

Two faces of peripherality: labour markets, poverty, and population dynamics in Hungary and Czechia*

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This study investigates socioeconomic peripherality in Hungary and Czechia. Despite the current attention devoted to peripheries in post-communist societies, the authors argue that there is a lack of data-driven international comparisons of the socio-spatial outcomes of peripheralisation processes. In the study, the situations in Hungary and Czechia are compared to assess the validity of peripheralisation as a mutually reinforcing economic, social and demographic decline specifically affecting rural areas. First, the concentration of social problems such as unemployment and poverty is examined in economically weak rural areas. Second, the role of transport accessibility and remoteness is analysed. Third, the links between socioeconomic peripheralisation and population development are explored. The results indicate basic structural similarities in the development of peripherality in Czechia and Hungary; however, the Hungarian case corresponds much more than the Czech case to the concept of peripheralisation defined as interrelated processes of economic problems, the accumulation of poverty and social exclusion, and population shrinkage that especially affect remote rural localities. The authors conclude by discussing the role of historically shaped settlement structures, current population compositions, and overall development at the country level.

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Introduction

Increasing spatial inequalities following the regime change have led an enhanced focus on peripheries in Central and Eastern Europe. Regional peripheralisation can be understood in terms of the cumulative processes of economic decline, deteriorating living conditions, the concentration of social problems and demographic shrinkage, accompanied by a loss of political capabilities and stigmatisation (Kühn 2015, Steinführer et al. 2016). These processes operate at different spatial scales (Šimon 2017), affecting not only large regions (Gorzelač et al. 1995), but also contributing to socioeconomic polarisation between small spatial units. In many cases, peripheralisation processes particularly affect rural areas (Turnock 1996).

The debate on peripheralisation and its social consequences has been especially stimulated by German geography and sociology describing the problems eastern Germany has faced since the 1990s. The former East Germany's transformation resulted in a long-term high unemployment rate, poverty, and social exclusion, as well as a strong out-migration to the western part of the newly unified state. This age-selective migration has led to a significant imbalance in the social structure and accelerated population ageing. Specifically, younger, more educated people has left the eastern part of the country, with more women leaving than men (Leibert 2016). Rural areas were particularly affected by the combination of socioeconomic disadvantage and demographic shrinkage; collectively, these processes have created a downward spiral of decline. Similar tendencies have been recognised in other post-socialist Central European countries too; however, the dynamics and outcomes of peripheralisation markedly differ across countries and regions (Banski 2005, Bihari-Kovács 2005, Musil-Müller 2008, Péntzes 2013a).

Despite the attention devoted to this issue, there is a lack of truly comparative studies to assess the similarities and differences of peripheralisation in individual countries. Such comparative studies could not only investigate whether the socio-spatial manifestations of peripheralisation can be generalised, but also identify the limits of such generalisations. In this study, we comparatively analyse the spatial patterns of socioeconomic disadvantage and population dynamics in two Central European countries: Czechia and Hungary. We also aim to examine comparatively two basic elements of the peripheralisation thesis as formulated in the German milieu. First, we analyse the extent to which such social problems as unemployment and poverty are concentrated in economically lagging rural areas. Second, we explore whether peripheralisation's socioeconomic outcomes are indeed accompanied by a population decrease, thus creating a vicious circle of decline. We also detail the relationship between disadvantage on one side and settlement structure and transport accessibility on the other. We demonstrate that the situations in Czechia and Hungary differ despite basic structural similarities, and we discuss the causes of these differences.

The article is structured as follows. First, we briefly review the research on peripheralisation in Central Europe. We define the territory of Central Europe to include the Visegrád countries – Czechia, Slovakia, Poland, and Hungary – and the former East Germany. These countries have all experienced the post-socialist transition, in terms of an interrelation of delayed post-industrial transformations with a specific, post-totalitarian political change (Hampl 2007). Second, we investigate and compare the spatial patterns of poverty and social exclusion indicators on the one hand, and economically lagging rural areas in Czechia and Hungary on the other. Third, we analyse peripherality through the perspectives of settlement structure, transport accessibility and demographic change. The article concludes by discussing the similarities and differences in patterns of social disadvantage and peripherality.

Peripheralisation in Central Europe

Research on peripheries and the peripheralisation process reveals an ambiguity of definitions, hindering the comparability of research results across countries. These differences stem not only from the conceptualisation of peripherality, but also from the spatial scale on which peripheries are explored. Generally, peripheries' emergence and persistence are part of a more general spatial polarisation process. A comparison can be drawn between successful and growing metropolitan areas as development cores, and peripheries in terms of declining regions in a dependent position, or with deteriorating economic and social conditions. Scientific studies place different emphases on the individual facets of this process, thus using different approaches to delimit peripheries. They either emphasise the geometric aspect of peripherality as it relates to poor accessibility (Novotný et al. 2015), or its relational nature. Peripheries are too loosely related to centres providing jobs (Sýkora–Mulíček 2009), or largely depend on them and face potential discrimination from the centre (Nolte 1991). Other contributions highlight the challenging economic situation and potential for economic development (Leibert 2013), or peripheries' social conditions and exclusionary effects on the population (Bihari–Kovács 2005, Musil–Müller 2008).

Recently, an academic debate has emerged regarding the dynamic aspects of the peripheralisation process, predominantly in German geography and sociology (Barlösius–Neu 2008, Keim 2006, Kühn 2015, Leibert–Golinski 2016). This approach strongly reflects on the former East Germany's territorial transformation, which had resulted in job loss, unemployment, and out-migration to western Germany. Rural areas were more severely affected by peripheralisation than cities (Steinführer et al. 2016). Against this empirical background, peripheralisation has been repeatedly conceptualised as a complex process, consisting of mutually reinforcing economic, social, and demographic factors resulting in a territory's decline (Keim 2006). All

three factors are essential in the peripheralisation process, but simultaneously reinforce each other. The decoupling of regions from the prevalent economic dynamics of prosperous urban agglomerations results in constrained labour markets in rural areas. Thus, challenges include the access to employment and limited employment choices particularly in rural regions. A vulnerable labour market is accompanied by unemployment, poverty, and social deprivation, contributing to local communities' deterioration. Out-migration and decreasing population can further reduce regions' economic potential and human capital, and can complicate the provision of public and private infrastructure and services. Consequently, a vicious circle of regional decline emerges to further consolidate the peripheries' structural deficits (Barlösius–Neu 2008) and downgrade one region relative to others (Kühn 2015). Although conceptualising the cumulative processes of regional decline theoretically relies on classical polarisation theories (Myrdal 1957), it also more strongly emphasises the quality of living conditions, wealth, demographics, and political interdependencies. Similar complex, vicious circles of regional decline have also been proposed in Czechia and Hungary to explain peripheralisation and the reproduction of core-periphery relations (Bihari–Kovács 2005, Musil–Müller 2008, Nagy et al. 2015b, Ouředníček et al. 2011, Pósfai–Nagy 2017, Virág 2006).

