European Review, Vol. 32, No. 3, 241–268
doi:10.1017/S1062798723000534

Economic Resilience in the Centre Development Region, Romania. A Methodological Approach to the 2009–2011 Economic Crisis and Post-crisis

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Economic resilience consists of the decisions taken by firms in order to face decreasing demand (during an economic crisis) while maintaining a functional economic structure so that they may then return to business as usual after the crisis has passed. In addition, it refers to how the population acts in order to stay in the labour market and maintain their standard of living. The educational structure must fit the needs of firms. This study relies on three datasets at the NUTS V level for the Central Development Region in Romania for the demographic, labour market and educational structure: the situation in 2008, the evolution of the three structures during the crisis period (2009–2011), and the evolution of the above-mentioned structures during the 2012–2019 post-crisis period. The migration of people with a domicile from urban areas to rural areas was associated with a decrease in the number of employees and the unemployed in urban areas (big and medium-sized cities) simultaneously with an increase in the unemployed population in rural areas. The unemployed moved their domiciles from urban areas to peri-urban areas, commuting to the cities. There were people who moved their residence from small cities to big and medium-sized ones. The post-crisis economic recovery was quick and the economic structure remained functional during the crisis.

Introduction

Starting from the original concept of resilience used in engineering to emphasize the ability to withstand a shock (regarding materials), or in ecology the ability to absorb a shock (without changing system structure, identity and function) (Holling 1973), different sciences have begun to use the concept by integrating it into their own body of knowledge, and naming resilience according to the specifics of the science that adopts it (social resilience, economic resilience).

First, behavioural psychologists described individuals' resilience (positive adaptive resilience) as the ability to deal with and recover from personal trauma and adversity (Kaplan 1999; Luthar *et al.* 2000; Denhardt and Denhardt 2010; O'Dougherty Wright *et al*. 2013). The social sciences called the concept *social resilience*, humanizing the features of resilience: learning to live with change and uncertainty by developing the ability to reorganize (one's own life) and combine different types of knowledge is the most important feature in the opinion of Berkes and Seixas (2005). The renewal cycles stimulated by change, learning, and experimenting used by Holling and Gunderson (2002) in ecology became the humans' capacity to live in dynamic environments that are characterized by unpredictability and surprise (Harris *et al.* 2000). Barbarin (1994) defined social resilience as the individual's ability to better cope with a situation of great difficulty, to face the disorganized conditions of life, to survive and grow despite limited resources and an unfavourable environment. Social resilience refers to the people's ability to cope with, adapt to and configure change and not try to control these changes (Smit and Wandel 2006).

Regional economic development is far from evolving smoothly, being subjected to all types of disruptions and disturbances: periodical economic recession, unpredictable major competitors rising elsewhere, unscheduled closure of enterprises (Şerban *et al*. 2016). Scientists emphasize that resilience is the ability of an economy (local, regional, national), firms or households to cope with the consequences of a shock, such as cyclical economic crises (Martin and Sunley 2020). Economic resilience is about transformation in response to shocks (therefore, this type of resilience is also called system transformation). Maintaining performance and functionality involves changes in some structural components (Kitano 2004). The works of Lorenz (2013), Obrist *et al*. (2010) and Béné *et al*. (2012) lead us to the conclusion that resilience can be described as coping capacities, adaptive capacities, and transformative capacities. Resilience is a concept that fits in the studies of economic geographers, economists or regional science researchers who deal with recessions, major policy changes and economic crises. The concept of resilience is used to analyse how (more or less extensive) localities or regions recover from crises and future development paths (Lang 2012). Economic resilience is analysed either from the perspective of economic entities (firms, the workforce) adapting to changing circumstances, or from the perspective of the entire economic system that transforms during an economic crisis. Business scholars used resilience to refer to firms' strategic response to the global market place (Hamel and Valikangas 2003; Starr *et al.* 2003;

Tompkins 2007; Sheffi 2007, 2015). Martin and Sunley (2020) point out that there may be commonalities, as well as discrepancies regarding the analysis of economic resilience. Thus, the economic system as a whole can be approached, or the analyses can be much more thorough, at the firm or household level together with policy bodies and other entities. Individuals deliberately undertake changes in preparedness or mitigation of certain shock, as economic resilience involves adaptability (Martin and Sunley 2020).

Economic resilience was analysed by measuring how the population has faced the shock of the negative evolution of the regional economies, with various indicators (employment, degree of urbanization, GDP, sector composition) being used. Fingleton *et al.* (2012), for instance, analysed regional economic resilience using employment patterns for the UK and the EMU regions. The impact of the crisis varies across the EU regions and countries (Groot *et al.* 2011). These variations were attributed by Brakman *et al.* (2015) to the degree and pattern of urbanization combined with the sector composition of the region's economy. The study used as benchmarks both unemployment and the evolution of the GDP (see Belloc and Tilli 2013, for the economic crisis – a spatial direct impact in terms of employment and GDP contraction, and Cuadrado-Roura and Maroto-Sanchez 2014; Petrakos and Psycharis 2014; Raagmaa *et al.* 2014 for the spatial distribution of the impact of the crisis). Notwithstanding, more urbanized areas are more and differently specialized (see Brakman and van Marrewijk 2013). Previously, there were studies (Glaeser and Kahn 2004) that showed the link between the degree of regional urbanization and regional growth. Regions that are more urbanized and regions that have the workforce employed in skill-intensive sectors do perform better (see Glaeser 2005, for a study on the resilience of Boston, but not during the economic crisis; Martin *et al.* 2013, for French clusters; or Brakman *et al.* 2015 for 22 EU countries). Analysing the command-and-control function of Eastern European cities by using the financial performance of the largest corporations based in the region and the impact of selected sectors on this function during the economic crisis, Raźniak *et al.* (2018) concluded that during economic crises, cities with different corporate headquarters representing various sectors of the economy performed better than cities dominated by a single major corporation. According to Martin *et al.* (2013), firms in clusters had a higher survival rate during the economic crisis. Luthar and Cushing (1999) and Gartstein *et al.* (2014) have shown that resilience cannot be directly measured, but only inferred, based on two concepts that make it up: the risk (or adversity) and the successful adaptation (or competence).

The economic crisis has affected the activity of firms by reducing financing and the consumption of the population. In order to face this situation, firms reduced their activity and fired employees. The dismissed population looked for a job in their home town or migrated to an available job in another town. During the crisis, we can observe the intensity of the shock through the differences between the number of employees before the crisis and the number of employees at the end of the crisis. The post-crisis period meant economic development, the increase in the number of available jobs and the recovery of the population's standard of living by finding a

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job. In this study, we consider economic resilience the restoration of the business environment of firms and the increase in the number of employees (business as usual), the effort of the population to remain part of or to reintegrate onto the labour market. The restoration of the number of employees and the high flows of changes of domicile mean economic resilience. Questions and challenges appeared here regarding how the Government acted through public policies regarding local economies in order to support businesses and maintain the standard of living of the population. The intervention of the Government as well as that of some external financial institutions (financial packages granted by the IMF) can stabilize the macro-economic situation. Regarding the business environment, the Government took measures to alleviate the effects of the economic crisis, and the decisions (the decrease in economic activity and, implicitly, layoffs) are taken by each individual company. The Government made efforts to control the expenses of the consolidated general budget, with the aim of achieving the deficit target of the consolidated general budget, but the results were not as expected (lower revenue collections, exceeding current expenses, especially regarding salaries). The consolidated general budget deficit increased to 8.1% of the GDP. In order to limit the fiscal deficit in 2009 and reduce it in 2010, the Government applied a series of measures, such as reducing personnel expenses (local authorities and self-financed institutions) by 15.5% between October and the end of December 2009 (Duca and Duca 2009). Between 2009–2011, the Government reduced the number of jobs in the private sector by over 100,000 (data source: National Institute of Statistics).

