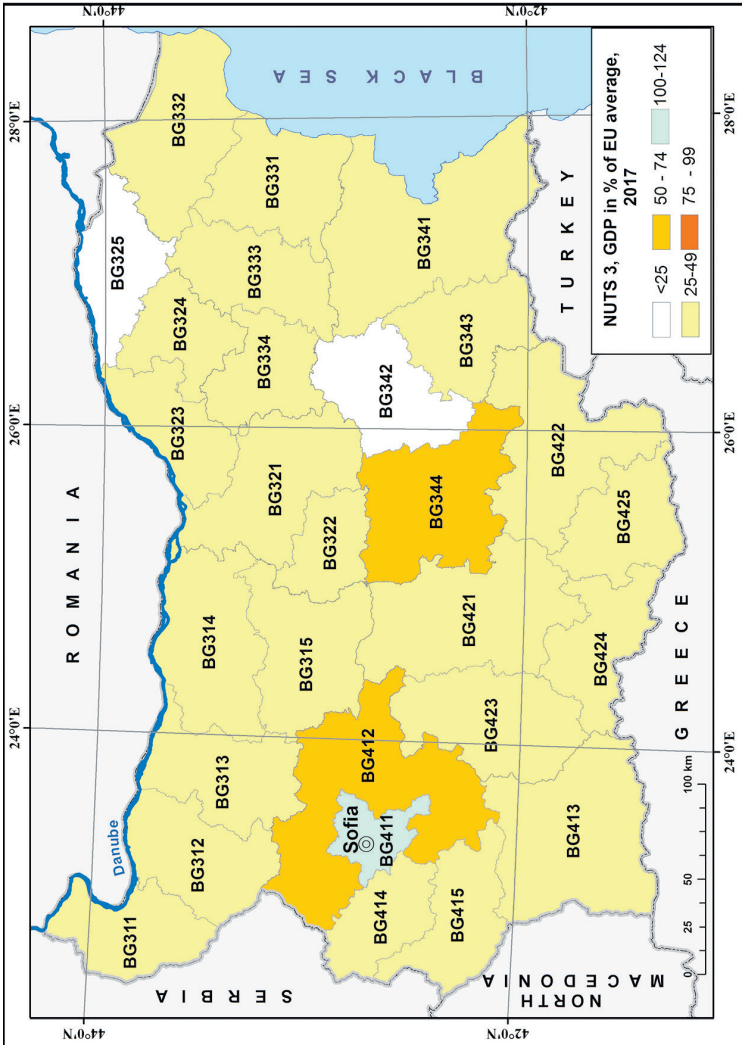

Figure 15. Gross Domestic Product (PPS) per inhabitant at NUTS 3 Scale for Bulgaria in percent of EU-28 average in 2017.

In comparison to 2007, all NUTS 3 regions in Bulgaria increase their standard of living. However, for some of them the increase is not significant. Thus, for the period of eleven years the standard of living results for two NUTS 3 regions - Sliven (BG342) and Silistra (BG325) – have increased by one to three percent only and they still cannot even qualify for the Deep Periphery category. Such regions should have been and should be at the moment an object of special policy attention not only at national, but at EU level.

3.2.3 Politico-Geographic Peripheries: Europe, the European Union, and Bulgaria

The section attempts to discern some of the causes and geospatial characteristics of the process of peripheralization in Bulgaria, the European Union, and Europe as a whole. In order to pinpoint and outline some of Europe's Deep Peripheries, i.e., its most vulnerable areas, this research analyzes the overlap of socio-economic and political geography peripheries from the NUTS 0, through the intermediate scales, to the NUTS 3 scale in the Bulgarian national borders and then going further to the Bulgarian part of EU's external borders.

Political geography peripheries cannot be reduced to border regions only. Ideally, the peripheralization of such areas stems from their remoteness – real and/or perceived, physical and/or virtual - from the centers of power of different scale. The salience of this type of peripheries is due to the same reason. Their disadvantages make them more susceptible to outside, unplanned, and possibly even negative, influences and activities, which, ultimately, present a risk to the core.

The European Commission has recognized the significance of EU border regions and seeks to boost growth and cohesion in them [COM (2017) 534 final]. One argument in support of this decision is the high density of the internal borders in the Union: about 40 percent of the EU territory and close to 30 percent of the EU population belongs to border regions. This is the reason that explains EU's use of a border

region definition that is exclusively based on the internal, land-based borders, including those with Liechtenstein, Norway, and Switzerland. Another supporting argument is related to the greater difficulties that border regional economies face, compared to the rest of the regions. Access to public infrastructure and services is generally lower, and difficulties to transportation and communication are larger. To meet these challenges and for the purpose of the overall harmonious development of the Union, in 2000, the 'Interreg' initiative has been re-organized as a formal "objective" of the European Cohesion Policy (Cross-border… 2000).

Eurostat's territorial typologies (Methodological… 2018) define border regions in the European Union as NUTS 3 level 'regions with a land border, or those regions where more than half of the population lives within 25 km of such a border.' This typology is not yet recognized by the EU NUTS Regulation (Regulation (EC) No 1059/2003) and, currently, EU legislation adapts it to its needs and makes use of alternative definitions. For cross-border cooperation purposes, for example, the definition has been changed to include regions with maritime borders too. As a EU Member State, and especially for territorial policy purposes, which include regions' eligibility for EU funding, Bulgaria needs to support as much as possible the EU-proposed territorial typologies, participate in the conceiving of their methodologies, and their legalization.

Depending on the different Eurostat criteria that have been proposed (Statistics… 2019), a few variations of the border regions of Bulgaria are possible (See Figure 16).

Only nine, of the 28 Bulgarian NUTS 3 regions, do not qualify as 'border'. These include the capital region of Sofia (stolitsa) (BG412), which is not of interest in this study, since it no longer belongs to the European Periphery. Three more of the remaining 'non-border' regions are located in Southern Bulgaria: Plovdiv (BG421), Stara Zagora (BG344), and Sliven (BG342). The 'non-border' regions in Northern Bulgaria are Lovech (BG315), Gabrovo (BG322), Targovishte

(BG334), Shumen (BG333), and Varna (BG331). Pazardzhik (BG423) and Razgrad (BG324) regions are currently included in the Eurostat border regions' typology. Their future treatment as regions for targeted investments depends on whether the 'land border within 25 km' criterion is adopted and legalized. The Varna (BG331) Region, however, is presently not included in the Eurostat border typology on the grounds that part of its border is maritime. Its future inclusion also depends on whether maritime borders will be accepted as a criterion by the EU and legalized accordingly. On the 2018 Eurostat border typology map (Statistics 2019, Map 1, p. 3), the Varna (BG331) Region is clearly depicted as an apparent 'open door' at a distance of about 150 km by sea from a non-EU state only. This is just another example to prove that, due to EU security management reasons, the land criterion must be omitted in the case of the EU and national external borders of the Southern and Eastern Member States of the European Union.

On national scale, the problem of including Varna (BG331) within the EU land border-based category would certainly be more efficiently and effectively solved through a change in the administrative territorial division of Bulgaria. The Varna (BG331) Region needs to gain a piece of Dobrich (BG332) Region's land area that borders Romania. The Shabla Municipality or even only its Northern half will be sufficient. Alternatively, the two NUTS 3 regions could simply merge into one.

Garavoglia (2016) rightly posits that, before any Pan-European asylum policy is established and instituted, Europe's external borders should be secured and adequately managed. He proposes a 'concentric circles approach: outside Europe, at Europe's borders themselves, and within Europe's borders' and argues for reorganization and strengthening of the maritime dimension of a European Border and Coast Guard.

Furthermore, FRONTEX, the European Border and Coast Guard Agency, adheres to the concept of Integrated Border Management (IBM) (Regulation (EU) No 2016/1624 Art. 4). On the basis of the evidence from the socio-economic situation in the border regions of the Eastern and Southern EU borders and the periphery overlap phenomenon, this

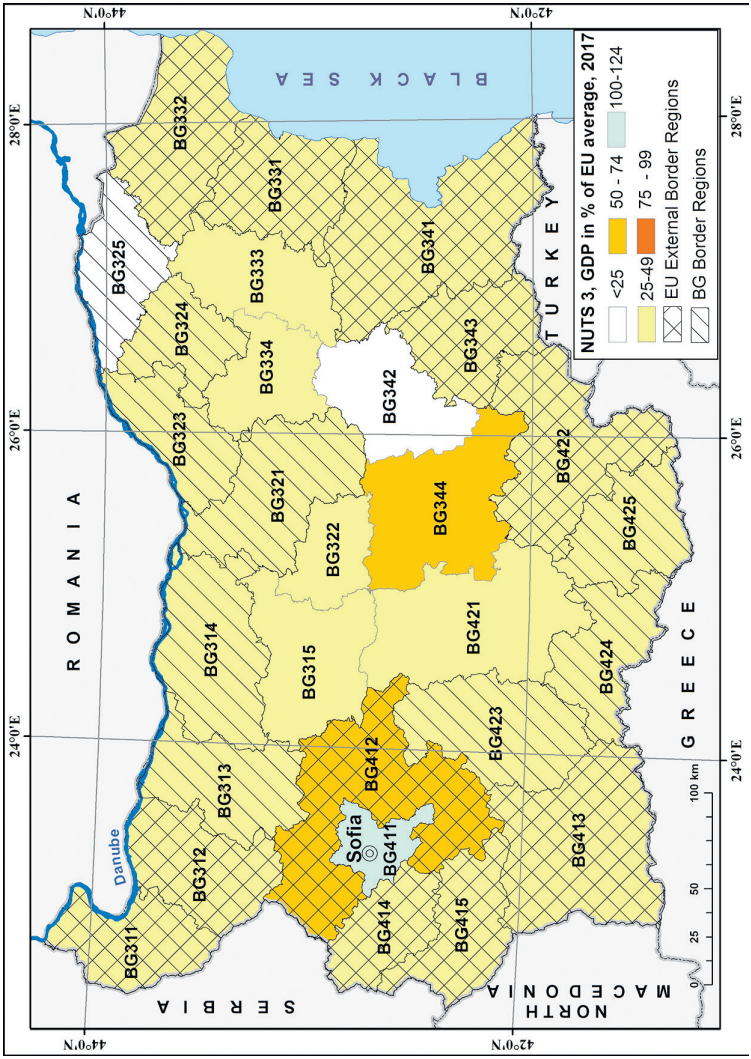

Figure 16. Gross domestic product (in purchasing power standard per inhabitant in percentage of EU–28 average) in the border regions of Bulgaria, 2017.

work argues that, in respect to EU's external borders, the IBM concept has to widened and diversified to include a socio-economic component.