Many studies have mapped the spatial patterns of peripheries in individual countries (Musil–Müller 2008, Péntzes 2013a) and described not only the economic problems of peripheries (Leibert 2013), but also peripheral regions' demographic dynamics (Leibert 2016), social conditions and problems (Bernard et al. 2016). Aside from these general challenges, numerous studies have focused on the specific problems of peripherality associated with employment and commuting (Alpek et al. 2016, Hardi 2015, Pálóczi 2016, Péntzes 2013b) as well as with consumption and services (Nagy et al. 2015a), or on the role of borders (Hardi 2015). In Czechia, Musil and Müller (2008) coined the term 'inner periphery' to describe areas with the worst social conditions and living standards, located predominantly on regional borders. Novák and Netrdová (2011) later found a similar spatial pattern of areas in decline. Further, Bernard and Šimon (2017) differentiated multiple types of peripheral areas in Czechia, arguing that previous studies had failed to distinguish between different forms of disadvantage in peripheries.

Several Hungarian papers have focused on the differentiation between forms of peripheralisation. A series of studies edited by Kanalas and Kiss (2006) defined several forms of core-periphery relations, such as geographical, economic, or social aspects and power relations. These investigations distinguished between different types of inner peripheries and other peripheral areas located along Hungary's border. Nemes Nagy's (1996) earlier works presented similar results in an examination of core-periphery relations after 1990.

Only a few of these studies were comparative in nature, and works by Péntes (2013a), Egri and Tánczos (2015), or Novotný et al. (2015) on Central Europe's peripheral areas are particularly remarkable. Péntes (2013a) demonstrated that Central European countries' regional transformations exhibit several common aspects. One of these involves the strengthening of capital cities' economic dominance, the converse of which has been the economic downturn in various regions. On the one hand, negative peripheralisation processes have been recorded in regions affected by structural economic problems and in strongly industrialised regions in particular. On the other hand, traditionally economically weak territories (especially remote rural areas) have further weakened. The ongoing weakening of these traditionally rural regions indicates the formation of a new type of regional disadvantage – in which economic and social marginalisation simultaneously occur – called either 'disconnected rural areas' (Lennert 2017) or 'regional ghettos' (Virág 2006) in Hungary.

Unexpectedly, the German debate on mutually reinforcing economic, social, and demographic peripheralisation processes has been only sparsely reflected in empirical research on peripheries in other post-communist Central European countries, with the exception of Bernard and Šimon (2017). Despite the theoretical formulation of vicious circles of cumulative regional disadvantage, empirical studies have failed to address whether the assumption of mutually reinforcing economic, social, and demographic factors holds true, resulting in the formation of peripheries affected by economic marginalisation restricted labour markets, unemployment, and poverty, and accelerated demographic changes. Evidence even exists that these processes can, in fact, be decoupled from each other. Bernard and Šimon (2017) demonstrated that Czechia has four different types of disadvantaged rural areas: 1. rural peripheries characterised by low qualifications, lower living standards, and the absence of a middle class; 2. peripheries with an increased risk of social exclusion; 3. peripheries with poor accessibility; and 4. peripheries facing demographic challenges. These four types of peripheries overlap rather weakly.

Data and methods

Logic and flow of analyses

Peripheralisation includes three interrelated aspects as highlighted in this paper's theory: social exclusion, manifesting as increased poverty or social vulnerability; certain areas' general economic weakness, mostly related to labour market conditions; and decreased populations, resulting in an unbalanced population structure. First, we use the same set of indicators for both Hungary and Czechia to map the spatial patterns of areas facing problematic, constrained labour markets with low economic opportunities, and areas distinguished by increased unemployment, poverty, and social exclusion. Secondly, we investigate the extent to which these two

types of disadvantaged areas overlap, and we examine these areas' population dynamics. The analysis was conducted on a detailed spatial level using LAU 2 units: 6,251 in Czechia and 3,154 in Hungary. As peripheralisation processes operate at different spatial levels, they affect different-sized regions. Using small units enabled us to reveal the resulting spatial patterns of peripheralisation outcomes, including the clustering of peripheral areas within larger regions.

Analysing the socioeconomic manifestations of peripheralisation implies several considerations that must be taken into account when choosing tools to investigate and interpret evidence. One consideration is that social systems' dysfunctions – as generators of processes leading to the exclusion of certain social groups from their relationships with society – are often marked by a clear spatial manifestation (Madanipour et al. 2015, Nagy et al. 2015b). Another consideration is that while these manifestations illustrate peripheralisation's different dimensions, they are also multidimensional, which implies that multiple indices should be chosen to explore the characteristics of peripheralisation. Thus, a principal component analysis (PCA) was used as a dimensionality reduction tool and translated the studied phenomenon's multidimensional features into single measures, which were easier to compare and interpret. The PCA is commonly used in research on area-level disadvantage and deprivation to create composite indices that can be included in statistical models (Kearns et al. 2000, Koós 2015, Messer et al. 2006).

The comparison of the PCA model's results between the two countries was further advanced by considering how the investigated aspects of peripheralisation relate to different spatio-structural characteristics. As a part of this analysis, we investigate the interrelations between the types of disadvantages represented by different components and the settlement structure, transport accessibility, and population development in each country. We anticipate not only that the spatial distribution of social exclusion and labour market constraints would exhibit regional specificities, but also that a position in the settlement structure might characterise how peripheralisation affects different territorial units. Therefore, the PCA's results are examined using a cross-section of municipalities' population size categories. Further, the distance from/access to more central parts of the settlement structure might shape spatial patterns of social exclusion and the labour market. As services and opportunities are selectively concentrated in urban centres, these are more available to – and accessible by – populations living in proximal areas. Thus, living in poorly accessible areas might lead to socioeconomic disadvantages due to the higher costs related to transport or the restricted access to urban services and opportunities. The lack of access to centres could enhance socioeconomic disadvantages and lead to peripheralisation, while accessibility patterns themselves could be regarded as indices of peripheries. This paper analyses Czech and Hungarian municipalities' accessibility to urban centres of different sizes (5,000–10,000–20,000 inhabitants) in a cross-

comparison with the PCA's results. These results are further compared with selected demographic indicators to reflect the demographic challenges related to peripheralisation. This part of the analysis provides an insight into population development in areas affected by the socioeconomic aspects of peripheralisation.