This article is focused on the economic resilience of local economies (communes and municipalities) of the Centre Development Region in Romania (the most urbanized development region) at the firm and household level. to which we added two vulnerable categories of graduates (high school and vocational school). For this study, we have chosen six variables, having in mind three categories of structures: demography, labour market and education. Each structure has two variables, as follows: the economically active population and net settling of domicile for demography, the employed and unemployed population for the labour market, and high school and vocational school graduates for education. The new element that the article brings is the division of variables into structures and the use of new variables (the economically active population, the net settling of domicile, high school and vocational school graduates) to highlight the transformations that have occurred in local economies and their causes.

The objective of the article is to analyse economic resilience: the extent to which companies have reduced their activity (which implies a decrease in the number of employees) in order to face the decreasing demand on the international and national markets so that they can then return to business as usual, keeping functional economic structure, on the one hand, and the way the population acted to stay on the labour market (migration in searching of a job) and to maintain their standard of living, on the other hand.

A Hypothesized Model was proposed aiming at better addressing the research questions. Studies have established that the economic crisis has influenced local

businesses and the behaviour of the population. Resilience has to do with recovering from or mitigating the effects of a shock, such as the economic crisis.

- **Hypothesis 1 (H_1)**: The previous economic crisis (2009–2011) negatively and significantly affected the labour market. We have examined the labour market during and after the crisis period. The decline of economic activity due to the reduction of bank loans and the demand for products and services meant layoffs which further fuelled the reduction in demand.
- **Hypothesis 2 (H_2):** The previous economic crisis (2009–2011) significantly affected population behaviour. The loss of jobs caused the economically active population/employees to look for a/other work place(s). If the available job was in another commune or municipality, the population had to change their domicile. Economic activity being more intense in cities, it is possible that there was a rural exodus.
- **Hypothesis 3 (H_3):** The economic evolution in the post-crisis period (2012–2019) positively and significantly affected the labour market. The increase in the number of jobs occurred during the period of economic recovery.
- **Hypothesis 4 (H_4):** The economic evolution in the post-crisis period (2012–2019) significantly affected population behaviour. People got used the new way of life that the economic crisis created, continuing to migrate from urban areas to rural areas.
- **Hypothesis 5 (H_5):** The economic evolution in the post-crisis period (2012–2019) significantly affected schools' purposefulness. Secondary schools have become more attentive to the demand on the labour market, adapting the number of graduates.

Study Area

The Romanian regional system has the following statistical-territorial levels: NUTS II (eight Development Regions without administrative and juristic person status – North-West, Centre, North-East, South-East, South-Muntenia, Bucharest-Ilfov, South-West Oltenia and West); NUTS III (41 counties and Bucharest, represents Romania's administrative-territorial structure) and NUTS V (319 towns/urban LAUs and 2862 communes/rural LAUs) (Mitrică *et al*. 2020). The Development Regions – regional areas with specific development problems – were designed based on a study of regional disparities, the main purpose was to delineate these regions as functional spaces of comparable size composed of units with different levels of economic and social development (Hansen *et al*. 1996; Mitrică *et al*. 2021). Economic performance is more consolidated in the development regions from the centre and western part of the country and more vulnerable in the eastern and southern part (Popescu *et al*. 2016). The intraregional disparities are significant, being the result of the association within the same region of counties with different profiles and levels of development. The most homogeneous, from this point of view, are the Centre and West Development Regions (Săgeată and Popescu 2016).

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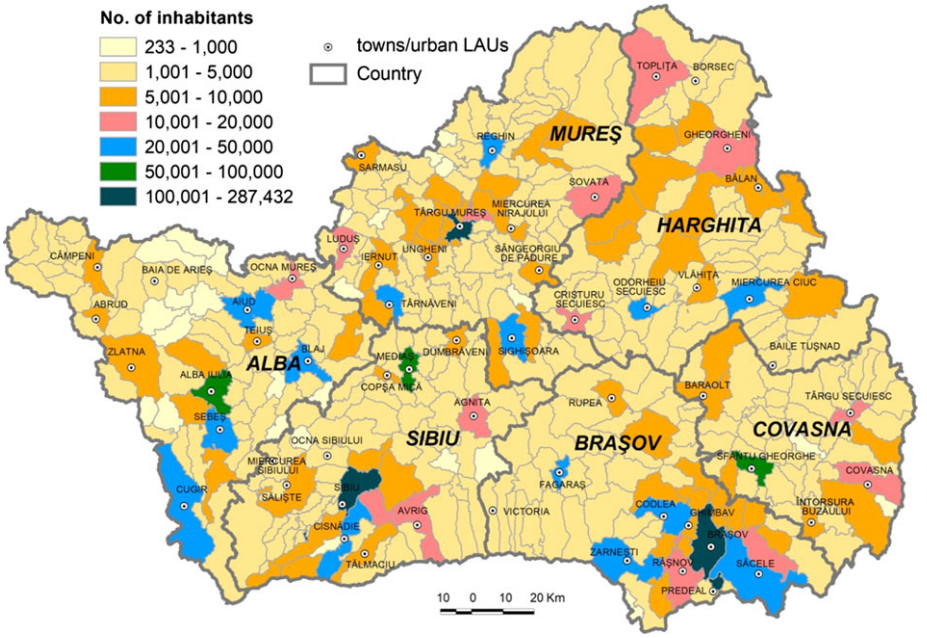

Figure 1. Centre Development Region.

The Centre Region consists of Alba, Braşov, Covasna, Harghita, Mureş and Sibiu counties located in the central and southern part of the historical province of Transylvania, covering 14.3% of the country's surface and 11.8% of Romania's population (National Institute of Statistics 2022) (Figure 1). The economy is diversified, with varied resources, traditions and accessibility. At the national level, this development region is one of the economically developed ones, ranking third in terms of GDP (11.4% of the national value). The contribution of the six counties to the formation of the regional GDP differs depending on the economic development. Thus, Brasov county reaches 29.6%, Mureş – 19.8%, Sibiu – 19.5%, Alba – 14.5% while Covasna and Harghita counties contribute 6.6% and 10.0% respectively.

Materials and Methods

Resilience can be conceptualized, but it is difficult to operationalize, that is, it cannot be measured directly based on the evolution of a variable, but we can use proxies for resilience, or, more precisely, for processes related to resilience. The following relevant indicators were chosen: the economically active population, the net settling of domicile/migration balance (for the demographic structure), the employed, the unemployed (labour market structure), high-school graduates, vocational school graduates (educational structure). There is a close link between the internal migration of the active population and the expansion or contraction of the labour market. The importance of education or labour force qualification was highlighted in

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various studies (Van Gramberg and Teicher 2000). The educational structure responsible for the training of the workforce is controlled by the central government, thus influencing the population and firms' decisions. The study relies on three data sets at NUTS V level for the Centre Development Region in Romania: the first set represents the situation in 2008, the second set stands for the evolution of the three structures during the crisis period (2009–2011) (calculated as the value difference between 2011 and 2009), and the third set stands for the evolution of the above-mentioned structures during the post-crisis period (2012–2019). There are several dates for the onset of the crisis, but according to IMF criteria, the global recession occurred in a single calendar year, 2009. The period 2009–2011 was when the economic crisis manifested itself in Romania, and 2012–2019 was the period of economic recovery (2020 being the start of the COVID-19 pandemic). Data were provided by the National Institute of Statistics. The software used was Philcarto.