Garavoglia (2016) points out ninety percent of irregular migrants use smugglers at some point of their journeys, which necessitates a focus on securing pre-border areas. At the same time, external and internal EU border regions are treated equally by both EU and national regional development legislation (Regional… 2008; Targeted 2015). To prevent irregular migration and criminal cross-border activities, EU regional policy should be integrated with the European external border policy and targeted support directed to ensure appropriate socio-economic security in the pre-border areas of the Southern and Eastern Member States. Unfortunately, the 2018 Proposal, which establishes an instrument for financial support for border management, does not reach far enough (Proposal COM/2018/473 final).

At the national scale too, it is much more effective and more efficient for Member States to conduct integrated management of a part of their borders with the support of the EU Regional policy financial footing. This investigation emphasizes the substantial difference between Bulgaria's internal borders and the parts of its borders – both land and sea – which coincide with EU external borders. The latter are characterized by a level of higher sensitivity to a number of different security threats and should, therefore, result in a different category of regions in EU's territorial typology – EU external border regions – and treated with attention, relevant to their specificity.

Border region in general are disadvantaged, due to their remoteness from both the European Union's and the Bulgarian core areas. More often than not, they do not contain sizeable political or administrative centers, especially such of higher rank and/or of key significance to the Core. While the EU has selected the NUTS 3 scale as basic for the purposes of their analysis, this investigation employs both multi-scalar and multi-aspect approaches to be able to identify exactly the target areas that are most in need of development assistance, not only from EU, but also from the national and regional decision makers.

The EU external border regions in Bulgaria are a sub-group of the national border regions. This group consists of two segments: A/ Eastern and South-Eastern, along the Black Sea and the border with Turkey, and B/ Western, along the boundary with the Republic of Serbia and North Macedonia. The Eastern and South-Eastern segment of EU's Periphery in Bulgaria results from overlap of regions from the NUTS 0, through NUTS 1 and 2, to five NUTS 3 regions: Dobrich (BG332), Varna (BG331), Burgas (BG341), Yambol (BG343), and, partially, Haskovo (BG422) (See Figure 16). The Western segment is also a result of overlap of regions at those scales, except that at the NUTS 3 scale it comprises of six regions: Blagoevgrad (BG413), Kyustendil (BG415), Pernik (BG414), Sofia (BG412), Montana (BG312), and Vidin (BG311).

The overlay with the socio-economic regions at the NUTS 3 scale portrays the following findings. The regions with sea access generally have a relatively higher standard of living per inhabitant (40 percent of the EU-28 average GDP per inhabitant, PPS, in 2017), in comparison to the landlocked Western and Southern border regions (31.5 percent). Next to a capital city, its surroundings, and non-renewable energy resources, the Black Sea proves to be the single most important geographic factor for socio-economic development of Bulgaria's regions. It is more influential even than the size of the urban population factor. The strategic opportunities offered by the coastline, in terms of cheaper transportation, international tourism, and other sea-related economic activities, as well as the location of two NUTS 3 regional centers - Varna (BG331) and Burgas (BG341) – at the EU politically sensitive external border, significantly augment the comparative political and socio-economic position of the Southeastern-most part of EU Periphery. In terms of internal polico-administrative power, both Varna and Burgas are also centers of the respective upper NUTS 2 scale regions - Severoiztochen (BG33) and Yugoiztochen (BG34) – and play respective security and socio-economic functions. As a

result, these two NUTS 3 regions are serious candidates to be the next entrants in the European Middle Periphery category.

The vast majority of the regions along the Western Bulgarian segment of EU's border, as well as the landlocked regions, situated along the border with Turkey, exhibit the highest regional development needs at the NUTS 3 scale in the country. The year 2017 has been the first for Vidin (BG311) region to barely qualify for the Deep Periphery with 25 percent of the EU-28 average GDP per inhabitant (PPS). Haskovo (BG422), Kyustendil (BG415), and Pernik (BG414) are also among the regions with lowest purchasing power standard per inhabitant in the EU - 27 to 28 percent – that present the best testimony of some of the deepest, at the NUTS 3 scale, periphery, situated at the EU external border.

The relative geographic proximity of the Istanbul megalopolis – a participant in the NUTS system and the European Socio-Economic Core - to the Haskovo (BG422) and Yambol (BG343) regions has not proven to be a notable beneficial factor so far. In fact, Sofia (BG412) - the region surrounding the state capital that is one of the two regions making up Bulgaria's Middle Periphery in 2017 - is the only, although quite logical, exception from this group of border regions at EU's external borders that are apparently in dire need of economic development support. A further, more detailed investigation is to be carried out at the lower (LAU 1 and LAU 2) local scales, that should include the respective areas in Serbia, and North Macedonia, to better understand the extent of the influence of Bulgaria's capital city region in the direction of the nearest state border.

While one of goals of this investigation is to identify the most urgent regional development priority areas, it is also important to note that the comparative geospatial analysis exemplifies that Bulgaria's 'Deep Periphery' at NUTS 3 scale is not located only in proximity of EU external borders. The presence of its geospatial elements in other parts of the country, e.g., Sliven (342), close to the middle of the country,

and Silistra (325), located at EU internal border, demonstrates that neither the influence of borders in general, nor even the external EU border, necessarily feature as sole determining factors in that respect (See Figure 16). Naturally, real life situations depend on unique and dynamic mix of factors, which is why regular monitoring at the all territorial levels is necessary to secure an accurate understanding of the real state of affairs at any particular moment in time.

3.2.4 Physical Geography Peripheries: Mountain Areas

The physical geographic features of the landscape can play a very significant role in the formation of Deep Periphery areas. Among the Regions with Specific Geographic Features (Green... 2008), mountain regions are some of the most widely spread inhabited areas. Similar to border regions, Eurostat typology (Statistics… 2019) includes mountain areas, due to their major impact on economic development, environmental sustainability, and social wellbeing.

Mountains, as well as a number of other specific physical geographic features, often serve as political boundaries of countries and/or their internal administrative territorial units. With the increase of altitude, physical geographic characteristics, like geomorphology, climate, soils, and vegetation, transform to render mountain areas progressively peripheral, in respect to many aspects of human life (Koulov 2013). Resources are relatively less accessible, while soil and climate acquire qualities which make them less favorable for human utilization. At the same time, however, mountain areas are also disproportionally rich in some resources and provide unique ecosystem services, like clean water and air, water and wind energy, forests, wild animals, natural and cultural diversity, scenic views, and a multitude of natural attractions for recreation, tourism, and sports.

Human geography characteristics are also subject to the altitude transformations. Mountain areas are generally sparsely inhabited and lack large urban areas, economic, financial and state-level

political centers. Population groups and human settlements in mountain areas are generally more geographically and socially isolated, including from each other. Compared to the non-mountainous parts, they are generally characterized by a relatively lower standard of living, higher rates of unemployment, and lower access to social services. Parallel to this, higher elevation areas are more environmentally vulnerable to both natural and anthropogenic risks and hazards (Nikolova 2001), among which resource depletion, deforestation, biodiversity loss, poaching, landslides, and forest fires. Discrepancies between the higher needs for resource protection at the global and national scale, and the socio-economic development goals of the local populations may, at times, lead to conflicts. Economic activity in mountainous areas is less diverse, the infrastructure - less developed and more capital intensive, while people are generally more dependent on the local resources. In sum, the drawbacks for human development in mountainous areas are generally more significant than the benefits, which, in concert with other factors, like border location, foster peripheralization of such areas (Koulov 2013). In principle, neither peripherality is exclusive to mountain areas, nor are they be necessarily peripheral, in respect to many human activities. However, the comparative analysis of the altitude transformations of the different geographic characteristics (e.g., economic, political, social, cultural, environmental) and the increasing peripheralization of mountainous areas leads to the conclusion that, in such areas, different peripheral characteristics often overlie each other.

Eurostat typology defines mountain regions in the European Union as '...NUTS level 3 regions where more than half of the surface is covered by mountain areas, or in which more than half of the population lives in mountain areas' (Statistics… 2019). According to this definition, the mountain area in Bulgaria is located in its Southwestern and Central parts (See Figure 17) and incorporates two categories of NUTS 3 regions.