Data description

The analysis involves socioeconomic indicators, those related to the settlement structure and demographic indicators (see Table 1). The data were selected at the municipality level (LAU 2) in both Czechia ($n = 6,251$) and Hungary ($n = 3,154$) by using 2011 as the reference year. The period between 2001 and 2011 was used in the case of dynamic variables. The primary sources for data collection included Czech and Hungarian census databases, as these datasets provide the widest range of socioeconomic variables and represent each country's entire population at a low administrative level. The income measures incorporated data from other sources: the Czech Ministry of Finance and the Hungarian National Tax and Customs Administration database.

Variables related to the socioeconomic aspects of peripheralisation

A pool of potential indicators of peripheralisation was collected to cover two dimensions of disadvantage. The first reflects the aspects of constrained labour markets, with little innovation, poor income opportunities, low-skilled jobs, and above-average agricultural employment. The second reflects the aspects of poverty and social exclusion among marginalised population groups, including unemployment, early school leaving, poor education, and low-quality housing. We explicitly limited the number of indicators to cover some basic aspects of the concepts under study.¹

Indicators of settlement structure and transport accessibility

Patterns of socioeconomic disadvantage are influenced by their position within the settlement structure. Two types of such measures were considered: 1. the municipality's size; and 2. its accessibility to the nearest urban centre. Municipality size categories are represented using the number of inhabitants, with thresholds of 200–500–2,000–10,000–100,000 inhabitants and the capital city. Instead of the settlements' legal status, municipality size was selected to ensure comparability, as no legal difference exists between villages and towns in Czechia, and their role and function in the settlement structure predominantly depend on their size.

¹ This approach is explicitly deductive. A limited number of indicators were selected to express important aspects of previously defined theoretical concepts, similar to the process of developing various area-level deprivation indices (e.g. Kearns et al. 2000, Messer et al. 2006). Approaches based on including a broader range of indicators (e.g. Novák–Netrdová 2011) proceed inductively, aiming to investigate existing socio-spatial patterns in an explorative way. A deductive, theory-driven approach seems more reasonable for our analysis, in which the peripheralisation theory represents a theoretical point of departure.

Transport accessibility to the nearest urban centre refers to the difficulties in accessing services and (employment) opportunities as a result of the growing distance from towns and cities. The multiplicity of services and infrastructure that people commonly access – such as jobs, healthcare, education, and shopping— – was operationalised to a simple model based on the accessibility of cities of three different sizes, allowing for direct, cross-national comparisons. Towns and cities with population sizes of 5,000+, 10,000+ and 20,000+ were selected as centres of accessibility for services (Hungary: $n_{5,000} = 278$, $n_{10,000} = 142$, $n_{20,000} = 61$; Czechia: $n_{5,000} = 256$, $n_{10,000} = 130$, $n_{20,000} = 62$). Further, every service has a catchment area that depends on a minimum number of users required for a service to be run both effectively and in an economical manner. Three different sizes were selected as approximations of differences in particular services' catchment areas. We opted for a lower-level urban hierarchy, as smaller cities contain most of the basic everyday services used by the population in everyday life. This decision was further supported by the fact that most of the travel for services occurs over short distances, or typically within a 15-minute drive. The accessibility model is based on the actual road network, and it measures the travel distance² from every municipality to each site's closest centre of accessibility. The method for shortest path accessibility measurement reflects the rational decision to visit the closest service available.³ The index of accessibility measures how many kilometres one must travel from a municipality to reach the closest urban centres for three defined sizes in every Czech and Hungarian municipality.

Demographic indicators

The goals of this study involve investigating how socioeconomic disadvantage and peripheralisation processes relate to population dynamics as well as the resulting population structure imbalances in Czechia and Hungary. Several demographic indicators were selected to answer this question and were analysed in a cross-section of socioeconomic disadvantage as caused by peripheralisation: age structure, gender balance, and the components of population change.

² Measurements could be improved by replacing travel distance indices with travel time indices; however, we did not have comparable datasets for both countries to allow for such an analysis. The analysis using travel distance indices is sufficiently robust to answer this study's research questions.

³ As the accessibility model was computed only for urban centres within a country, it was not sensitive to possible centres of accessibility beyond a country's boundaries. Although the model only approximates reality, we are convinced that it is robust enough to capture the basic differences between municipalities with good, average and poor accessibility. The model's key added value is that it applies the same data and identical variables to delimit spatial accessibility in both Hungary and Czechia. Further, the grouping of three different centre sizes in Hungary and in Czechia is similar, thus supporting the results' comparability.

Table 1

**Indicators used in the comparative analysis of peripheralisation
in Czechia and Hungary**

Indicator	Measure	Source	Year/ Period
A) Variables related to constrained labour markets			
Share of the employed in occupations (ISCO 1–2), aged 25–50	Per cent	Czech Statistical Office (ČSU)/ Hungarian Central Statistical Office (HCSO) census data- base	2011
Share of inhabitants with completed secondary (ISCED 3–4) or tertiary (ISCED 5–8) education employed in occupations for which completed secondary (ISCO 7+) or tertiary education (ISCO 4+) is typically not required ^{a)}	Per cent	ČSU/HCSO census database	2011
Share of economically active persons employed in agriculture (NACE Rev. 2)	Per cent	ČSU/HCSO census database	2011
Average monthly income from employment	CZK/HUF	Czech Ministry of Finance/ Hungarian National Tax and Customs Administration data- base	2011
B) Variables related to poverty and social exclusion			
Share of the unemployed in the number of economically active inhabitants	Per cent	ČSU/HCSO census database	2011
Share of the youth aged 18–24 out of education (Eurostat methodology) ^{b)}	Per cent	ČSU/HCSO census database	2011
Share of inhabitants aged 25–50 with elementary education (ISCED 0–2)	Per cent	ČSU/HCSO census database	2011
Share of occupied dwellings without comfort	Per cent	ČSU/HCSO census database	2011
C) Variables related to the settlement structure			
Municipality size categories by population	Inhabitants	ČSU/HCSO census database	2011
Accessibility to the nearest urban centres	Kilometres	Country road network	2011

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Indicator	Measure	Source	Year/ Period
D) Demographic variables			
Share of inhabitants aged 65+	Per cent	ČSU/HCSO census database	2011
Share of inhabitants younger than age 15	Per cent	ČSU/HCSO census database	2011
Female/male ratio in the 20–30-year age group	Per cent	ČSU/HCSO census database	2011
Relative population change	Per cent	ČSU demography database/ HCSO census database	2001–2011
Average yearly rate of natural increase	1,000 inhabitants	ČSU demography database/ HCSO census database	2001–2011
Average yearly gross migration rate	1,000 inhabitants	ČSU demography database/ HCSO census database	2001–2011

a) Over-qualification is traditionally measured as the years of education required for a job and the years spent in education (Brynin–Longhi 2009). Our case measured the educational degree obtained and compared it to the educational degree required, or that held by most employees with the same occupation. Given the rough categorisation of occupations using the ISCO's one-digit classification, the indicator should be understood as an approximation.

b) Early leaver from education and training refers to a person aged 18 to 24 who has completed, at most, an ISCED-2 educational level, and who is not involved in further education or training. See https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Early_leaver_from_education_and_training

Note. ISCED – International Standard Classification of Education; ISCO – International Standard Classification of Occupations; NACE – Statistical Classification of Economic Activities in the European Community.