The selected indicators relied on the methodologies developed by several research papers, reports and studies (Fererra 2005; Anania and Tenuta 2006; Filó 2008; Prezioso 2008; Marlier and Atkinson 2010; Dao *et al*. 2011; Copeland and Daly 2012; ESPON KITCASP 2012; Abrahams 2014; Ministry of Regional Development and Public Administration 2014; Medeiros 2016; Muller *et al*. 2017; Annoni *et al.* 2017; Schwab 2019; Abreu *et al*. 2019).

The Hierarchical Ascending Classification (HAC) is used as a data mining technique. This technique groups spatial units (in this case, communes and municipalities) according to similarities in terms of variables values, providing information on their typology. By using the HAC, we have grouped variables into classes referring to the variable mean and using standard deviation. The HAC has provided us with detailed information on the profile of territorial units (communes or municipalities) by using the data for 2008 and the functional links between territorial units when using the data on the evolution of the structures over the 2009–2011 and 2012–2019 time span (Bruynooghe 1977; Benzécri 1982; Şerban and Tălângă 2015; Mitrică *et al*. 2016, 2017, 2020).

Data analysis entails the following steps:

(i) calculating the standard deviation (what the square root of the variance is) in order to estimate the variance for each variable (demography, labour market and educational);
(ii) we used isolated variables, not integrated into an index, in order to not distort the results obtained (the weight of each index variable varies in our reference years 2008, 2011, 2012, and 2019). Furthermore, it is easier to track how each variable behaves;
(iii) the analysis was first made in 2008, the values of the variables being used as a benchmark in the following steps, when we analysed the evolution of variables between 2009 and 2011 and between 2012 and 2019. Simultaneously, we compared the evolution of the demography and the labour market in order to extract information on economic resilience.

There are studies that, for a complete assessment of resilience, used several resilience indicators grouped together in a 'resilience index' (Suarez *et al*. 2016) or in a

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'composite resilience indicator' (Jülich 2017). In such cases, questions of incommensurability are raised, two or more values cannot be expressed or measured on a common scale or in terms of a common measure of value (Cutter *et al.* 2012). Different indicators of resilience often represent quite different aspects of what it means to be resilient. Developing a global index for resilience would mean combining items from several incomparable categories into one global scale. When the elements of resilience are measured separately there is no problem, but the measurement of resilience becomes difficult to perform once we try to combine the elements into one general index, since that would imply that a lower score on an element could be compensated by a higher score on another element (Copeland *et al.* 2020). In the current case, it does not make sense to compensate a low score for the unemployed with a high score for, for example, vocational school graduates, because the two items are non-fungible.

Limitations

There is no definition of resilience from the perspective of economic sciences. As a result, there is no uniform methodology for measuring resilience at the local or regional level. There are, however, some common points in the previous approaches: the use of variables from a relatively narrow set (employment, unemployed population, degree of urbanization, GDP, sectoral composition) and the analysis of the relationships between them. A limitation is the availability of statistical data at the spatial level where the analysis is performed. For example, there are no available data on GDP at the commune and municipality level in Romania, the data on the sectoral composition at this spatial level are only available for censuses (2002, 2011, 2021), making it impossible to carry out analyses for the period of the economic crisis and post-crisis.

Results

What is it that makes a local economy more or less resilient? We took into account the local economies' processes, the analysis of the evolution of the chosen variables providing us with information about how population, firms and the Government acted to cope with the changes in business environment.

In 2008, the year before the economic crisis, 1.881 million people lived in the Centre Development Region aged between 15 and 64 years (the economically active population). Two thirds (64%) of the economically active population were located in cities. The urbanization degree of the region was approximately 60% that year. The labour market was represented by 633,000 employees, highly concentrated in the urban areas (86% of the number of employees). Instead, the 110,000 unemployed were evenly distributed between the two areas of domicile. The net settling of domicile was –1000 for the entire region (–6300 for urban areas and 5300 for rural areas). The attractiveness of cities proved to be inversely proportional to the

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demographic size, while rural areas proved more attractive than many small cities and towns for people to settle their domicile. Small cities played the role of growth poles for local development, hoping for an increased importance of these cities in the Romanian urban area (Ianoş 1987; Filimon *et al*. 2012). There were also exceptions for rural areas (more than 100 communes lost over 1000 of the net settling of domicile while small cities and towns such as Săcele, Sebeş, Avrig, Râşnov, Teiuş, Ghimbav, Sălişte, Ungheni, Miercurea Sibiului, Ocna Sibiului, Tălmaciu, Cisnadie, and Predeal totalled almost 1000 of the net settling of domicile. Most cities were located near big cities such as Sibiu and Braşov. Sibiu was the only big city that registered a slightly positive migration. The number of high-school and vocational school graduates was 27,000 (26,000 graduates in urban areas and 1000 graduates in rural areas).

By examining the map we notice that administrative units (cities) with a large number of economically active populations were included in classes 1, 2, 4, 5, 6, 7, 10, 11. Of these, only Sibiu, included in the category of large cities (over 100,000 inhabitants), and two other cities (Săcele and Sebeş) included in the category of small cities (under 50,000 inhabitants), had a positive net settling of domicile. In addition, a migration of the population from these cities to the small cities and communes near the big cities was observed. The numbers of employees, unemployed population, high school and vocational school graduates were distributed quite similar to that of the economically active population (Figure 2).

In 2011, when the economic crisis ended, the numbers showed the following: the economically active population counted 1.869 million (1,180,000 in urban areas and 689,000 in rural areas), the net settling of domicile was –1500 (–5000 for urban areas and 3500 for rural areas), 546,000 people were employed (461,000 in urban areas and 85,000 in rural areas), 65,000 people were unemployed (26,000 from urban areas and 39,000 from rural areas), 23,000 were high-school and vocational school graduates (21,500 graduates in urban areas and 1500 in rural areas).

The administrative units (cities) with a large number of economically active populations registered changes regarding the distribution by classes being included in classes 1, 2, 4, 5, 6, 9, 10, 11, 12. All the cities had a negative net settling of domicile (except for Alba Iulia with a slight positive balance). The population chose to establish domiciles near the big cities. The numbers of employees, unemployed population, high school and vocational school graduates were distributed quite similar to that of the economically active population, excluding small cities for the employed and unemployed population (classes 9, 10), and medium and small cities for high school and vocational school graduates (classes 5, 9, 10) (Figure 3).