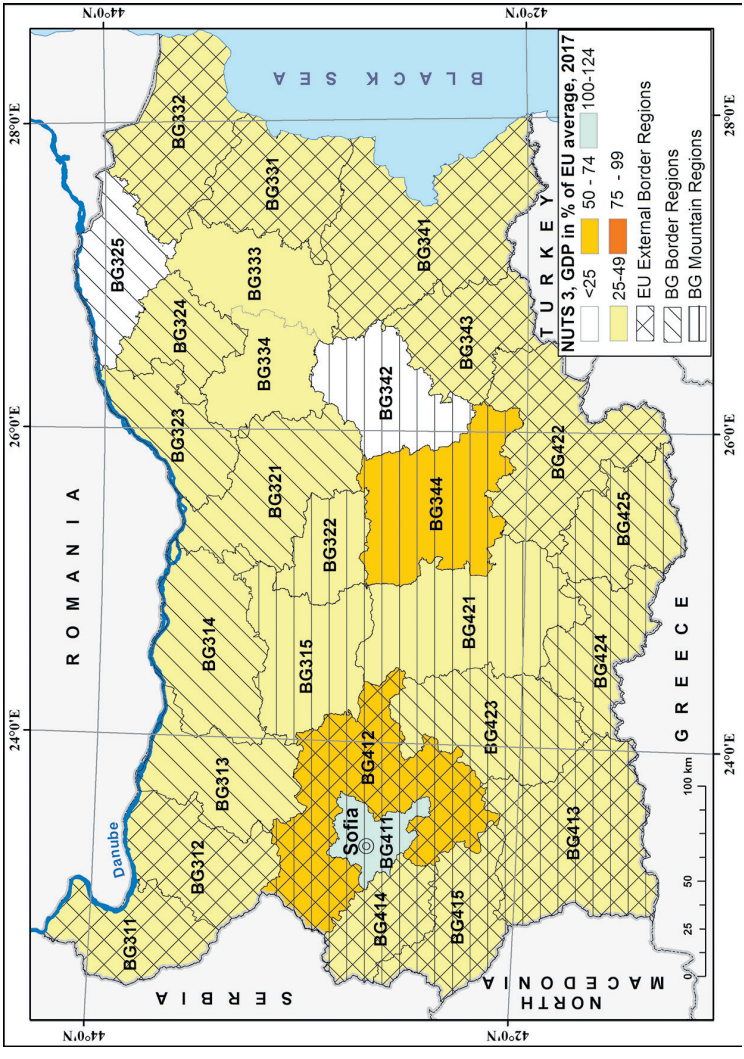

Figure 17. Gross domestic product (in purchasing power standard per inhabitant in percentage of EU–28 average) in the mountain regions of Bulgaria, 2017.

The first, and much larger, Eurostat category consists of regions, in which 'over 50 percent of the surface is defined as 'mountain' areas and over 50 percent of the population live in mountain areas'.

Bulgaria features ten such regions, which include: Sofia (stolitsa) (BG412), Sofia (BG412), Pernik (BG414), Kyustendil (BG415), Blagoevgrad (BG413), Pazardzhik (BG423), Smolyan (BG424), Kurdzhali (BG425), Lovech (BG315), and Gabrovo (BG322). Additionally, three more regions – Plovdiv (BG421), Stara Zagora (BG344), and Sliven (BG324) - belong to the second category of Eurostat-defined mountain regions, in which over 50 percent of the surface is in mountain areas. At present, no regions in the third Eurostat mountain regions category, in which over 50 percent of the population live in mountain areas are present in Bulgaria.

Thus, close to 46 percent of the NUTS 3 regions in Bulgaria qualify as mountain regions, according to the Eurostat typology of mountain regions. In fact, one of the two NUTS 1 regions in the country - Yugozapadna i yuzhna tsentralna Bulgaria (BG4) - is made up of NUTS 3 regions, which are mountain, according to the Eurostat typology, with only one exception - Haskovo (BG422). The mountain NUTS 1 region contains about 70 percent of all Bulgarian mountain regions at the NUTS 3 scale. Nevertheless, at the same time, mainly due to the presence of the capital region, the average socio-economic conditions in the mountain NUTS 1 region, as measured by the standard of living per inhabitant, are significantly higher, than in the rest of the country (See Figure 17): GDP per inhabitant (PPS) of EU-28 average in Yugozapadna i yuzhna tsentralna Bulgaria (BG4) is 61 percent versus 37 percent - in the other Bulgarian NUTS 1 region.

3.3 Peripheries' Overlap: Genesis and Structure of the Deep Periphery

To further understand the genesis and overall structure of the Deep Periphery, as well as identify and describe some of its geospatial elements in Bulgaria, the investigation adds the mountain periphery to the GIS-aided comparative analysis of the economic and political peripheries.

The simultaneous application of the multi-scalar and multi-aspect approaches improves targeting of regional and security policies, as well as the respective territorial investments.

The comparative analysis of the Eurostat-classified mountain and border regions in Bulgaria shows, first, that all, but two, NUTS 3 regions in Bulgaria – Shumen (BG333) and Targovishte (BG334) – belong to at least one of these two types of regions with special characteristics. Second, 25 percent of all NUTS 3 regions fall in both border and mountain categories (See Figure 17), which makes them even better positioned to receive European Union regional development funding. The latter group of seven contiguous regions consists of Sofia (BG412), Pernik (BG414), Kyustendil (BG415), Blagoevgrad (BG413), Pazardzhik (BG423), Smolyan (BG424), and Kurdzhali (BG425) and occupies the South Western part of the country. Third, the larger part of this group contains regions - Sofia (BG412), Pernik (BG414), Kyustendil (BG415), and Blagoevgrad (BG413) – which are classified, not only as mountain (from 77 to 100 percent of their territory is above 600 m AMSL, National Statistical Institute 2020), but also as a part of the EU external border, which should make them of even greater importance to the EU as a whole. This group of four regions make up an area, which experiences the generally negative influence of two, some of them even three, simultaneously operating peripheralization factors. In addition, they certainly belong, in a socio-economic sense, to the Deep European Periphery category, with one exception – the Sofia (BG412) Region, which is categorized in the Middle Periphery.

Theoretically, these arguments prove the existence of the peripheries' overlap effect. However, the empirical results of the investigation sanction some additional conclusions. The first of them concerns the 'exception' region - Sofia (BG412): It features a higher standard of living, due to its proximity to the capital city NUTS 3 region – Sofia (stolitsa) (BG411) – which, in fact, it territorially surrounds almost completely. Similar to many European

states, the political, socio-economic, and demographic influence of a geospatial element of the European Core in Bulgaria quite successfully compensates the peripheralization impact of mountain, internal, and external EU borders. The second conclusion concerns the two NUTS 3 regions which are characterized by the lowest standard of living in Bulgaria for the year 2017 (See Figure 17). The volumes of their GDP per inhabitant (PPS) of EU-28 average are below 25 percent and do not qualify them even for the Deep Periphery category. Both regions operate under circumstances which can be seen as partial explanations of their socio-economic situations: Silistra (BG325) is a border region, internal for the EU, and Sliven (BG342) – a mountain type region. While their example also confirms the periphery overlap effect, many other Bulgarian regions function in circumstances, which can be assessed as similar or even worse, but they have achieved better socio-economic results. Therefore, despite the volume of evidence that confirms the periphery overlap hypothesis, it does not pretend to have identified, neither all the determinants, nor all mechanisms of the process of peripheralization. At this stage of the investigation, it just suggests one plausible mechanism that explains the differences in the standard of living in the horizontal dimension, as well as the origin of the Deep Periphery.

The security of EU external borders is another issue, that necessitates special attention to the regions at the Bulgarian segments of these borders, with particular focus on the LAU 1 border regions. The corresponding administrative territorial units at this scale in Bulgaria are the municipalities. The level of engagement of the population in the municipalities that border directly on the external EU borders – especially land borders, but maritime too – is of crucial importance to the effectiveness and efficiency of their security. In border regions, which are situated in mountain landscapes, this level of engagement in security maintenance is of even greater significance. Only closely coordinated tools and

measures on behalf of EU and Member States' scale regional development, cohesion and security policies can achieve the necessary standard of living and the respective engagement of the population in the identified municipalities.

In practical terms, the application of the 'overlap of peripheries' method and GIS-supported map analysis at the NUTS 3 scale show that almost the entire Eastern and South-Eastern segments of EU's external border periphery in Bulgaria is situated below the 600 m AMSL contour line. Very small in size mountain areas - under 2 percent of the respective NUTS 3 regions' territories (National… 2020) - are identified in two - Burgas (BG341) and Haskovo (BG422) - of the three external land border regions (See Figure 18).

Under these circumstances, only the local (LAU 1) scale is of consequence for both border security and regional development purposes. The following four LAU 1 regions, located directly along the border with Turkey, contain areas above 600 m AMSL: Malko Tarnovo (BGS12), Sredets (BGS06), Topolovgrad (HKV32), and Svilengrad (HKV28).

The analysis of the characteristics and structure of the areas of peripheries' overlap along the longer, Western Bulgarian segment of EU's external border determines that, according to Eurostat methodology, four mountain NUTS 3 regions - Sofia (412), Pernik (BG414), Kyustendil (BG415), and Blagoevgrad (BG413) - are located directly at the border and contain areas higher than 600 m AMSL. At the LAU 1 scale, sixteen regions - Makresh (VID25), Belogradchik (VID01), Chuprene (VID37), Chiprovtsi (MON36), Georgi Damyanovo (MON14), Godech (SFO09), Dragoman (SFO16), Tran (PER51), Treklyano (KNL50), Kyustendil (KNL29), Nevestino (KNL31), Blagoevgrad (BLG03), Simitli (BLG44), Kresna (BLG28), Strumyani (BLG49), and Petrich (BLG33) - possess the same characteristics. For most of them, at least 40 percent of the territories is situated above the 600 m AMSL threshold.