The use of census data in the analysis partially guarantees the Czech and Hungarian cases' comparability. Regarding the European Union's 2011 population and housing censuses, European legislation has defined a high level of harmonisation regarding variables and data to be collected (Eurostat 2011). The Czech and Hungarian data's comparability has further improved by using international standards in the classifications related to economic activities (NACE Rev. 2), occupations (ISCO-08), and qualifications (ISCED 2011). Harmonisation issues have primarily affected housing and income data. Czech and Hungarian data related to low-comfort housing refers to slightly different types of housing standards. As these are complex measures, different combinations of vulnerabilities related to the availability of different types of housing amenities can be regarded as meaningful in each case. Therefore, the two countries' national standards are considered in denoting the two countries' housing disadvantages. The indicator of income from employment is suitable only for an indirect comparison, such as comparing the two countries' inequalities. In Hungary's case, this indicator was calculated by dividing the gross taxable income from employment by the number of income tax-payers, which refers to a wider population pool, in the absence of published data on the direct number of taxpayers based on income from employment. Regarding the Czech income

data, the data provided by the Ministry of Finance have only covered employees who processed their tax returns by themselves (approximately one-third of the employed population).

Analysis

Indices of disadvantage

The first set of variables (see Table 1, Part A) was used to produce an index characterised by high values in areas affected by constrained labour market conditions, with limited economic opportunities for the local population. The poverty and social exclusion index is based on the second set of variables (see Table 1, Part B). Both sets of variables correlate fairly well internally in both countries, although the correlations are generally higher in the Hungarian case; consequently, this indicates a stronger spatial overlap of different aspects of disadvantage in Hungary than in Czechia. The first principal component obtained by the PCA for each variable set was retained for further analyses. This component represents the unique linear combination accounting for the largest possible variation proportion of the underlying variables.⁴ Tables 2 and 3 present the results of the PCAs of both datasets for both countries.⁵

Table 2

PCA results – Constrained labour markets, 2011

PCA result	First component loading	
	Czechia	Hungary
Share of the employed in occupations ISCO 1–2, aged 25–50	–0.84	–0.88
Share of overqualified, employed inhabitants	0.68	0.46
Share of the economically active employed in agriculture	0.57	0.61
Average monthly income from employment	–0.69	–0.82
Total variance explained (%)	49.10	51.00

⁴ This study's deductive nature has led to separate analyses of the sets of variables, and in using the first principle component, which represents a major part of the underlying indicators' variation. A factor rotation would be more reasonable in an exploratory use of the factor analysis.

⁵ We have controlled the resulting indices' robustness by comparing them to alternative composite scores, created by summing the underlying variables' normalised values. An extremely high correlation was found ($r = 0.994$ and 0.997 in the Czech case; $r = 0.990$ and 0.999 in the Hungarian case), indicating the indices' strong consistency.

Table 3

PCA results – Poverty and social exclusion, 2011

PCA result	First component loading	
	Czechia	Hungary
Unemployment rate	0.74	0.81
Early school leavers	0.70	0.87
Share of inhabitants aged 25–50 with elementary education	0.79	0.92
Share of occupied dwellings without comfort	0.50	0.79
Total variance explained (%)	47.60	71.20

Hungary's larger explained variance in the poverty and social exclusion index than in Czechia is an outcome of the latter's less inter-correlated variables, indicating fewer overlapping spatial patterns of different poverty and exclusion symptoms than in Hungary. Poor-quality housing, represented by the 'share of dwellings without comfort', is particularly weakly related to the other measures of disadvantages in Czechia. The resulting component scores were saved and used as index values in all subsequent analyses. Maps for both countries (see Figures 1 to 4) present the spatial distribution of both composite indices.

Figure 1

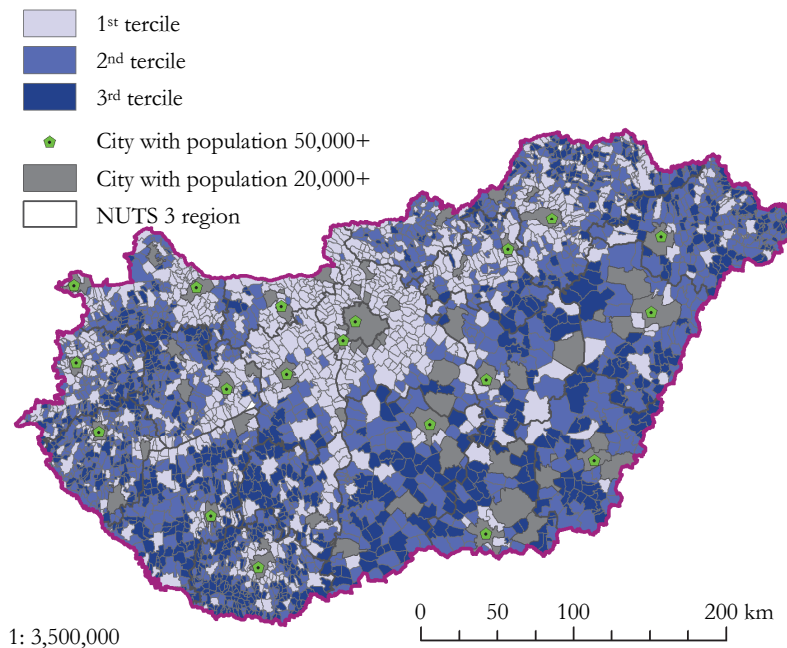
Index of disadvantage – Constrained labour market in Hungary, 2011