Therefore, during the crisis period (2009–2011), the economically active population dropped by 12,000 (–22,500 people in urban areas and 10,500 in rural areas), and internal migration increased totalling –4000. The number of the unemployed decreased by 46,000 of people (–30,000 people in urban areas and –15,000 people in rural areas), while the number of the employed fell by 86,000 (–81,000 employees from urban areas and –5000 employees from rural areas). High-school and vocational school graduates decreased by 4000. Between 2009–2011, the

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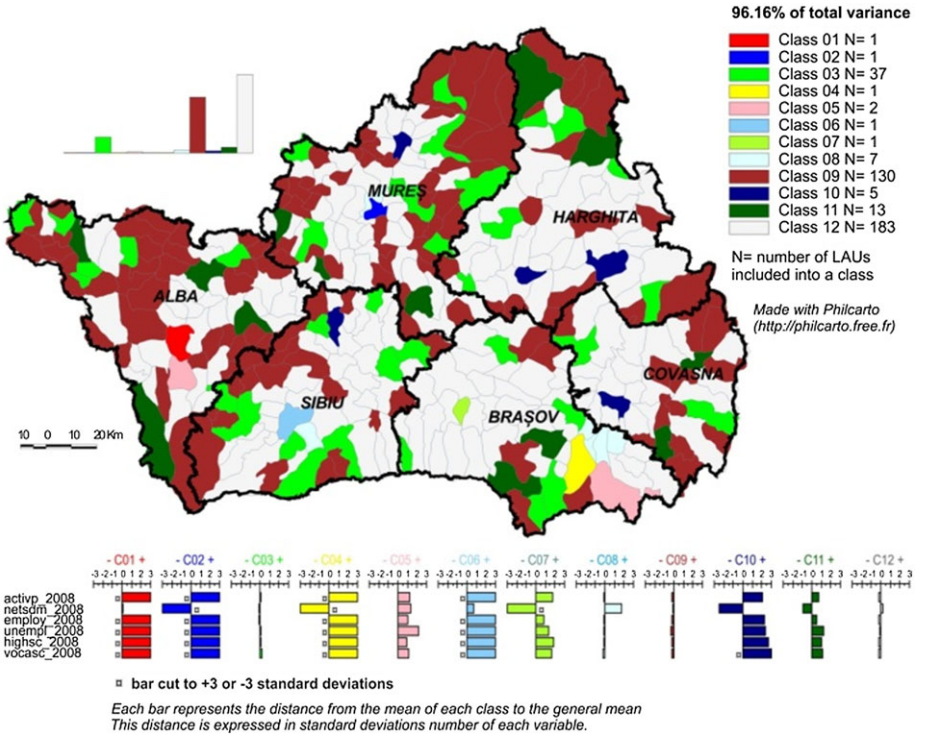

Figure 2. Types of localities using selected indicators and the average class profile, 2008.

Class 1 – City with very large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was little (average of the region) (Alba Iulia).

Class 2 – City with very large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was high negative (Târgu Mureş).

Class 3 – Small cities and big communes with average economically active population, net settling of domicile, employees, unemployed population, high school and vocational school graduates.

Class 4 – City with very large economically active population, employees, unemployed population and high school and vocational school graduates; net settling of domicile was high negative (Braşov)

Class 5 – Cities with a large economically active population, net settling of domicile, employees, unemployed population, high school and vocational school graduates (Sebeş, Săcele).

Class 6 – City with very large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was positive (slightly above region' average) (Sibiu).

Class 7 – City with a large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was high negative (Făgăraş).

Class 8 – Small cities and big communes with average economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was positive.

Class 9 – Communes with below average economically active population, net settling of domicile, employees, unemployed population, high school and vocational school graduates.

Class 10 – Cities with a large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was high negative (Reghin, Mediaş, Miercurea Ciuc, Odorheiu Secuiesc, Sfântu Gheorghe).

Class 11 – Cities with a large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was negative (Zărneşti, Codlea, Cugir, Câmpeni, Aiud, Luduş, Topliţa, Gheorgheni, Târgu Secuiesc, Întorsura Buzăului).

Class 12 – Communes with below average economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was positive (slightly above region' average).

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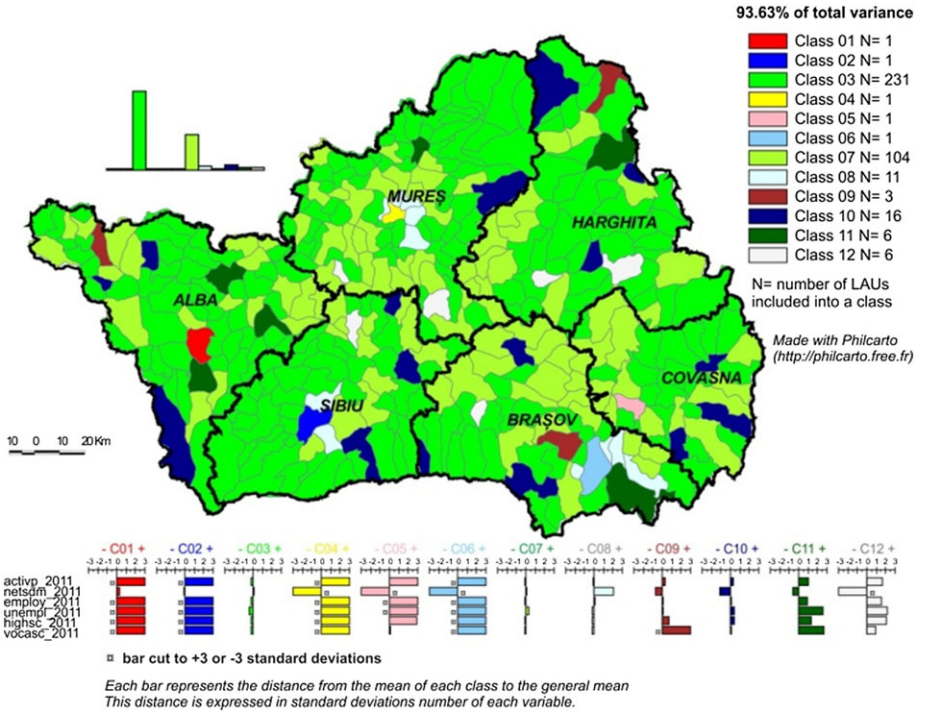

Figure 3. Types of localities using selected indicators and the average class profile, 2011.

Class 1 – City with very large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was little (average of the region) (Alba Iulia).

Class 2 – City with very large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was little (average of the region) (Sibiu).

Class 3 – Communes with average economically active population, net settling of domicile, employees, high school and vocational school graduates; unemployed population was little (slightly below region' average).

Class 4 – City with very large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was high negative (Târgu Mureş).

Class 5 – City with very large economically active population, employees, unemployed population, high school graduates; net settling of domicile was high negative; vocational school graduates was little (Sfântu Gheorghe).

Class 6 – City with very large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was high negative (Braşov).

Class 7 – Communes with average economically active population, net settling of domicile, employees, high school and vocational school graduates; unemployed population was little (slightly above region' average).

Class 8 – Big communes with average economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was positive.

Class 9 – Cities with small economically active population, employees, unemployed population, high school graduates; net settling of domicile was little (below region's average); vocational school graduates was high (Codlea, Câmpeni).

Class 10 – Cities with a small economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was negative (Zărneşti, Rupea, Victoria, Cugir, Avrig, Agnita, Dumbrăveni, Abrud, Baia de Arieş, Sovata, Topliţa, Vlăhiţa, Bălan, Covasna, Târgu Secuiesc, Întorsura Buzăului).

Class 11 – Cities with a large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was negative (Zărneşti, Codlea, Cugir, Câmpeni, Aiud, Luduş, Topliţa, Gheorgheni, Târgu Secuiesc, Întorsura Buzăului).