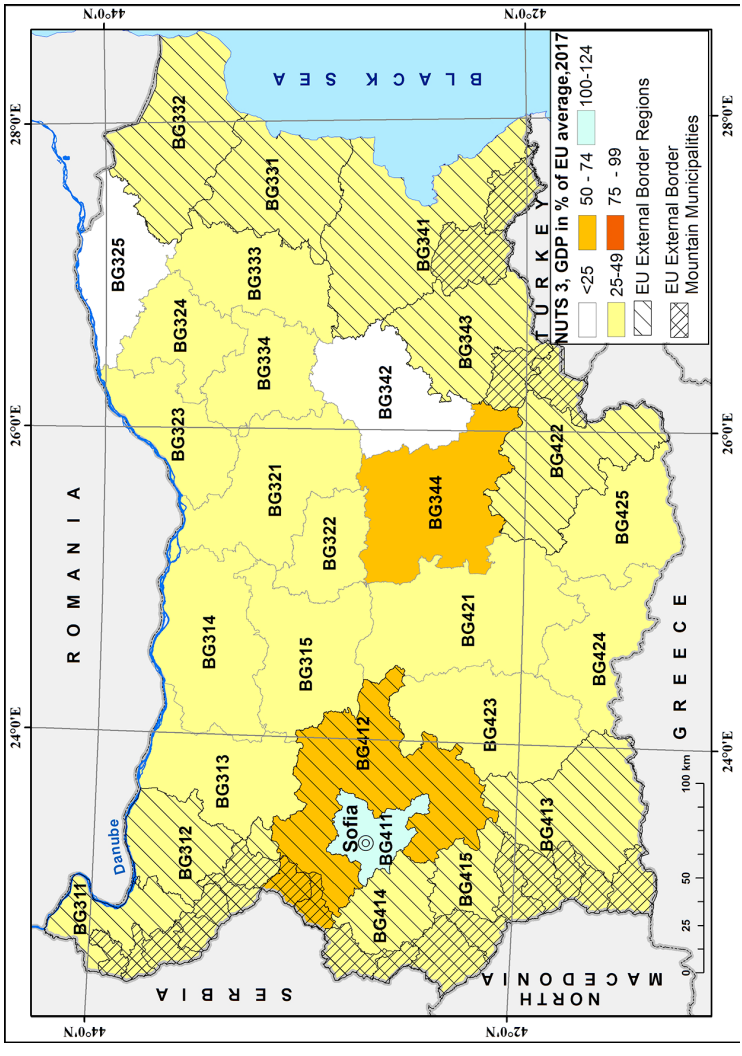

Figure 18. External EU land border regions of Bulgaria at the LAU 1 (municipality) scale, 2017.

The inclusion of the local (LAU 1) scale is particularly necessary in cases like, the NUTS 3 regions of Vidin (BG311) and Montana (BG312), situated in the North Western part of the EU external border. Eurostat does not identify them as mountain, since only 11 to 15 percent of their territory is mountainous (National… 2020). The multi-aspect investigation at the local scale, however, shows that each of the NUTS 3 regions includes a border municipality - Belogradchik (VID01) and Makresh (VID25) – with a share of area with mountainous characteristics of 32 percent and 12 percent, respectively (Koulov 2016).

Last, but not least, it is important to note that the latest amendments in the regulatory regional development documents in Bulgaria do not encourage endeavors related to regions with specific geographic features, despite the numerous EU-sponsored studies and related regulations, which focus on the relevance and effectiveness of their support (Zhelezov et al. 2018; Methodological… 2018; Relevance… 2012; Green… 2008). The March 2020 amendments of the Regional Development Law, promulgated in 2008 (Regional… 2018), in particular, represent a definite step back, in respect to some of the most important positive changes that the implementation of EU regional development and cohesion policies have introduced or reinforced in this country's regional development regulations and practice, e.g., the regions for targeted assistance (Art. 5 of the Regional Development Law of 2008, abolished in the March 2020 Amendment). Another prominent contribution to place-based decision making - the Targeted Investment Program for Development of North Western Bulgaria, Rhodope, Strandja – Sakar, Border, Mountainous, and Semi-Mountainous Less Developed Regions (Targeted… 2015) - has also been pushed into oblivion without impact assessment and public discussions. The lawmakers in the poorest country of the European Union must have found enough reasons to decide that the Operative Programme "Regions in Growth (2014-2020)" has achieved its stated goal - "To counteract the *free fall in the regional development*…"

(Operative… 2015, italicized by B.K.) - well in advance of its final year of operation. In addition to the inclusion of a number of concepts of rather questionable meaning, e.g., 'The plan for integrated development of a municipality contains: zones for application of an integrated approach for satisfaction of the identified needs and for support of the potentials for development and of the possibilities for cooperation with other municipalities;' [Regional Development Law, 2008, Art. 13 paragraph 3.3 (Previous para. 2, as amended - SG, no. 21 of 2020, in force from 13.03.2020)], the latest version of the Law omits fundamental territorial typologies, like mountain, coastal, and border regions, monitored by Eurostat and some of them covered by EU legislation (See Methodological… 2018), which represent nearly all of the Bulgarian territory. In fact, even the word "mountain" is not present any more in the ever-increasing volume of the Law.

In further evidence of the above, Article 10. (amend. SG 21/20, in force from 13.03.2020) (4) states: 'The national concept for regional and spatial development shall contain: ... 8. informal regions with specific characteristics and problems;' (Regional Development Law 2008). Notwithstanding the concept title, which combines the regional and the spatial, as well as the 'original' feature of the concept, which is the first to 'contain'(!) regions, the previously existing clarity of the responsibilities and territorial units, within which the unstated 'problems' will be dealt with, is quite obfuscated. The Integrated Territorial Strategy for the Development of the Level 2 Planning Region, which Law envisions (Art. 11., amend. SG 21/20, in force from 13.03.2020), will, according to paragraph 4, 'take into account the forecasts and the investment intentions for development of the territory of the region and is used as a basis in the development of regional state aid schemes.' The planning regions of Level 2, however, are not administrative units, like the Oblasts and Municipalities, with respective rights and responsibilities. The discrepancy between the scales of regional planning and administration is quite problematic from a management point of view. Furthermore, the state interests for

balanced and sustainable geospatial development and the interests of the regions with specific geographic features have been significantly undercut by the 2020 amendments of the Regional Development Law.

The neglect of mountain areas development in general and, particularly, the administrative territorial units with specific physical geography characteristics in the 2020 legislation does not contribute to the sustainable governance and cohesiveness of Bulgarian territory. Mountains have a special place, not only in Bulgarian geography, but also in this country's historic, economic, and cultural space. State policies have specifically targeted mountain development at least since the beginning of the 20th century. Mountains feature quite high on the public agenda and the state has consistently demonstrated high political and policy attention to them. From 1960 to 1995, the Council of Ministers adopted 15 decrees, aimed at improvement of the living and working conditions in these regions (Geshev 1995). Public attention towards development of mountainous regions have continued unabated in post-socialist Bulgaria, despite the prolonged and extremely strenuous transition to market economy. The special Temporary Parliamentary Commission for Development of Mountainous Regions, set up in 1992, has been upgraded to "standing" in 1995, in view of the continued public interest to the issue. Between 1999 and 2008, the Parliament passed three separate regional development laws (Regional… 1999, Regional… 2004, Regional… 2008) and the latest version has been amended and supplemented sixteen times for the twelve years of its operation. Troeva's (2015) diagnosis about the reasons for the Bulgarian regional development policy failures, among which lack of finances, overly hasty change of policies, and absence of consistency in policy implementation, still stands strong.

CONCLUSION

This investigation of Europe's core-periphery relations and horizontal disparities applies the systems approach and uses Eurostat's Nomenclature of Territorial Units (NUTS, 2016) to model the European socio-economic space as a hierarchical geospatial system. To identify, locate, and measure the horizontal disparities and their dynamics within the elements of the European Socio-Economic Geosystem, the research conceptualizes it as a core-periphery model with two interdependent poles – Core and Periphery subsystems – to be approached in an interrelated and interdependent manner and analyzed as a 'whole' unit.

GIS-aided comparative and historical analyses of the Core and the Periphery subsystems identifies their geographic locations, elements, boundaries, geospatial structure, and dynamics at each scale from Europe-wide through NUTS 0 to NUTS 3 during the 2007 - 2017 period. The investigation pinpoints the centers of socio-economic growth and decline in Europe, the geospatial elements, which 'need' to become regional policy 'targets', and provides information about their patterns of distribution, and potential to create, transfer, and utilize socio-economic opportunities. The NUTS 0 (country) and NUTS 2 regions -scales of investigation receive special attention, since they are of interest, not only to regional development theorists from diverse scientific fields, but also to policy makers and planning practitioners. The NUTS 3 scale analyses provide the most detailed information about the level of cohesion and regional policy efficiency, which is of utmost importance to the public. Most valuable in this respect should prove the analyses, assessments, and forecasts, which outline

the geospatial directions of the ongoing socio-economic changes in Europe. The magnitude of the horizontal disparities, as well as their dynamics, are estimated by using a 'disparity ratio' indicator, which measures the differences between the 'top' and 'bottom' geospatial elements within the Core, the Periphery, as well as between them, in a historical perspective.

The classification of regions takes place on the basis of Eurostat-provided regional data for their standard of living, measured as the GDP per inhabitant (PPS) in percent of EU-28 average (Eurostat 2019b). The work concludes that a lack of the necessary and sufficient recognition of the crucial importance of regional data collection and provision in general exists in a number of countries. Engler (2020) emphasizes the importance of data science methods, like predictive analytics, micro-simulation modeling, network, and image analysis, in development and planning. Sufficient and readily accessible data provision does not only support knowledge-based policy making: It is also a vital public service, which guarantees governance transparency, and informed citizens participation in decision making.