Figure 2

Index of disadvantage – Constrained labour market in Czechia, 2011

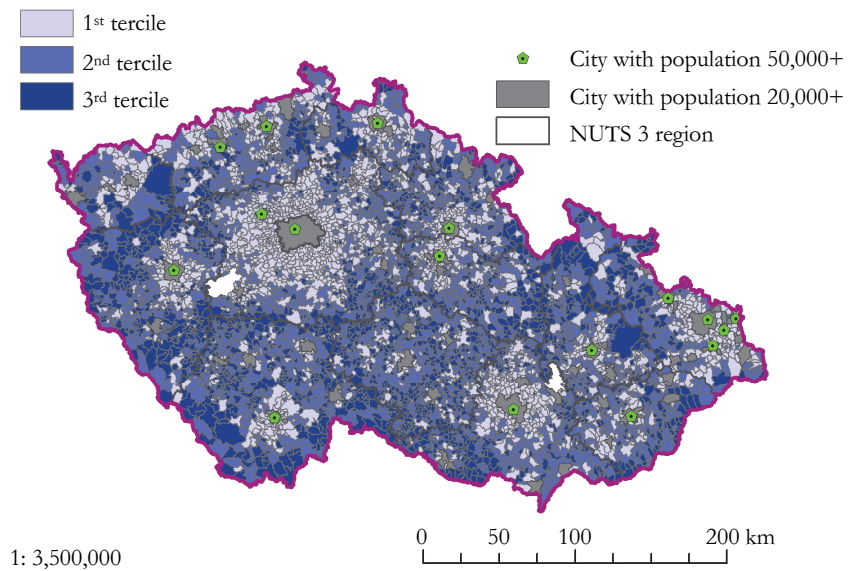


Figure 3

Index of disadvantage – Poverty and social exclusion in Hungary, 2011

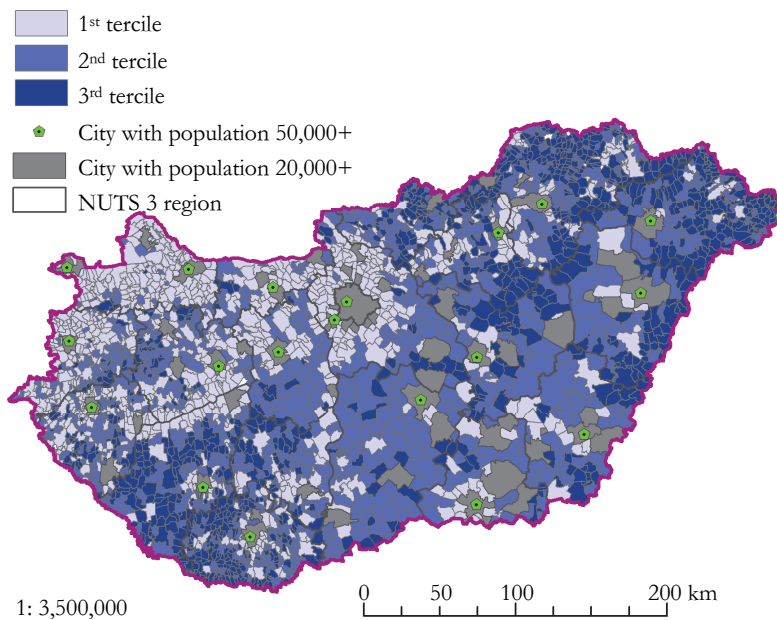
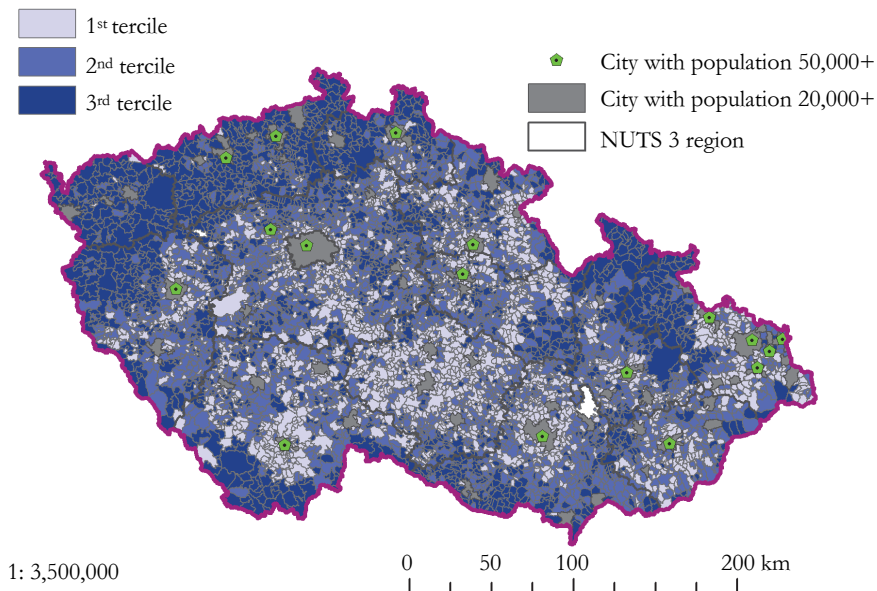


Figure 4

Index of disadvantage – Poverty and social exclusion in Czechia, 2011

Tables 4 and 5 illustrate the mean values of the underlying indicators in areas represented by the highest, average, and lowest terciles of both composite indices. The results document remarkable differences between both countries' well and poorly performing areas. On average, approximately half share of people with highly qualified occupations live in poorly performing areas in terms of labour market constraints, compared to well-performing areas. Nearly twice as many residents experience over-qualification – or have higher education than normally necessary for their job – in low-performing areas. More than three times more people are employed in agriculture, and the average gross wages are approximately one-third lower than wages in well-performing areas. Despite the overall slightly worse situation in Hungary, the intra-country differences are remarkably similar for both countries; territorial differences in poverty and social exclusion are more pronounced. The unemployment rate in poorly performing areas is approximately twice as high as in well-performing areas, with four times more youth leaving school early, and three times more middle-aged residents with only an elementary education. Moreover, Hungary's poorly performing areas in terms of high poverty and social exclusion have more low-quality housing.