Class 12 – Cities with a large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was strong negative (Miercurea Ciuc, Odorheiu Secuiesc, Sighişoara, Mediaş, Făgăraş, Târnăveni).

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change in net settling of domicile was positive in rural areas (approx. 10,000) and negative in urban areas (–14,000), which means that rural areas attracted people from urban areas. During the economic crisis (2009–2011), cities proved less attractive for living than rural areas. In areas where there was a large economically active population, the number of both the employed and the unemployed population was high, as was the number of pre-university graduates.

The economic crisis was felt most in big cities (county seat) and medium-sized cities. These municipalities were included in classes 1, 3, 4, 5, 7, 10, 11. Compared with the total number of employees, in the period 2009–2011 the cities listed above lost 10–20% of their workforce. The exception was made by Sibiu, which lost only 7%. In these cities, the economically active population also decreased proportionally with employees, part of the unemployed population migrating to rural areas. Sibiu and Alba Iulia were exceptions, attracting population and registering a minor decrease (Sibiu) or even an increase (Alba Iulia) of the economically active population. Along with the employees, the number of the unemployed also decreased here. High school and vocational school graduates decreased, in general, in these cities. The economically active population has increased in some small cities and in the communes near the big cities based on a positive net settling of domicile (Figure 4).

In 2019 the numbers showed the following: the economically active population counted 1.792 million (1.086 million people in urban areas and 706,000 people in rural areas), the net settling of domicile was 1000 (–2000 in urban areas and 3000 in rural areas), 659,000 people were employed (546,000 employees in urban areas and 113,000 employees in rural areas), 28,000 people were unemployed (8000 people in urban areas and 20,000 people in rural areas), 19,000 were high-school and vocational school graduates (18,000 in urban areas and 1000 in rural areas).

Before the start of the Covid-19 pandemic, the picture looked like this: large and medium-sized cities had increases in the number of employees, the number of unemployed and the economically active population. These municipalities fit into the classes 1, 2, 5, 6, 11.

With the exception of classes 1 and 6 (Alba Iulia and Brasov), the population chose to leave these cities and settle in communes and small towns in Brasov and Sibiu counties (classes 3 and 4). In some communes unemployment was high (classes 8, 9). High school and vocational school graduates were in large numbers in the cities (Figure 5).

After the crisis (2012–2019), the economically active population continued to decrease (–77,000) (–94,000 people in urban areas and +17,000 people in rural areas). The population exodus from the region dropped, but the migratory flows increased between the two places of domicile (but the period which we refer to was more extensive compared with the crisis period). Thus, in the urban areas, the net settling of domicile was negative (–28,000) and in rural areas the net settling of domicile was positive (27,000). The economic growth of this period was found in the expansion of the economic activity of the firms and, implicitly, the increase in the number of employees (113,000 people) (85,000 people in urban areas and 28,000

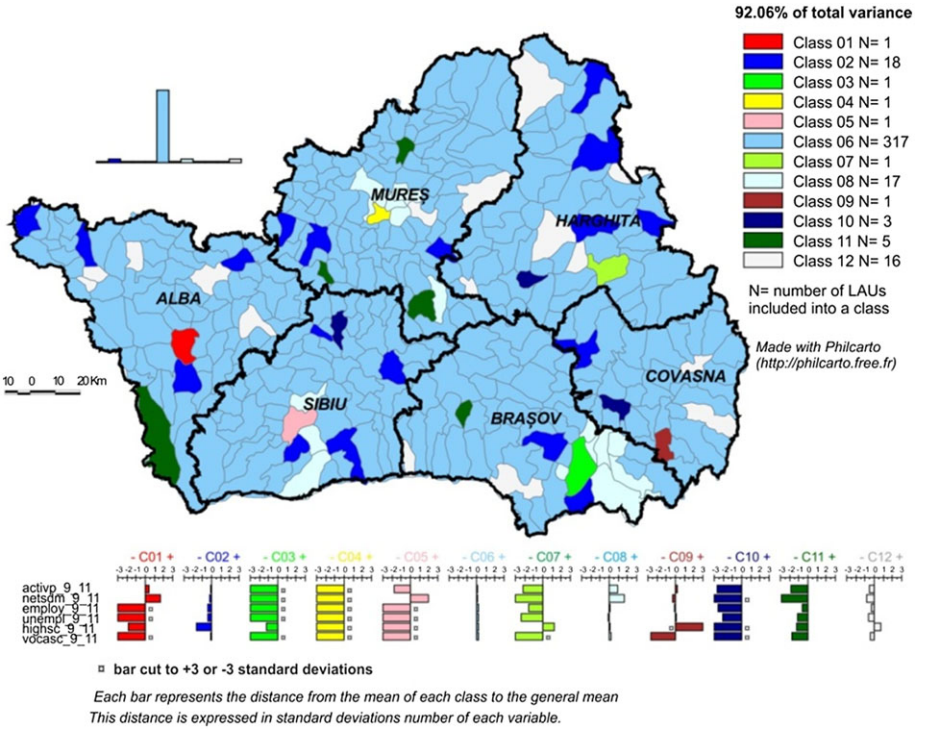

Figure 4. Types of localities using selected indicators and the average class profile for 2009–2011.

Class 1 – City with positive evolution of economically active population and net settling of domicile and negative evolution of employees, unemployed population, high school and vocational school graduates (Alba Iulia).

Class 2 – Cities with slightly positive/negative evolution of economically active population and negative evolution of net settling of domicile, employees, unemployed population, high school and vocational school graduates (Sebeș, Câmpeni, Ocna Mureș, Luduș, Iernut, Sângeorgiu de Pădure, Odorheiu Secuiesc, Gheorgheni, Miercurea Ciuc, Baraolt, Codlea, Predeal, Avrig, Mediaș, Copșa Mică, Agnita.

Class 3 – City with high negative evolution of economically active population, net settling of domicile, employees, unemployed population and vocational school graduates; negative evolution of high school graduates (Brașov).

Class 4 – City with high negative evolution of economically active population, net settling of domicile, employees, unemployed population, high school and vocational school graduates (Târgu Mureș).

Class 5 – City with negative evolution of economically active population; positive evolution of net settling of domicile; high negative evolution of employees, unemployed population, high school and vocational school graduates (Sibiu).

Class 6 – Communes with average evolution of economically active population, net settling of domicile, employees, unemployed population, high school and vocational school graduates.

Class 7 – City with negative evolution of economically active population, net settling of domicile, employees, unemployed population; high negative evolution of vocational school graduates; positive evolution of high school graduates (Miercurea Ciuc).

Class 8 – Towns and big communes with positive evolution of economically active population and net settling of domicile and average evolution of employees, unemployed population, high school and vocational school graduates.

Class 9 – City with average evolution of economically active population, net settling of domicile, employees, unemployed population; positive evolution of high school graduates; negative evolution of and vocational school graduates (Întorsura Buzăului).

Class 10 – Cities and communes with high negative evolution of net settling of domicile, employees, unemployed population; negative evolution of economically active population, high school and vocational school graduates.

Class 11 – Cities with negative evolution of economically active population, net settling of domicile, employees, unemployed population, high school and vocational school graduates (Cugir, Reghin, Sighișoara, Târnăveni, Făgăraș).

Class 12 – Communes with negative evolution of economically active population, net settling of domicile, employees, unemployed population and vocational school graduates; positive evolution of high school graduates.