Two geospatial processes, opposite in direction, are observed within the highly dynamic structure of the European Socio-Economic System, which reflect on its boundaries, as well as on the boundaries of its Subsystems: advancement, by acquisition of new elements and withdrawal, expressed in 'losing' countries and regions to the other subsystem. These processes, caused by the variations in the regions' standard of living, are indicative of the general socio-economic status of System. In addition, they support the prognostication of the Core–Periphery relations, potential magnitude, and directions of the geospatial transformations on the European continent.

The investigation findings show that, during the 2007-2017 study period, the Core retreats, geospatially, in size, mostly in the Southern and, to a lesser extent, in the Western part of the continent. Nevertheless, it remains 'anchored' in Northwestern Europe at all scales. The Core structure includes a geospatial 'nucleus' – a group

of contiguous countries, in which the majority of regions qualify as Core elements at all four NUTS scales. Like the Core itself, its nucleus also retreats geospatially during the study period. In 2017, the following seven members make up the nucleus and contribute the most to the socio-economic status and stability of the European Socio-Economic System: Luxemburg, Norway, Sweden, Denmark, Netherlands, Austria, and Germany. The European regions with core standard of living characteristics exhibit significant geospatial positive autocorrelation: Most of them form a second structural element of the Core - a geospatial 'band', situated just outside the nucleus. The Core has assumed, in 2017, a clear cluster pattern.

The Core nucleus contains a 'Super Core' category of regions, characterized, in 2017, by GDP (PPS) per individual between the 125 percent and 1 311 percent of the EU-28 average. This work considers the group of regions above, as a significant potential source for positive geospatial change: reduction of the horizontal socio-economic disparities in the Europe. In the European Union only, fifteen percent of the 1348 NUTS 3 regions fit in this Core category, which also determine potential locations for growth transfer. In geospatial sense, the overall stability and sustainability of the European Socio-Economic System depends on the effective use of this resource too.

Between 2007 and 2017, significant geospatial transformations take place within and between the European Socio-Economic Core and its Periphery, with specific implications for the continent's horizontal disparities. Generally, a process of geospatial retreat dominates the Core structural dynamics at all scales between 2007 and 2017, while the opposite process of expansion prevails in the Periphery. As a result of the prevalent decrease in the living standards particularly in Western Europe, in some cases well below the EU-28 average, three countries from Europe's South - Cyprus, Spain, and Italy – have 'left' the Core during the study period. At the NUTS 1 scale, some of the largest economies and societies in Europe – United Kingdom, France, and Spain - after 'losses' of Core elements of their own, participate in

its structure with only two regions each. Greece lost its only NUTS 1 and NUTS 2 Core regions, while Portugal is following it very closely in the same direction.

United Kingdom and France probably best demonstrate a geospatial process, which has been typical for the Core: continuous concentration of the standard of living growth in fewer regions. The 'Core' standard of living in these two states hinges, in 2017, on two NUTS 1 regions in each of them. The UK possesses a total of twelve NUTS 1 regions, while France - eight such continental regions. (Is France the next state to leave the EU?) The social and geopolitical consequences of this geospatial process are momentous and their lessons should be carefully considered.

The European Socio-Economic Core has geospatially retreated, during the research period, despite the growing standard of living in the European Union, which actually forms most of it. Thus, the 'vertical', or socio-economic, hierarchy of the European Geospatial System is increasing, which simultaneously widens the regional disparities, with the respective negative consequences for the European cohesiveness and stability.

Naturally, the structural changes in the European Socio-Economic System are most dynamic, detailed, and visible at the lowest, NUTS 3 scale. Significantly, Eurostat provides much more regional data for the end of the study period (Figures 7 and 8). At this scale too, the geospatial dynamics only confirms the tendency, identified at the scales above: the geospatial advances of the European Core, mainly in Central and Eastern Europe, have not been able to compensate the opposite process of Core withdrawal. Germany proves to be the largest contributor to the Core's structure and Austria also positively affects its balance of regions. Poland (2016) is the only state that joined the EU after 2007, which has added other regions (four), besides its capital, to the Core. Thereby, this state is on its way to become another geospatial 'pillar' of Europe's Core, especially in Central and Eastern Europe.

The European Periphery experiences geospatial expansion at all four NUTS scales, mostly at the expense of the Core. At the politically most important NUTS 0 scale, the European Socio-Economic Periphery encompasses nineteen countries. Most of them are situated in Eastern Europe, while some - Portugal, Malta, and Greece – reside in the Southern part of the continent. At the beginning of the study period in particular, the majority of the Periphery elements, have been situated to the East of the European Core, where they still form a specific geographic pattern – a North-South –oriented zone - between Western Europe and its Eastern parts and the Near/Middle East. The Periphery geospatial expansion is hereby forecasted to continue in the Eastern/Southeastern direction.

The geospatial advance of the European Socio-Economic Periphery indicates that, between 2007 and 2017, the number of regions in Europe that offer below EU-28 average standard of living conditions has increased. Geospatial expansions, in general, naturally bring about enrichment of the respective structures, which also become more complex. During the period of the investigation, three macro-regions, each with specific characteristics of its own, result from the geospatial transformations within the European Socio-Economic Periphery Subsystem.

In the West European macro-region, the majority of the countries and regions from the Periphery fall into the Upper Periphery category. The standard of living between 2007 and 2017 generally, stagnates or decreases at all scales. Nevertheless, in Germany, Austria, and Netherlands, the Upper Periphery regions continue to dominate in number. In the European South (Portugal, Spain, Italy, and Greece), however, the number of regions in the Middle Periphery dramatically increases and clearly dominates by the end of the studied period. Great Britain, Sweden, and Finland, among others, have also been negatively affected. Two countries, Malta and the Czech Republic are the only exceptions from the Upper Periphery that demonstrate positive socio-economic development. Malta can reasonably be forecasted to even join the Core in the next few years.

The geospatial advances of the Core in Western Europe appear first in the NUTS 2 scale analysis: Eleven East German and one Danish Upper Periphery regions raise their standard of living during the eleven-year period of the investigation. Two of the German regions even rise to Core status. Other contributions to the Core have come from two East European states – Romania and Lithuania – which contribute their capital regions. However, the overall balance of accessions versus withdrawals in the European Socio-Economic Core has overwhelmingly been in favor of the latter (See Figure. 8). The few Middle Periphery regions situated West of the Core are located in Southern Europe, furthermost from the Core itself. While no elements of the Deep Periphery category exist in Greece in 2007, by the end of the study period, the country joins Southeastern Europe by including nineteen such regions.

Eastern Europe, the second macro-region within the European Socio-Economic Periphery, is dominated by the Middle Periphery at all scales throughout the study period. However, all countries, and, generally, the regions at all scales in Eastern Europe, which are adjacent to the Socio-Economic Core, exhibit significant socio-economic growth. This achievement should be interpreted as a success story of EU Cohesion policy. In 2007, the Czech Republic and Slovenia have been the only exceptions, which qualify for the Upper Periphery category. By 2017, they have been joined by Estonia, Lithuania, and Slovakia, which thereby strengthen the geospatial expansion of this Periphery category in Eastern Europe. In addition, six NUTS 1 scale regions from this part of Europe have upgraded their categories to Upper Periphery.

In Eastern Europe, the Upper and Middle peripheries gain most elements at the expense of the Deep Periphery. At the NUTS 2 scale, the North-South zone of Periphery regions in Eastern Europe of 2007 is joined in the North by the only two such regions in East Finland. During the period of the investigation, the standard of living in all Finnish NUTS 2 regions declines and the state acquires two more Upper Periphery elements at the expense of its Core. To the south, the

East European Periphery zone continues with the three Baltic states, which, in 2007, belong to the Middle Periphery category. South of the Germany and all the way to Greece, the predominant category of the Periphery regions changes to Middle, due mostly to their beneficial situation, which directly borders the European Core. In 2007, there are only two NUTS 2 regions in the Upper Periphery category between Germany and Greece. The further East and South a region is situated in relation to the Core, the more likely it is to be classified into the Deep Periphery category.

The Middle Periphery category also dominates the NUTS 3 regions of the Czech Republic and Slovakia throughout the period of the investigation. In Poland (data from 2016) and Hungary, the Middle Periphery regions predominate at the end of the study period, while in Estonia and Slovenia, the numbers of the regions in the Middle and the Deep Periphery categories are equal. In this macro-region, the Deep Periphery leads in the number of NUTS 3 regions only in Croatia and Latvia.

Southeastern Europe, the third macro-region within the European Socio-Economic Periphery, houses the states, in which Deep Periphery regions prevail on at least one scale. In 2007, this category of regions has completely dominated all scales in seven states: Romania, Bulgaria, Serbia, Montenegro, North Macedonia, Albania, and Turkey. By 2017, however, all of the Deep Periphery regions, except for Serbia (data since 2012), have improved their standard of living, in some instances, significantly. Romania and Turkey even move up to the Middle Periphery category at the NUTS 1 and 2 scales.

Nevertheless, the Deep Periphery macro-region persists: At the country scale, the number of participating countries in 2017 is slightly smaller, but still includes an EU Member State: Bulgaria. At the NUTS 1 scale, this category is represented in the easternmost part of the Eastern Europe Macro-region, as well as in Europe's Southeast, and includes EU Member States: Poland, Hungary, Romania, and Bulgaria. It spreads out much wider at the lower scales. The Deep

Periphery category of regions forms a special zone at the European Union's politically-sensitive eastern and southeastern borders (with Russia, Ukraine, Belarus, Moldova, and Turkey). Its geopolitical significance closely ties regional development and territorial planning to EU security, and neighborhood policies.