Table 4

**Mean values of underlying variables in different areas according
to the terciles of the composite index 'constrained labour markets', 2011**

Area according to the 'constrained labour markets' composite index	Share of the em- ployed in occupa- tions ISCO 1–2, aged 25–50, %	Share of overquali- fied employed inhabitants in population, %	Share of the eco- nomically active employed in agri- culture, %	Average monthly gross wage, EUR
Czechia				
Well-performing	23.6	15.5	4.6	1,146.40
Average	16.1	20.7	8.1	860.50
Poorly performing	11.0	27.3	14.4	756.60
Hungary				
Well-performing	18.6	24.1	4.8	472.20
Average	11.1	28.0	9.4	373.40
Poorly performing	6.8	32.4	16.7	302.20

Table 5

**Mean values of underlying variables in different areas according
to the terciles of the composite index 'poverty and social exclusion', 2011**

Area according to the 'poverty and social exclusion' composite index	Unemployment rate, %	Share of early school-leavers in population, %	Share of inhabitants aged 25–50 with elementary educa- tion in population, %	Share of occupied dwellings without comfort, %
Czechia				
Low exclusion	7.1	2.6	4.1	4.7
Average exclusion	9.9	5.5	6.4	6.4
High exclusion	14.3	12.3	12.5	8.6
Hungary				
Low exclusion	9.6	8.2	13.1	6.1
Average exclusion	14.4	16.3	24.1	12.9
High exclusion	24.5	34.9	42.2	24.0

Indices of disadvantage within the settlement structure

The mean component scores by population size indicate remarkable systematic differences (see Table 6). The constrained labour market indicator in both countries documents a clear, expected pattern, with the settlements' size positively related to the labour market situation. Specifically, the smallest settlements experienced the least favourable labour market situation. In the case of poverty and social exclusion, only Hungary's relationship with population size is pronounced.

Table 6

Mean component scores by settlement population category, 2011

Population category (LAU 2)	'Constrained labour markets' composite index		'Poverty and social exclusion' composite index	
	Czechia	Hungary	Czechia	Hungary
0–200	0.447	0.536	0.077	0.496
201–500	0.149	0.438	0.070	0.227
501–2,000	–0.256	–0.022	–0.106	–0.036
2,001–10,000	–0.618	–0.497	–0.071	–0.328
10,001–100,000	–0.958	–1.360	0.003	–0.793
100,001+	–1.751	–2.236	–0.107	–1.066
Capital city (Prague/Budapest)	–2.862	–3.513	–0.503	–1.169

Spearman's correlation was computed to statistically assess the relationship between population size and component scores (see Table 7). A statistically significant ($p < 0.05$), negative correlation was found in every case, verifying the importance of municipality size. However, it should be noted that this correlation is always weaker in Czechia than in Hungary, with an especially striking difference in the correlation between municipality size and social exclusion (–0.0299 in Czechia and –0.2860 in Hungary). This correlation reflects this relationship's factual insignificance in Czechia, and points to a more socially polarised Hungarian settlement structure. The intercountry differences are smaller in the case of the constrained labour market indicator (–0.3715 in Czechia and –0.4497 in Hungary).

The correlation matrix also reveals the interplay of the socioeconomic aspects of peripheralisation as well as its country-specific nature. The correlation between the two composite indices was positive in both cases, indicating that the constrained labour market index score increases as the poverty index increases; however, Czechia exhibits a weak correlation between social exclusion and a constrained labour market (+0.2285), indicating that these two aspects of peripheralisation may be spatially separated. In a Czech municipality with constrained labour market conditions, the high probability of poverty and social exclusion cannot be directly predicted, as most rural villages struggling with limited job availability cannot be grouped with areas of increased poverty and unemployment. Thus, peripheralisation's economic and social aspects are spatially decoupled from each other in Czechia.

A stronger spatial overlap of different aspects of peripheralisation can be observed in Hungary, which is reflected in the higher correlation coefficient (+0.6288). Thus, areas in Hungary with increased poverty in many cases are rural villages affected by an underdeveloped labour market. Poor job availability, low economic innovation, and low qualifications closely connect to the spatial patterns of poverty, unemployment, and social exclusion.

Table 7

**Relationship between population size and component scores
in Czechia and Hungary (Spearman's correlation matrix), 2011**

Category/index	Category/index					
	Czechia ($n = 6,229$)			Hungary ($n = 3,141$)		
	Population category	'Poverty and social exclusion' composite index	'Constrained labour market' composite index	Population category	'Poverty and social exclusion' composite index	'Constrained labour market' composite index
Population category	1.0000			1.0000		
'Poverty and social exclusion' composite index	-0.0299*	1.0000		-0.2860*	1.0000	
'Constrained labour market' composite index	-0.3715*	0.2285*	1.0000	-0.4497*	0.6288*	1.0000

* $p < 0.05$.

Disadvantage indices from the accessibility perspective

Spatial accessibility measures the access to services and opportunities provided in a limited number of places, such as urban centres. Thus, access to such centres is theoretically unequal by definition, and leads to disadvantage for the populations outside of such centres; however, an evaluation of any possible disadvantage cannot be performed solely using spatial accessibility measures. Various redistributive mechanisms, selective population mobility, and technological developments in contemporary societies can significantly modify spatial accessibility's role in social disadvantage, and thus, can mitigate or even negate poorer spatial accessibility's effects on disadvantage. The actual link between spatial accessibility and disadvantage *de facto* demonstrates the strength and effectiveness of redistributive and inclusive mechanisms in society, and in preventing exclusion by transport accessibility.

This comparison reveals two important findings. First, the key difference between rural areas in Czechia and Hungary is that in the former they are generally closer to urban centres than in the latter (see Table 8). This difference in the structure of settlement systems shapes the access to the services and infrastructure con-

centrated in cities and towns (see Figures 5 and 6). Thus, prevalent remote rurality can ignite more exclusion due to a lack of access to opportunities. Second, urban centres' accessibility affects the two dimensions of disadvantage more in Hungary than in Czechia. Regarding poverty and social exclusion, a clear link exists between transport accessibility and social exclusion in Hungary ($R^2 = 0.208$). In contrast, the link between social exclusion and accessibility is low in Czechia ($R^2 = 0.053$), and four times weaker than in Hungary. The disadvantage stemming from constrained rural labour markets relates to transport accessibility in similar ways in both Czechia ($R^2 = 0.190$) and Hungary ($R^2 = 0.208$). The smallest municipalities in Hungary (0–200 inhabitants) are excluded more often, even when they are relatively close to urban centres. Generally, Hungarian localities' transport accessibility matters regarding citizens' chance to be affected by social or economic disadvantage more than in Czechia; however, this difference is driven far more by the dimensions of social exclusion and poverty than by a constrained rural labour market.