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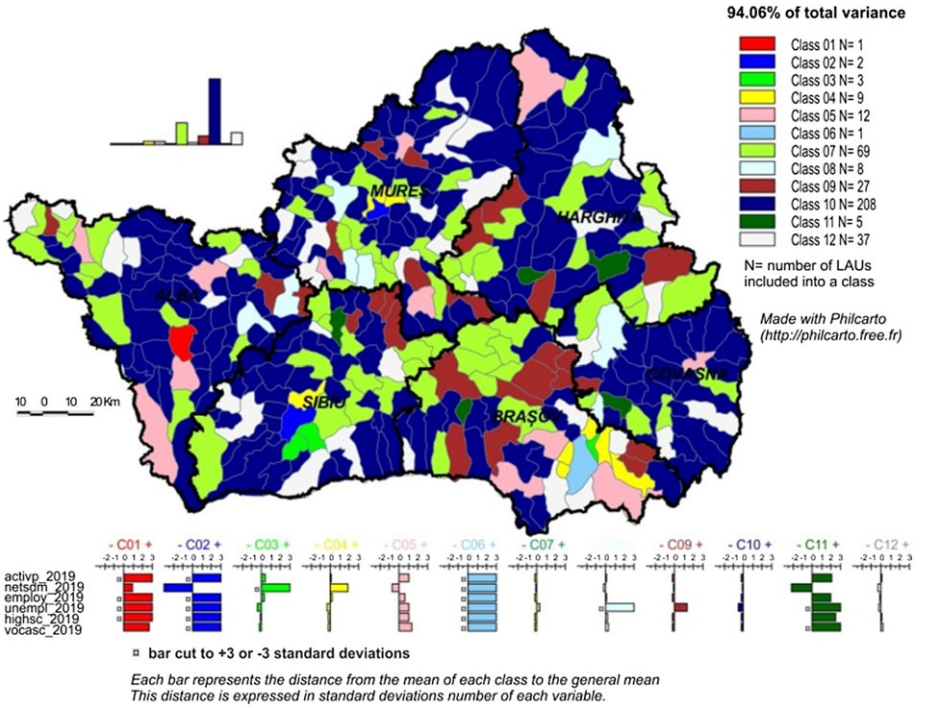

Figure 5. Types of localities using selected indicators and the 2019 average class profile.

Class 1 – City with very large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was little (average of the region) (Alba Iulia).

Class 2 – City with very large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was negative (Sibiu, Târgu Mureş).

Class 3 – Communes and a town with average economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was high positive (Cisnădie, Şelimbăr, Sânpetru).

Class 4 – Communes and a town with average economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was positive (Ghimbav, Cristian, Târlungeni, Bod, Hărman).

Class 5 – Cities with large economically active population, employees, unemployed population, high school and vocational school graduates; net settling of domicile was negative (Săcele, Zărneşti, Codlea, Cugir, Sebeş, Câmpeni, Aiud, Sighişoara, Târnăveni, Reghin, Topliţa, Târgu Secuiesc).

Class 6 – City with very large economically active population, net settling of domicile, employees, unemployed population, high school and vocational school graduates (Braşov).

Class 7 – Communes with average economically active population, net settling of domicile, employees, high school and vocational school graduates; unemployed population was little (slightly above region's average).

Class 8 – Communes with average economically active population, net settling of domicile, employees, high school and vocational school graduates; unemployed population was very high.

Class 9 – Communes with average economically active population, net settling of domicile, employees, high school and vocational school graduates; unemployed population was high.

Class 10 – Communes with average economically active population, net settling of domicile, employees, high school and vocational school graduates; unemployed population was low.

Class 11 – Cities with a large economically active population, employees, high school graduates; very large unemployed population, vocational school graduates; net settling of domicile was strong negative (Miercurea Ciuc, Odorheiu Secuiesc, Sfântu Gheorghe, Mediaş, Făgăraş).

Class 12 – Communes with average economically active population, net settling of domicile, employees, unemployed population, high school and vocational school graduates.

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people in rural areas). Simultaneously, the number of unemployed decreased by 36,000 (18,000 people in urban areas and 18,000 people in rural areas). The number of high school and vocational school graduates decreased by 3000 but the amount is made up of a decrease in the number of high school graduates (–5500) and an increase in the number of vocational school graduates (2500).

Large and medium-sized cities recovered the labour force lost during the economic crisis, even if the economically active population was decreasing. These municipalities were included in classes 1, 3, 4, 7, 8, 12. Compared with the total number of employees, in the period 2012–2019 the cities listed above gained 10–30% of their workforce. The exception was made by Făgăraş, Reghin, Sighişoara, Săcele, Zărneşti medium-sized cities which lost 3–20% of employees (classes 6 and 10). Apart from these cities, we also mention the small cities Ocna Mureş, Agnita, Sovata, Victoria, Iernut, Copşa Mică, Sângeorgiu de Pădure that have lost 5–36% of employees (class 11) (Figure 6).

In these cities, the economically active population decreased due to the population migrating to rural areas. Alba Iulia was the exception, attracting population. Along with the employees, the number of the unemployed also decreased here. High school graduates decreased and vocational school graduates increased in these cities. Nevertheless, the economically active population has increased in some small cities and in the communes near the big cities based on a positive net settling of domicile classes 2 and 5) (Figure 6).

Discussion

Economic resilience involves non-linear evolutions of various characteristics of economies that are interconnected and that most often change over time (Abenayake *et al*. 2016). The population, companies, and public institutions act to prevent and mitigate the negative effects of economic crises using their risk assessment skills, prevention/mitigation and preparation abilities in the pre-shock phases, and absorption, adaptation and transformation abilities in the post-shock phases (Constas *et al*. 2014; IFRC 2016). Resilience is context-specific, place-specific, so not all characteristics of resilience are necessarily of equal importance (Twigg 2009).

A resilient response of a local economy to a shock is provided by individuals (households, workers, firms), aided or driven by government actions and policies (Alessi *et al*. 2020). The difference between the values of the variables before the crisis (2008) and the year in which the economic decline ended can be significantly positive, negative or insignificant.

The economic crisis meant a reduction in the number of employees, especially in large and medium-sized cities, where they were more numerous. Some of the population who lost their jobs chose to migrate in rural areas, as data regarding the net settling of domicile suggested. This hypothesis is supported by the data on unemployment. At the same time, a decrease in the number of unemployed in urban areas was observed simultaneously with an increase in the number of unemployed in