This research forecasts a stable future for the Deep Periphery category, especially in the Southeastern Europe Macro-region, due to the significant 'reservoir' of regions, first, among the geospatial elements at NUTS 2 scale, which presently barely pass 25 percent of the GDP per inhabitant (PPS) of EU average - the threshold that qualifies them for the category. Second, in 2017, certain number of regions in Europe still have a standard of living which does not meet the threshold above. The increase of the standard of living during the study period has diminished their number considerably, but at its end, some of them, situated exclusively in the Southeastern Macro-Region, are still observed, albeit at the NUTS 3 scale only. EU Member State Bulgaria and candidate for EU accession North Macedonia can each still point to two regions in this GDP quartile, as well as Albania, in which half of the NUTS 3 regions do not qualify for European Deep Periphery. Serbia also features ten such regions.

The investigation has identified another factor for the stability of the Deep Periphery macro-region. It concludes that two types of geospatial expansion of the European Periphery exist: The first is internal: It develops in the direction of the Core – by 'invading' of its geospace. The second Periphery expansion is external and develops, generally, in the direction away from the Core, by taking up geospace from 'outside' the System. The current 'Deep Periphery' is a result from the second type of geospatial transformation of the Eurostat-defined European Socio-Economic System, which experienced in 2004 its largest expansion: the EU accession of 10 states, followed in 2007 and 2013, by continuing the expansion process by addition of three more countries. This source of Periphery expansion offers additional evidence for the veracity and relative stability of the Deep Periphery

regions in Europe, as well as in European Union Member States. It also endorses that supposition that national regional development, as well as EU Cohesion Policy, should place greater emphasis and use area-specific tools on this category of regions in the days to come.

This Europe-wide, multi-scale, and multi-aspect study draws public and specialists' attention to the 'Deep Periphery" areas and adds to the knowledge of their origin and characteristics. On the basis of the case study of Bulgaria, it suggests and tests a method for their identification. The prognostication of areas, which exhibit the highest development needs enables better geospatial targeting of regional development policy and, thereby supports national and regional governance, as well as the security of EU external borders.

The discussion of the 'overlap of peripheries' effect should contribute to the literature on peripheralization. It offers conclusions on core-periphery interactions in general, as well as such, which specifically concern the magnitude of the geospatial impacts of the European Core, including the influences of capital city regions on the peripheralization of areas with specific geographic characteristics.

The research results at the NUTS 3 scale – which is the closest to the everyday experiences of the Europe's citizens - provide one of the best illustrations of the magnitude of the horizontal disparities among the European Socio-Economic Core elements, as well as their dynamics. During the eleven-year period, the existing significant disparities within the Core increased, albeit relatively little. In 2007, the differences in the standard of living between the 'top' and 'bottom' elements of the Core, as measured by the socio-economic disparity ratio, is 12.6 to 1, while in 2017, it raises to about 13.1 to 1. The opposite tendency is observed in the Periphery Subsystem: first, the disparities between the 'top' and 'bottom' elements are much smaller at all scales, compared to the Core. Second, at the NUTS 3 scale, the Periphery disparity ratios are 7.1 in 2007 and 5.5 in 2017. Thus, the tendency between 2007 and 2017 is positive: the disparity in the Periphery is actually narrower at the end of the study period.

The relative increase of the average standard of living in the Periphery causes a significant reduction of the horizontal disparity in the standard of living between the ‘top’ and ‘bottom’ NUTS 3 -scale elements of the European Socio-Economic Geospatial System: In 2007, the disparity ratio between Camden & City of London (UKI31) and Kukës (AL013) is 90.1, while in 2017, the ratio (between Camden & City of London (UKI31) and Dibër (AL011) fell to 72.8. Despite this positive tendency, the magnitude of such a disparity is hardly rational and poses risks of equal scale to Europe's cohesion and social stability, which should not be overlooked.

REFERENCES

Bański, J. Contemporary transformations of the rural space in Poland: selected problems. In: New aspects of regional transformation and the urban-rural relationship, Pecs, 2004

Bański, J. The development of rural areas in Central Europe – an identification of new processes. - In: Regionality and/or Locality, Discussion papers, Centre for Regional Studies of Hungarian Academy of Sciences, Pecs, 2007.

Banski, J., M. Ilieva, I. Iliev. Agriculture land use in Bulgaria and Poland - an attempt at comparasion. Проблеми на географията, 1-2, 1998.

Begg, R. Politics of Bulgarian agriculture. Paper presented at the second symposium on the impact of political and economical restructuring on the Bulgarian environment, Morgantown, West Virginia, February, 1993.

Bennett, C. (2013) Core–Periphery Relations in the European Union and the Role of Central Places in Europe with a Focus on Regional Policy in Britain and Germany. European Review, 21, pp 435-447. doi:10.1017/S1062798713000392.

Berenyi, I. Hungarian agriculture in transformation: spatial aspects. – In: Kovacs, Z. (Ed): Hungary towards the 21st century: the human geography of transition. Budapest, 2000.

Bertalanffy, Ludwig von, 1901-1972. (1969) General System Theory: Foundations, Development, Applications. New York: G. Braziller.

Bontje M (2004) Facing the challenge of shrinking cities in East Germany: the case of Leipzig. GeoJournal 61:13–21.

Boyadjiev, V. (1997) Geographical Views and Structural Development of Agribusiness in Bulgaria (Географските възгледи и структурното развитие на агробизнеса в България) Annual of Sofia University, 2, Geography, v. 88.

Boyadjiev V (2006a). Regional Development and Local Self Governance (Регионално развитие и местно самоуправление). Angelov I, Boyadjiev V, Bankov G, Delcheva E, Krainińska I, Balabanov I, Matev M, Hubenova-Delisivkova T, Borisova K, Ileva-Naidenova P, Zareva I, Uzunov S. (2006a) The Economy of Bulgaria and the European Union: Catching Economic Development - Strategy and Realities (Икономиката на България и Европейския съюз. Догонващо икономическо развитие - стратегия и реалности). Publishing House "Marin Drinov", Bulgarian Academy of Sciences, Sofia, p. 525.

Boyadjiev V (2006b). Economic Aspects of Regional Policy (Икономически аспекти на регионалната политика). Angelov I, Boyadjiev V, Bankov G, Delcheva E, Krainińska I, Balabanov I, Matev M, Hubenova-Delisivkova T, Borisova K, Ileva-Naidenova P, Zareva I, Uzunov S. (2006b) The Economy of Bulgaria and the European Union: Catching Economic Development - Strategy and Realities и реалности (Икономиката на България и Европейския съюз. Догонващо икономическо развитие - стратегия). Bulgarian Academy of Sciences Publishing House "Marin Drinov", Sofia, p. 525.

Boyadjiev V (2011) The role of small settlements for the regional development of Bulgaria (Ролята на малките селища за регионалното развитие на България). Proceedings of the Higher School of Agribusiness and Development of the Regions, Plovdiv.

Brunet, R. (1989) Les villes europeénnes: Rapport pour la DATAR. Montpellier: RECLUS.

Combes, P., T. Mayer, and J. Thisse (2008) Economic Geography: The integration of Regions and Nations, Princeton University

Press, New Jersey.
Combes, P. and T. van Ypersele (2013) The role and Effectiveness of Regional Investment Aid - The Point of View of the Academic Literature. European Commission, Luxembourg: Publications Office of the European Union. 132 pp. (doi: 10.2763/32058, accessed on 15.02.2020).
Cromartie, J. (2019) Rural Classifications. Economic Research Service, United States Department of Agriculture. (https://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/, accessed on 20.03.2020).
Cromartie, J., S. Bucholtz. (2008) Defining the "Rural" in Rural America. In: Rural Definitions, Economic Research Service, United States Department of Agriculture. (https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/rural-economy/?topicId=14910, accessed on 20.03.2020).
Csatari, B. New Elements of the Rural Transformation in Hungary, 1990-2000. Paper to the 12 Polish-Hungarian Geographical seminar, Karpacz (Poland), 2000.
De Souza, P. (2017) The Rural and Peripheral in Regional Development: An Alternative Perspective. Taylor and Francis, ISSN 9781351811927.
Debarbieux, B., Price, M. Representing Mountains: From Local and National to Global Common Good. (2008) Geopolitics, vol. 13, no. 1, p. 148-168. (http://archive-ouverte.unige.ch/unige:3978, accessed on 12.08.2017).
Dijkstra, L. and Poelman H. (2014) A Harmonized Definition of Cities and Rural Areas: The New Degree of Urbanization. European Commission. Regional Working Paper.
Doyle, M. and Stiglitz, J. (2014) Eliminating Extreme Inequality: A Sustainable Development Goal, 2015–2030. (https://www.ethicsandinternationalaffairs.org/2014/eliminating-extreme-inequality-a-sustainable-development-goal-2015-2030/).

Engler, A. (2020) What all policy analysts need to know about data science. Brookings Report. (https://www.brookings.edu/research/what-all-policy-analysts-need-to-know-about-data- science/86576055, accessed on 20.04.2020).

Faludi, A. (2015) The 'Blue Banana' Revisited. European Journal of Spatial Development. 56.

Garavoglia, M. (2016) Securing Europe's Borders: The First Step to a Comprehensive Asylum Policy. Foreign Affairs.

Geshev G (1990) Депопулация на селските територии в България (Depopulation of rural regions in Bulgaria.) In: Проблеми на географията (Problems of Geography), Vol. 4, Sofia.