Table 8

Dimensions of disadvantage in the accessibility framework, 2011

Area category	Index of accessibility, km	Czechia			Hungary		
		Share of the area category in the total area of the country	Mean value of the index of disadvantage	Standard deviation	Share of the area category in the total area of the country	Mean value of the index of disadvantage	Standard deviation
Poverty and social exclusion							
Urban areas	0	3.6	−0.18	0.68	2.3	−0.88	0.48
Suburban areas	1–30	41.5	−0.15	0.86	20.8	−0.52	0.64
Close rural areas	31–60	45.9	0.03	0.99	41.6	−0.09	0.86
Rural areas	61–90	8.4	0.58	1.42	28.0	0.33	0.99
Remote rural areas	91+	0.6	1.34	1.67	7.3	1.03	1.42
Constrained rural labour markets							
Urban areas	0	3.6	−1.07	0.84	2.3	−1.66	0.89
Suburban areas	1–30	41.5	−0.35	0.99	20.8	−0.67	1.03
Close rural areas	31–60	45.9	0.27	0.86	41.6	0.07	0.83
Rural areas	61–90	8.4	0.68	0.85	28.0	0.42	0.76
Remote rural areas	91+	0.6	0.75	0.73	7.3	0.42	1.11

Figure 5

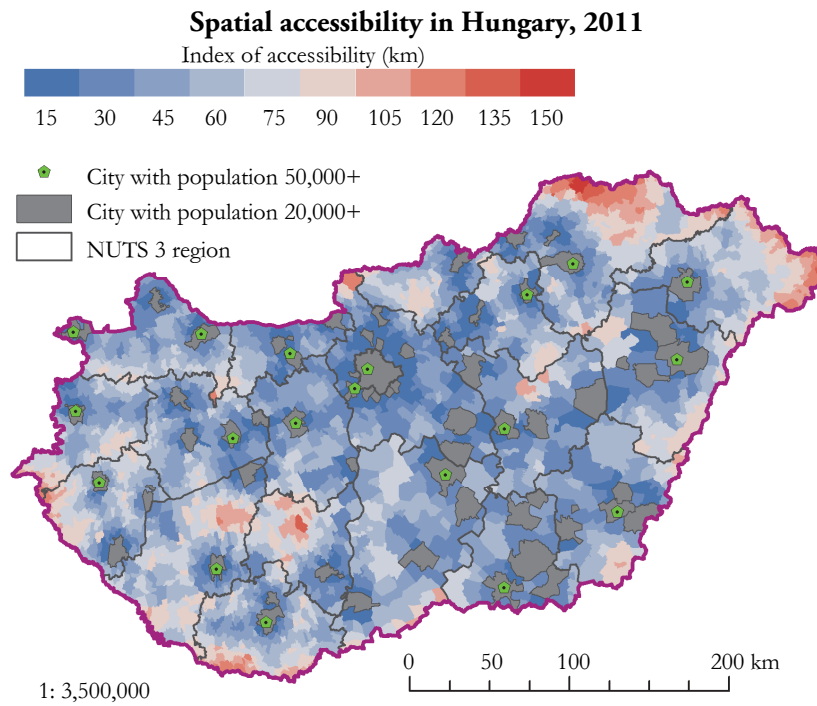
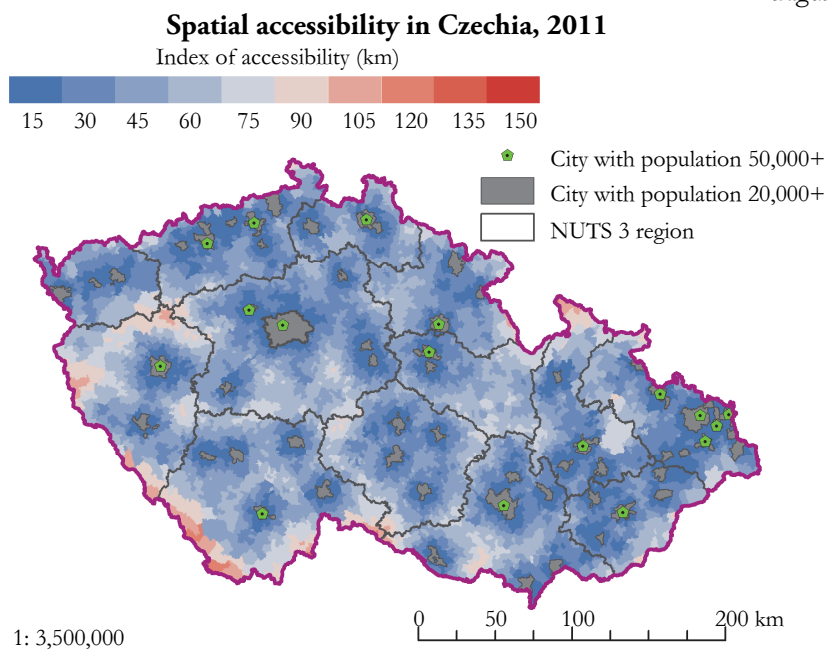


Figure 6



Disadvantage and demographic change

The investigation of demographic trends provides some insight into how the socio-economic aspects of peripheralisation are associated with a population's decline. The demographic trends in the two countries provide distinct profiles. While several central and eastern European Union member states have higher rates of population decrease – such as Croatia, Bulgaria, and the Baltic states – it is Hungary where the phenomenon of population loss has been present for the longest time, since the early 1980s (Monostori et al. 2015). In contrast, Czechia is one of three Central European countries – together with Slovakia and Slovenia – that still have positive population dynamics (EC 2015) driven by immigration from other countries.

Although the national demographic characteristics might differ, intra-country differences reveal structural similarities. Age structure indicators or the share of old and young age groups, demonstrate small differences between Czechia and Hungary (see Tables 9 and 10). The terciles of previous analyses' component values decompose the overall trends into specific territorial tendencies. While higher constraints regarding labour markets are associated with a higher share of older age groups in both Czechia and Hungary, the share of the population younger than age 15 is only higher in areas of Hungary that are more vulnerable to the socioeconomic disadvantage index. Regarding the index representing poverty and social exclusion, poor performance in the underlying indicators seems to be insignificant in shaping the age structure in Czechia, while the Hungarian figures indicate a higher vulnerability to poverty and exclusion that parallels a lower share of older age groups and a significantly higher share of younger age groups. This potentially signals the Roma population's disadvantaged position.

Female/male ratios in the 20- to 30-year age groups are generally higher in Czechia than in Hungary. The overall figures demonstrate that typically fewer women than men are in these age groups in both countries. The only exception relates to the group of areas in Czechia with low labour market constraints, as this group has a higher ratio of females in the population. This underlines the sex-selective nature of mobility by noting the higher mobility of women in younger age groups (Leibert 2016), and especially when facing labour market constraints. In Hungary, both components of socioeconomic disadvantage reveal that while female/male ratios in the 20- to 30-year age groups might be higher in areas with better performance, this is also true of the groups of areas with the highest disadvantage regarding labour market constraints or vulnerabilities to poverty and social exclusion (see Tables 9 and 10).