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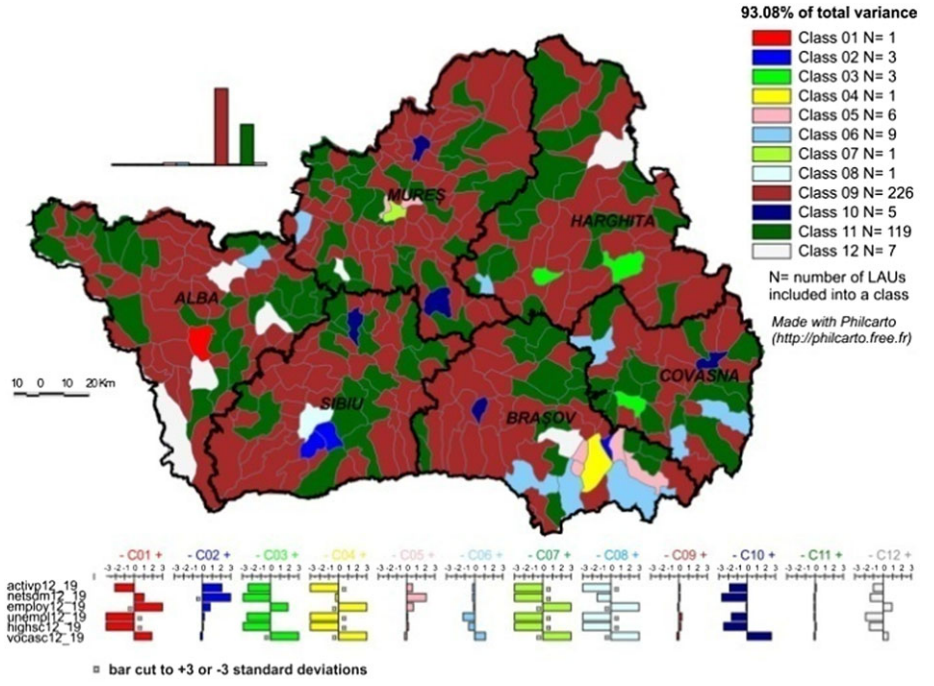

Figure 6. Types of localities using selected indicators and the average class profile for 2012–2019.

Class 1 – City with negative evolution of economically active population, unemployed population, high school graduates; positive evolution of net settling of domicile employees and vocational school graduates (Alba Iulia).

Class 2 – Communes and a town with positive evolution of economically active population and net settling of domicile, employees; average evolution of unemployed population, high school and vocational school graduates (Cisnădie, Şelimbăr, Sânpetru).

Class 3 – Cities with negative evolution of economically active population, net settling of domicile, unemployed population and high school graduates; positive evolution of employees; high positive evolution of vocational school graduates (Miercurea Ciuc, Odorheiul Secuiesc, Sfântu Gheorghe).

Class 4 – City with high negative evolution of economically active population, unemployed population, high school graduates; high positive evolution of employees and vocational school graduates; average evolution of net settling of domicile (Braşov).

Class 5 – Communes with slightly positive evolution of economically active population and employees; positive evolution of net settling of domicile; average evolution of unemployed population, high school and vocational school graduates.

Class 6 – Cities with average evolution of economically active population, net settling of domicile, employees; negative evolution of unemployed population, high school and vocational school graduates (Săcele, Zărneşti, Codlea, Întorsura Buzăului, Covasna, Baraolt, Cristuru Secuiesc, Ludus, Ocna Mureş).

Class 7 – City with high negative evolution of economically active population, net settling of domicile, unemployed population and high school graduates; high positive evolution of employees and vocational school graduates (Târgu Mureş).

Class 8 – City with high negative evolution of economically active population, unemployed population and high school graduates; negative evolution of net settling of domicile; high positive evolution of employees and vocational school graduates (Sibiu).

Class 9 – Communes with average evolution of economically active population, net settling of domicile, employees and high school and vocational school graduates; slightly positive evolution of unemployed population.

Class 10 – Cities with negative evolution of economically active population, net settling of domicile, unemployed population and high school graduates; average evolution of employees; positive evolution of vocational school graduates (Târgu Secuiesc, Făgăraş, Mediaş, Sighişoara, Reghin).

Class 11 – Communes and small cities with average evolution of economically active population, net settling of domicile, employees, unemployed population and high school and vocational school graduates.

Class 12 – Cities with negative evolution of economically active population, net settling of domicile, unemployed population and high school graduates; positive evolution of employees and vocational school graduates (Codlea, Cugir, Blaj, Sebeş, Aiud).

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rural areas. It should be noted that the increase in the number of unemployed in rural areas was much higher than the decrease in the number of employees there. This verifies H_1 – the previous economic crisis (2009–2011) negatively and significantly affected the labour market.

The differences in economic resilience may also occur because of the various risks to which the population and firms were subjected (Şerban and Tălângă 2015). Unemployment is most often associated with migration. Economic decisions expressed in the reduction of the size of businesses are reflected directly on population behaviour. The movement of the population may be an important piece of evidence of the population's instability, or, conversely, increased stability, as it depends on the type of migration (Adger, 2000).

Examining data on net settling of domicile (domicile – the place indicated on one's identity card), no significant changes in the trend were observed. The negative values of this variable recorded before the economic crisis were maintained at similar levels during the crisis. However, if we check the data on changes of residence (the place where a person actually lives) we observe major differences between the period before the crisis and the period of the economic crisis. Net settling of residence was positive and increased for the three big cities of the region (Braşov, Sibiu and Târgu Mureş). H_2 – the previous economic crisis (2009–2011) significantly affected population behaviour – was verified. Here we mention that the laid-off population from urban areas did not migrate to rural areas. Only people who did not find a job in a big city preferred to migrate to the villages. The rural exodus was partial. The people who found a job in the big cities only changed their residence, not their domicile.

Local economies struggle in the long term to support a path of development that in times of crisis proves to be difficult to follow. Pendall *et al.* (2010) distinguish between 'slow burns' and shocks. Regions where economic conditions have gradually deteriorated, necessitating transformation and restructuring, are classified as undergoing a slow burn. When sudden, disruptive events occur, economies face shocks. In the opinion of Martin *et al.* (2016) economic recessions have in common the contraction of the economy, the closing of firms and the loss of jobs. The differences are given by the intensity of the shock. A severe economic shock imposes on the regions a new path of economic development compared with the path before the shock. Sensier *et al.* (2016) claim that regional economic resilience offers local economies opportunities to identify their abilities to face economic shocks, a fact that will influence their future development path. The economic peculiarities at the local level influence the ability to adapt in case of economic crises (Giacometti and Teräs 2019). The existence of a single large company represents a major risk for the region that hosts it compared with a cluster of small or medium-sized companies. Economic crises represent a challenge for companies, and resilience does not mean the survival of all companies after a shock, but rather the ability of the local economy to adapt to new conditions (Sensier *et al.* 2016).

Adaptive resilience describes the population's ability to adapt, learn and reorganize in response to certain shocks. Behavioural psychology sees resilience as the ability of individuals to maintain or regain the well-being lost as a result of

personal stress, trauma or any other crisis (Masten *et al*. 1990; O'Dougherty Wright *et al*. 2013). Adaptive resilience involves structural/operational adjustment in response to shocks and also allows the system to evolve into a new developmental path (Folke *et al*. 2010; Simmie and Martin 2010; Davoudi 2012; Martin and Sunley 2015).

The recovery of local economies after a shock or disturbance can be achieved either by 'bouncing back' or by 'jumping forward'. Bouncing back refers to the return to the pre-shock position in terms of economic parameters, in this case the number of employees. Jumping forward entails a new state of equilibrium, a break with the old path of development by having the economic parameters reach different values. Depending on the amplitude of the shock, local economies can evolve in two ways: absorbing the negative effects without changing their economic profile (and returning to business as usual) or by modifying, transitioning to another economic profile (Bonß 2016; Muštra *et al*. 2016). In the latter scenario, change means the elimination of non-productive activities and opportunities for the emergence of new economic activities that will reinvigorate economic development. Martin *et al.* (2016) consider regional economic resilience as the ability of companies, industries, workers in the region to primarily withstand shocks, and, second, to undertake adjustments to boost economic performance, including employment. Dagdeviren and Donoghue (2018) consider that the response to the economic crisis depends on the time frame we refer to: absorptive, when people make short-term efforts to cope with the shock of the sudden deterioration of their circumstances, often with negative consequences for their well-being; adaptive, when people adopt strategies to protect and stabilize their well-being in the medium or long term; and transformative, when people change their lives in a way that makes them better and less vulnerable in the long term.