Grykień, S. Transformation in agriculture in new läin Germany, Poland and Ukraine. – Bulletin of Geography (socio-economic series), 2005, 4.

Hospers, G. (2003) Beyond the Blue Banana? Structural Change in Europe's Geo-Economy. Intereconomics, 2, pp. 76–85.

Iliev, I. The problem of land owner-ship in Bulgaria during the transition to market economy. – Проблеми на географията, 1-2, 1998.

Iliev, I. Undeveloped rural regions in Bulgaria. - In: (Ed. B. Galczynska, M. Ilieva) Transformations of rural areas in Poland and Bulgaria. Case studies. - Dokumentacja Geograficzna, No 27. Instytut Geografii i przestrzennego zagospodarowania PAN, Warszawa, 2002a.

Ilieva, M. Changing spatial patterns of Bulgarian agriculture in the period of transformations. - Проблеми на географията, 1-2, 1998.

Ilieva, M. Rural areas in Bulgaria on the way of the transformation (case study of Dobrudzha). – In: M. Jasiulewicz (Ed.) Socio-economical alterations in rural areas of Central Europe in the transition period, Koszalin, 2000.

Ilieva, M. Some issues on the transformation of rural regions in Bulgaria. Проблеми на географията, 1-2, 2001a.

Ilieva, M. Transformation of the rural areas in Bulgaria (processes, territorial disparities). In: Gałczynska, B., M. Ilieva (Eds.) Transformations of rural areas in Poland and Bulgaria. Case studies. Dokumentacja Geograficzna, No 27. Instytut Geografii i przestrzennego zagospodarowania PAN, Warszawa, 2002b.

Ilieva, M. The Changing Role of the Agriculture in the Bulgarian Economy. - In: J. Kitowski (Ed.). New Arrangement of Socio-Economic Links in Central and Eastern Europe, Rzeszów, 2002c.

Ilieva, M. SAPARD fund as development factor for rural areas in Bulgaria. – In: T. Komornicki, K. Czapiewski, B. Jaworska (Eds.) New functions of rural and industrial space in Central and Eastern Europe, Europa XXI, 2008, 17, Polish Academy of Sciences, Warszawa, 2008.

Ilieva, M., Ch. Mladenov. Changes in the rural areas in Bulgaria: processes and prospects. - Geographia Polonica, Vol. 76, No 1, Spring, 2003.

Ilieva, M., I. Iliev. Changes in the ownership and farmland use in Bulgaria during the transition to market economy. Проблеми на географията, 1995, 4.

Ilieva, M., I. Iliev. Restoration of property rights over farmland in Bulgaria as an important prerequisite for transition to market economy. In: J. Muncar, A. Vaishar (Eds.). Rural Geography and Environment, Valtice, Czech Republic, 1997.

Jordanova, Ch. Comparative analysis of agricultural reform in Bulgaria and Romania and its effect on European Union membership. In: New Europe College Regional Program Yearbook 2005-2006, Bucharest, 2006.

Keeble, D. (1989). Core-Periphery Disparities, Recession and New Regional Dynamisms in the European Community. Geography, 74(1), 1-11.

Koulov, B., V. Boyadjiev, A. Ravnachka (2019) The Demographic Draining of Bulgaria's Rural Area: A GIS-Aided Geospatial Analysis (1992-2017). Banski, J. (ed.) Three Decades of Transformation in the East-Central European Countryside. Springer. ISBN:978-3-030-21236-0, DOI:10.1007/978-3-030-21237-7_11, 22 pp.

Koulov, B. (2018) Social and Economic Transformations in a Bulgarian Mountain Area: A 1986-2014: Comparative Analysis. Annals of the Bulgarian Geographic Society, v.1, (XXXIX), ТерАрт, 2018, ISSN:0205, 75-82.

Koulov, B. (2016) EU 'Deep' Periphery: A Case Study of Mountain Borderlands in Bulgaria. Revue Roumaine de Géographie/Romanian Journal of Geography 60. (1): 61–72.

Koulov, B., M. Nikolova, G. Zhelezov. (2016) Mountain Development Policies in Bulgaria: Practices and Challenges. In: Kulov, B. and G. Zhelezov (Eds.) Sustainable Mountain Regions: Challenges and Perspectives in Southeastern Europe, pp 268, Springer, ISBN:978-3-3019-27903-9, DOI:10.1007/978-3-319-27905-3, 1-15.

Koulov, B. (2013), Mountains between Sustainability and Development: Managing Sustainable Development in Mountain Areas. Ankara University, Journal of Environmental Sciences, 5:1, pp. 87–93.

Kovacs, T. Regional disparities in the privatization of Land. - In: Regional processes and spatial structures in Hungary in the 1990's., Pecs, 1999.

Kovacs, T. Restructuring agriculture. In: Barta, G., E.G. Fekete, I.K. Szorenyjne, J. Timar. Hungarian Spaces and places: patterns of transition, Pecs. 2005.

Kulikowski, R. Transformation in agriculture in the countries of the EU first accession group from Central Europe. In: Kitowski, J. (ed.) Spatial dimension of socio-economic

transformation processes in Central and Eastern Europe on the turn of the 20th century, vol.II, Rzeszów, 2001.
Krugman, P. (1991a). Geography and Trade. Cambridge: MIT Press.
Krugman, P. (1991b) Increasing returns and economic geography. Journal of Political
Economy, 99, 483-499.
Krugman, P. (1998) What's New About the New Economic Geography? Oxford Review of Economic Policy, 14:2, 7-17.
Krugman, P. (2010) The New Economic Geography, Now Middle-Aged. Prepared for presentation to the Association of American Geographers. (https://www.princeton.edu/~pkrugman/aag.pdf, accessed on 12.02.2020).
Kunzmann, K., M. Wegener (1991). The Pattern of Urbanization in Western Europe. Ekistics. 350: 291.
Martin, R., A. Pike, P. Tyler, B. Gardiner. (2015) Spatially Rebalancing the UK Economy: The Need for a New Policy Model. Regional Studies Association: The Global Forum for City and Regional Research, Policy and Development.
Martinez-Fernandez C, Audirac I, Fol S, Cunningham-Sabot E (2012) Shrinking cities: urban chal-lenges of globalization. Int J Urban Reg Res 36(2):213–225;
Maurel, M. C. Patterns of post-socialist transformation in the rural areas of Central Europe. In: G. Horvath (Ed.) Regions and cities in the global world, Pecs, 2000.
Maza, A., J. Villaverde. (2004) Regional Disparities in the EU: Mobility and Polarization. Applied Economics Letters, 11:8, pp. 517-522.
Meurs, M. R. Begg. Path dependence in Bulgarian agriculture. In: Pickles, J., A. Smith (eds). Theorising transition: the political economy of post-communist transformation, Routledge, London, 1998, pp. 243-261.

Mitrică, B., Persu, M., Mocanu, I., Şerban, P., Grigorescu, I., Damian N. (2019) Changes In the Dynamics and Demographic Structures of the Romanian Rural Population: An Overview of the Post-Communist Period. Bański, J. (ed.) Three Decades of Transformation in the East-Central European Countryside. Springer.

Mladenov, Ch. (2015) Impact of Internal Migration on the Regional Demographic Situation. Population. 2, pp. 73-87.

Mladenov, Ch. (2000) The Demographic Situation in the Rural Regions of Bulgaria during the Transition Period. In: M. Jasiulewicz (Ed.). Socio-Economical Alterations in Rural Areas of Central Europe in the Transition Period, Koszalin.

Mladenov, Ch. (2001) The Depopulation in the Rural Regions of Bulgaria. Проблеми на географията, 1-2.

Mladenov, Ch. (2002) Problems of Rural Population in Bulgaria. Gałczynska, B., M. Ilieva (Eds.) Transformations of rural areas in Poland and Bulgaria. Case studies. Dokumentacja Geograficzna, No 27. Instytut Geografii i Przestrzennego Zagospodarowania PAN, Warszawa.

Nagy, J.N. (2000) Regional inequalities in Hungary at the end of the socio-economic transition. In: Kovacs, Z. (Ed): Hungary towards the 21st century: the human geography of transition. Budapest.

Olsen A (2013) Shrinking cities: fuzzy concept or useful framework? Berkeley Plan J26(1):107–132. (http://escholarship.org/uc/item/9cd585dr, accessed on 01.10.2018).

Pallagst, K. (2008) Shrinking cities: planning challenges from an international perspective. In: RugareS, Schwarz T (eds) Cities growing smaller. Cleveland Urban Design Collaborative, Cleveland,OH, pp 6–16.

Pallagst, K. and Aber, J. (2009) Introduction. In: Pallagst K. et al. (eds) The future of shrinking cities :problems, patterns and strategies of urban transformation in a global context. IURD monograph series, pp 1–4.

Pascariu, G. and M. Duarte (eds.) (2017) Core-Periphery Patterns Across the European Union: Case Studies and Lessons from Eastern and Southern Europe. Emerald Publishing Limited. ISBN: 9781787144965. 424 pp. https://doi.org/10.1108/978-1-78714-495-820171001.

Patarchanova, E., Ivanova, E., Kolev, B. (2009) Contemporary Situation and Development Opportunities of the Agricultural Activities in the Municipality of Montana (Съвременно състояние и възможностите за развитие на земеделието в община Монтана) Annual of Konstantin Preslavsky University of Shumen Vol. XIX B4, Bishop Konstantin Preslavski Publishing House of University, Shumen, p.108-127.