Table 9

Mean values of demographic variables in different areas according to the terciles of the composite index 'constrained labour markets', 2011

Area category	Share of inhabitants aged 65+, %	Share of inhabitants younger than 15, %	Female/male ratio in the 20- to 30-year age groups, %	Relative population change, 2001–2011, %	Average yearly rate of natural increase, 2001–2011, 1,000 inhabitants	Average yearly gross migration rate, 2001–2011, 1,000 inhabitants
Czechia						
Well-performing	15.2	15.6	101.7	18.8	–0.5	15.7
Average	16.0	15.0	98.4	6.2	–1.4	6.8
Poorly performing	16.7	14.5	95.8	2.7	–2.2	4.2
Hungary						
Well-performing	17.5	14.8	92.3	0.4	–5.4	5.7
Average	18.0	15.1	89.6	–7.9	–6.7	–1.2
Poorly performing	18.7	15.8	93.6	–11.9	–6.9	–5.1

Table 10

Mean values of demographic variables in different areas according to the terciles of the composite index 'poverty and social exclusion', 2011

Area category	Share of inhabitants aged 65+, %	Share of inhabitants younger than 15, %	Female/male ratio in the 20- to 30-year age groups, %	Relative population change, 2001–2011, %	Average yearly rate of natural increase, 2001–2011, 1,000 inhabitants	Average yearly gross migration rate, 2001–2011, 1,000 inhabitants
Czechia						
Low exclusion	15.9	15.4	99.6	12.9	–0.9	11.1
Average exclusion	16.2	14.9	98.2	8.6	–1.5	8.5
High exclusion	15.7	14.9	98.3	6.2	–1.7	7.2
Hungary						
Low exclusion	18.1	14.0	92.0	–0.3	–6.2	5.9
Average exclusion	18.9	14.0	91.0	–9.0	–7.5	–1.4
High exclusion	16.8	17.9	93.2	–10.1	–4.8	–5.3

The population change – such as a natural increase or decrease, or migration – indicates a significant interrelationship with the analysed peripheralisation factors. The investigation of the population dynamics between 2001 and 2011 reveals that Czechia's overall population increase and Hungary's overall population decrease were incredibly selective depending on the regions' socioeconomic status. As anticipated, these demographic trends are more positive in groups of municipalities with fewer disadvantages in both labour market constraints and poverty and social exclusion. Somewhat opposite trends characterise the Hungarian municipalities regarding their rates of natural population change. In this case, groups of areas with the lowest values of natural decrease face the highest exclusion. These areas often overlap with concentration of the Roma population, in which birth rates and the ratio of children in the total population are often higher (Pénzes et al. 2013).

Discussion and conclusions

The development of peripheries in Czechia and Hungary does not correspond without difficulties to the German peripheralisation model, defined as mutually reinforcing economic and social problems and demographic decline. The analyses confirm that the peripheralisation processes proceed in a distinctly differentiated way in Hungary and Czechia. On the one hand, both countries include territories with constrained labour markets, located in rural areas with poor transport accessibility. Struggling rural communities tend to have low-qualification inhabitants, few skilled jobs, and lower income levels, and economically depend on agriculture at above-average levels. The accessibility problem is more urgent in Hungary than in Czechia, as the former has larger rural areas with poor access, while the latter has a denser, more evenly distributed network of small towns that partially eliminates any accessibility problems. On the other hand, the nature of peripherality differs between Hungary and Czechia. Czech rural areas with constrained labour markets are distinctly separated spatially from areas affected by poverty and social exclusion. Poverty, unemployment and social exclusion are not predominantly rural problems in Czechia, and do not strongly relate to poor accessibility. On the contrary, a majority of the affected territories are located in highly urbanised regions, which previously were economically oriented to heavy industry. In contrast, Hungary's rural areas with constrained labour markets more highly overlap with areas of social exclusion. The concurrent impact of labour market-related problems, poverty and social problems has led to the emergence of areas with complex issues, in which such socioeconomic problems meet the risk of transport-related exclusion. In light of these findings, Bernard and Šimon's (2017) argument regarding the existence of periphery types differentiated according to their prevailing social problems seems to be more valid for the Czech case.

The population dynamics in both countries are unevenly spatially distributed and clearly differentiated according to peripheralisation indicators; however, Czechia's population is not decreasing due to the nation's overall population growth, even in communities suffering from economic and social issues. Rather, a population stagnation has occurred in such municipalities. In Hungary, the periphery has experienced a clear depopulation process, primarily due to migration. Further, evidence exists of increased ageing among both countries' peripheries, although a relatively modest natural decrease due to higher birth rates has limited further ageing in Hungary's peripheries.

In conclusion, Hungary's peripheralisation more highly corresponds to the idea of interrelated and mutually reinforcing economic peripheralisation processes. These manifest as limited job supply in the labour market, an accumulation of poverty and social problems, and population shrinkage, which particularly affect remote rural localities. Several differences exist in the how two countries' peripheralisation has developed.

First, one important difference arises from both countries' historically formed settlement structures. Although both Hungary and Czechia have similar degrees of urbanisation, they differ in their rural municipalities' accessibility and their economic interconnections with cities. Czechia has a dense network of small and medium-sized towns that provide jobs and services for rural inhabitants. Such a network covers a majority of the Czech territory, while a similar condition applies to only part of the Hungarian countryside. In many of Hungary's rural areas, access to urban centres is more demanding, and daily commuting is not a reasonable economic strategy for their residents. The mutual enhancement of peripheralisation factors typically occur in such locales, resulting in the development of 'disconnected' rural areas (Lennert 2017) with co-mingled social and economic problems.

Second, distinct spatial patterns of ethnic composition have influenced the forms of peripheralisation. The Roma are among the most vulnerable groups in both countries in terms of social exclusion (Revenga et al. 2002, Sirovátka–Mareš 2006), the Roma population lives predominantly in urbanised areas in Czechia as a result of communist-era industrialisation and resettlement policies. The Roma in Hungary are primarily concentrated in rural, often inaccessible areas. Thus, the ethnic and spatial aspects of social exclusion reinforce each other and contribute to the rise of social problems in the peripheral countryside (Brown–Schafft 2003).

Third, differences in both countries' overall demographic development explain their diverse peripheralisation processes. In particular, Czechia's economic and social disadvantages are not accompanied by a marked population decline. The country's overall population growth and its population's strong tendency towards spatial deconcentration as documented by Šimon and Bernard (2016) and Ouředníček et al. (2013) have caused peripheral areas to stagnate in terms of population development.

In contrast, Hungary's long-term population decline is strong in disadvantaged peripheral areas.

This study illuminates the situation in the two countries while contributing to a more general question, focused on the extent to which peripheralisation processes are contextually dependent. Despite the fact that Czechia and Hungary share many structural similarities, have experienced similar political and historical developments in recent decades, and have similar economic situations, the two countries have far from identical spatial development, with remarkably distinct peripheralisation processes.

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