The economic recovery from the post-crisis period was fast. The number of employees in the Centre Development Region not only recovered but also increased during the period 2012–2019. The biggest winners in terms of the number of employees were large and medium-sized cities. Therefore, the trend of economic evolution was resumed in the period that followed the economic crisis and from this point of view we can observe the economic resilience of the firms and the population that kept the economic functionality of the region, relaunching the economy on the structure preceding the economic crisis. The negative effects of crisis were absorbed without changing the economic profile. Thus, H_3 – the economic evolution in the post-crisis period (2012–2019) positively and significantly affected the labour market – was verified.

Net settling of domicile continued to be negative in urban areas and positive in rural areas, but the intensity of migration was reduced during the period 2012–2019 (the number of changes of domicile was reduced to one third). The trend of changes of residence continued (slightly diminished), the population migrating towards large and medium-sized cities. As the economic recovery took place, population migration decreased significantly, so H_4 – the economic evolution in the post-crisis period (2012–2019) significantly affected population behaviour – was verified.

Cyrulnik (2004) painted a portrait of a resilient person, regardless of age or sex, as having: a high IQ, the capacity for autonomy and effectiveness in relation to the

environment, a feeling of self-worth, relational adaptability and empathy, the ability to anticipate and plan, a sense of humour. He refers to personal anticipating and planning, and not related to the whole system.

The presence of high school and vocational school graduates represented vulnerabilities in the adaptation to the adverse entrepreneurial environment. In a time when the labour market was shrinking, such as during the economic crisis, it was very difficult to find a job for the new graduates (who had no experience). Moreover, graduates who did not have a higher education, but only secondary school education, were just trying to become integrated in an increasingly competitive labour market (Şerban *et al.* 2015). During the economic crisis, young adults were disproportionately negatively affected by rising unemployment rates and precarious forms of work (Aassve *et al.* 2013; Bell and Blanchflower 2011; Connidis 2014; Crosnoe 2014; Mortimer 2014; Whelan *et al.* 2017), leading to the deterioration of their standard of living.

The period of economic crisis meant an opportunity to restructure the education system in Romania. In order to meet the needs of the labour market for certain professions, some of the high schools were transformed into vocational schools. H_5 – the economic evolution in the post-crisis period (2012–2019) significantly affected schools' purposefulness – was verified. There is still a problem, both at the national level and at the Centre Development Region level: the decrease in the birth rate and, consequently, the decrease in the number of secondary (and university) graduates.

Conclusions

The development path from the period that preceded the economic crisis is considered the reference point for the analysis of economic resilience (the impact of the shock from the crisis period and the transition to a new development path right after the economic crisis). Thus, our analysis includes the defining elements mentioned by Martin and Sunley (2020) to describe economic resilience: risk (the vulnerability of firms and employees in local economies), shock (the nature of the disturbance), resistance (the initial impact of the shock on local economies), adaptability (how companies, employees and public institutions, including external ones, acted to reorient themselves) and recovery (the nature and extent to which local economies recovered with reference to the new development path).

Analysing the evolution of the number of employees in local economies by comparing the data from the three periods (pre-crisis, crisis and post-crisis), we extract information regarding economic resilience and the extent of the shock. On the other hand, population migration provides information about its ability to adapt in order to maintain a high standard of living. By using demographic, labour market and educational variables separately, not integrated into an index, we have analysed their individual evolution and have easily observed the connections between them. The government played an important role through the policies implemented at the level of the business environment as well as through the decision to reduce the

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number of employees in the public sector, with significant consequences on the labour market. By means of the HAC approach we have established the connections between the variables based on the way they are spatially grouped and how they have evolved. In the case of some rural areas, the population saw them as more attractive, as the migration with domicile was positive. Some urban population left the cities during the economic crisis. Even some smaller cities were not attractive. Despite the fact that the number of employees was in decline, this was not reflected as an increase in the unemployed population. On the contrary, the unemployed population decreased during the crisis. The migration with domicile from urban areas to the rural areas was associated with the decrease in the number of employees and the unemployed in urban areas (big and medium-sized cities) simultaneously with an increase of unemployed population in rural areas. This meant a change in the way of life of some people. The unemployed preferred to move their domicile from urban areas to peri-urban areas, commuting to the cities. At the same time, there were people who moved their residence from small cities to big and medium-sized cities. This explains the increase in the net settling of residents in big and medium-sized cities during the economic crisis. The economic recovery after the crisis was fast, the number of employees exceeding in 2019 the number of employees in 2008. This means that the economic structure and functionality of the region was not affected (high economic resilience).

The results obtained must, however, be discussed from the perspective of the particularities of certain cities, especially big and medium-sized cities. Given the limited number of classes (12) that the software offers us as output, there are certain aspects that we will specify below. In the case of global economic crises (as was the case of the 2009–2011 crisis), small communities cannot do anything to avoid them being triggered, the only actions being the adaptation and reduction of the negative effects at the level of each affected individual. Each individual made decisions separately (or at family level), without cooperating with people in the community to stay on or return to the labour market. Giddens (1984) believed that people are intentional agents, capable of reflexively evaluating their actions. Action implies some form of human capacity to 'make a difference' in the flow of social life. Resilience is the effect of actions, chosen from a multitude of possibilities available to individuals or groups (families) at a given moment in time, while allowing a certain degree of dynamism in how resilience develops (Revilla *et al.* 2018). Even if the statistical data are available at the individual level, we believe that the minimum unit of resilience analysis ought to be the family, since it is the key social group and the basic core of interpersonal solidarity on which any attempts to progress and survive are based. The family configures itself as an essential source of support and care to overcome problems, and acts as a safe haven in troubled times (Revilla *et al.* 2018).

This outlook changes the way policymakers act, by focusing their attention on the links between the demographic and labour market variables (not just on one type of variable at a time without taking into account the connection between them) in order to direct financial resources towards an increase in economic resilience. Thus, the economy would recover faster by relaunching consumption. During the economic

crisis, when layoffs occur, people should be helped to increase their resilience through counselling, so as to increase the feeling of self-worth and foster greater relational adaptability and, last but not least, to develop the ability to anticipate and plan, which takes time to master. To anticipate means to predict something which could happen, such as a potential hazard, and to plan the means to take appropriate action before the situation has occurred. Resilience should be facilitated through wealth redistribution and strong social welfare policies. The World Bank roots resilience to poverty in 'the rural poor' who bear the burden of developing resilience through enterprising activity (World Resources Report 2008).

In conclusion, the study provides solid evidence of the impact of the economic crisis on the labour market and the behaviour of the population (migration). The findings can be valuable for researchers to understand the interconnected nature of firms' decisions on the labour market, economic development and changes in the way of living of the population (domicile migration/residence) in the context of cyclical shocks on regional economies. These can also serve as valuable guidelines for decision-makers in developing strategies that reduce the effects of economic crises.

Acknowledgements

The current study was carried out within the framework of a project entitled 'Regional geographical studies in view of sustainable development and trans-sectoral cooperation', as part of the Research Plan of the Institute of Geography.

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