Petrov, P., A. Kisselkova, E. Ivanov. Preservation of the Natural and Cultural Inheritance in Rural Areas in Bulgaria in the Period in Transition - In: Gałczynska, B., M. Ilieva (Eds.). Transformacions of rural areas in Polans and Bulgaria. Case studies. - Dokumentacja Geograficzna, No 27. Instytut Geografii i przestrzennego zagospodarowania PAN, Warszawa, 2002.

Ravnachka Al (2006) The unemployment in rural regions of Southwestern Bulgaria (Безработицата в селските райони на Югозападна България). Problems of geography, v. 1-2, pp. 83-91, ISSN 0204-7209.

Rey, V., M. Bachvarov. Rural settlements in transition - agricultural and countryside crisis in the Central-Eastern Europe. - GeoJournal 44, 4, 1998.

Simeonova, V. and Milkova, K. (2020) “Shrinking Cities” in Bulgaria: An Attempt for Defining the Models of “Urban Shrinkage”. Nedkov, S., Koulov, B., Nikolova, M. Ilieva,

N., Zhelezov, G., Naydenov, K. (eds) Smart Geography, Springer, ISBN:978-3-030-28190-8, DOI: https://doi.org/10.1007/978-3-030-28191-5_1.

Stiglitz, J., J. Fitoussi, M. Duran (2018). Beyond GDP: Measuring What Counts for Economic and Social Performance. OECD Publishing.

Stiglitz, J. (2015) The Great Divide: Unequal Societies and What We Can Do About Them. New York: W.W. Norton & Company. ISBN 9780393248579.

Stiglitz, J., J. Fitoussi, and A. Sen (2010) Mismeasuring Our Lives: Why GDP Doesn't Add Up. New York: The New Press. 176 pp. ISBN 9781595585196.

Troeva, V. (2015) State Policy for Support of Economic Efficiency in Underdeveloped and Disadvantaged Regions in Bulgaria: Alternatives to Traditional Production Activities). Council for Development of Regions and National Infrastructure to the President of the Republic of Bulgaria. (Държавната политика за насърчаване на икономическата ефективност в слаборазвитите и необлагодетелствани региони на България. Алтернативи на традиционните производства). Smolyan, (https://www.president.bg/docs/1430833285.pdf, accessed on 05.05.2015).

Turnock, D. (Ed.) Privatization in Rural Eastern Europe. The process of restitution and restructuring. Studies of communism in transition. Edward Elgar, Cheltenhamq UK, Northampton, 1998.

Yarnal, B. Decollectivization of Bulgarian agriculture. – Land Use Policy, Vol. 11, 1994.

Yarnal, B. The land-use impacts of Bulgarian decollectivization. - In: Paskaleva, K., Ph. Shapira, J. Pickles, B. Koulov (Eds.) Bulgaria in transtion, Ashgate Publishing Company, 1998.

Yovcheva, M. (2012) The reality of shrinking cities, UACG Yearbook. (https://www.uacg.bg/filebank/att_6874.pdf., accessed 23 Nov 2018).

Zhelezov, G., B. Koulov. (2018) Конвенция за планинските региони в Югоизточна Европа (Балканска конвенция) (Convention for the Mountain Regions in South East Europe: Balkan Convention). Problems of Geography, v. 1-2, Sofia: Prof. Marin Drinov Publishing House of the Bulgarian Academy of Sciences, ISSN:0204-7209, 159-164.

Anonymous

Cross-border cooperation. (2017) (https://ec.europa.eu/regional_policy/en/policy/cooperation/european-territorial/cross-border/#1, accessed on 03.02.2020).

Directorate General for Regional Policy (European Commission), Three Objectives (https://ec.europa.eu/regional_policy/how/index_en.cfm#3, accessed on 09.95.2016)

European Commission (2017) COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT on Boosting Growth and Cohesion in EU Border Regions [COM (2017) 534 final]. (https://www.eumonitor.eu/9353000/1/j9vvik7m1c3gyxp/vkhsgjimm9xs, accessed on 15.12. 2019).

Eurostat (2019 a). (http://ec.europa.eu/eurostat/web/nuts/overview, accessed on 22.07.2019).

Eurostat (2019 b). (https://ec.europa.eu/eurostat/databrowser/view/tec00114/default/table?l, accessed on 24.07.2019)

Statistics on rural areas in the EU (2017). Eurostat. (https://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics_on_rural_areas_in_the_EU, accessed on 22.07.2019).

Eurostat NUTS classification (2015 a). (http://ec.europa.eu/eurostat/web/nuts/overview, accessed on 16.01.2015).

Eurostat (2018, 2016, and 2013) Urban-Rural Typology. (http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary, accessed on 12-10-2018.)

Eurostat Regional Yearbook (2019), Luxembourg: Publications Office of the European Union.

Federal Statistical Office, Switzerland. ISSN: 2363-1716. (https://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-HA-19-001, accessed on 02.05.2020)

Green Paper on Territorial Cohesion: Turning Territorial Diversity into Strength [COM (2008) 616 final]. Communication from the Commission to the Council, the European Parliament, the Committee of the Regions and the European Economic and Social Committee. (https://eur-lex.europa.eu/legal-content/EN/LSU/?uri=CELEX%3A52008DC0616, accessed on 25 12.2020).

Methodological Manual on Territorial Typologies. (2018) Eurostat online publication, DOI: 10.2785/228845.

National Statistical Institute (Национален статистически институт). (http://www.nsi.bg/, accessed on 04.06.2020).

OECD Regional, Urban, and Rural Development (2011) (https://www.oecd.org/cfe/regional-policy/OECD_regional_typology_Nov2012.pdf: 2, accessed on 04.06.2020)

OECD Indicators (2013) (https://ec.europa.eu/agriculture/statistics/indicators/rd-2013/c1_en.pdf, accessed on 04.06.2020).

Operative Programme "Regions in Growth" 2014-2020 (Оперативна програма "Региони в растеж 2014-2020". (2015.) Ministry of Regional Development and Public Works. (http://www.mrrb.government.bg, accessed on 08.09.2016).

Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing, as part of the Integrated Border Management Fund, the instrument for financial support for border management and visa. COM/2018/473 final. (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018PC0473, accessed on 25 12.2019)

REGIONAL DEVELOPMENT LAW (ЗАКОН ЗА РЕГИОНАЛНОТО РАЗВИТИЕ). In force since 31.08.2008 Promulgated, State Gazette (S.G.) 50/30 May 2008, amended S.G. 47/23 June 2009, amended S.G. 82/October 16, 2009, amended S.G. 93/24 November 2009, amended and ext. S.G. 82/26 October 2012, amended S.G. 66/26 July 2013, supplement. S.G. 22/11 March 2014, amended S.G. 98/28 November 2014, amended S.G. 9/3 February 2015, supplement. S.G. 14/20 February 2015, amended and ext. S.G. 15/23 February 2016, supplement. S.G. 13/7 February 2017, amended S.G. 58/18 July 2017, amended and ext. S.G. 28/29 March 2018, amended and ext. S.G. 21/13 March 2020.

REGIONAL DEVELOPMENT LAW (ЗАКОН ЗА РЕГИОНАЛНОТО РАЗВИТИЕ). (1999) Prom. SG 26/23.03.1999.

REGIONAL DEVELOPMENT LAW (ЗАКОН ЗА РЕГИОНАЛНОТО РАЗВИТИЕ). (2004) Prom. SG/14/20.02.2004, Amend. SG 32/12.04.2005.

Regulation (EU) 2016/1624 of the European Parliament and of the Council of 14 September 2016 on the European Border and Coast Guard and amending Regulation (EU) 2016/399 of the European Parliament and of the Council and repealing Regulation (EC) No 863/2007 of the European Parliament and of the Council, Council Regulation (EC) No 2007/2004 and Council Decision 2005/267/EC. Latest consolidated version: 04/12/2019. (http://data.europa.eu/eli/reg/2016/1624/oj, accessed on 13.06.2020.)

Regulation (EC) No 1059/2003 of the European Parliament and of the Council of 26 May 2003 on the establishment of a common classification of territorial units for statistics (NUTS).

Relevance and the Effectiveness of ERDF and Cohesion Fund Support to Regions with Specific Geographical Features – Islands, Mountainous and Sparsely Populated areas. (2012) Report for the European Commission, coordinated by Analysis for Economic Decisions – ADE. (http://www.ade.eu, accessed on 08.09.2016).

Statistics Explained. (2019) Eurostat 9 Methodological manual on territorial typologies – border regions. (https://ec.europa.eu/eurostat/statisticsexplained/, accessed on 03.01.2020).

Targeted Investment Program in Support of the Development of Northwestern Bulgaria, the Rhodopes, Strandzha - Sakar, Border, Mountainous and Semi-Mountainous Underdeveloped Regions (Целенасочена инвестиционна програма в подкрепа на развитието на Северозападна България, Родопите, Странджа - Сакар, пограничните, планинските и полупланинските слабо развити райони.) Ministry of Regional Development and Public Works, December, 2015. (http://www.mrrb.government.bg, accessed on 08.09.2016).

UN General Assembly, *Transforming our world: the 2030 Agenda for Sustainable Development.* (2015) A/RES/70/1. (https://www.refworld.org/docid/57b6e3e44.html, accessed 16 May 2020).

World Urbanization Prospects: The 2014 Revision, United Nations, Department of Economic and Social Affairs, Population Division. (http://databank.worldbank.org/data/reports.aspx?source=2&series=SP.RUR.TOTL&country=#, accessed 16 May 2020).

Europe's Core-Periphery Relations and Horizontal Disparities

Publisher: Az-buki National Publishing House
Author: Boian Koulov
Printed Quires: 8,75
Printing House: Aliance Print Ltd