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Decoding Regional Resilience: Vulnerability and Exposure of European Regions to the Impacts of War in Ukraine

Czesław Adamiak (Nicolaus Copernicus University in Toruń)

Paweł Churski (Adam Mickiewicz University in Poznań)

Maciej Pietrzykowski (Poznań University of Economics and Business)

Anna Dubownik, Barbara Szyda (Nicolaus Copernicus University in Toruń)



Presentation agenda

- 1. Research Framework:** RECORU project aims and plan
- 2. Context:** Polysrisis and regional resilience
- 3. Methods and results:** classification of European regions within the Vulnerability-Exposure-Consequences framework
- 4. What next:** descriptive explanatory analysis, case studies



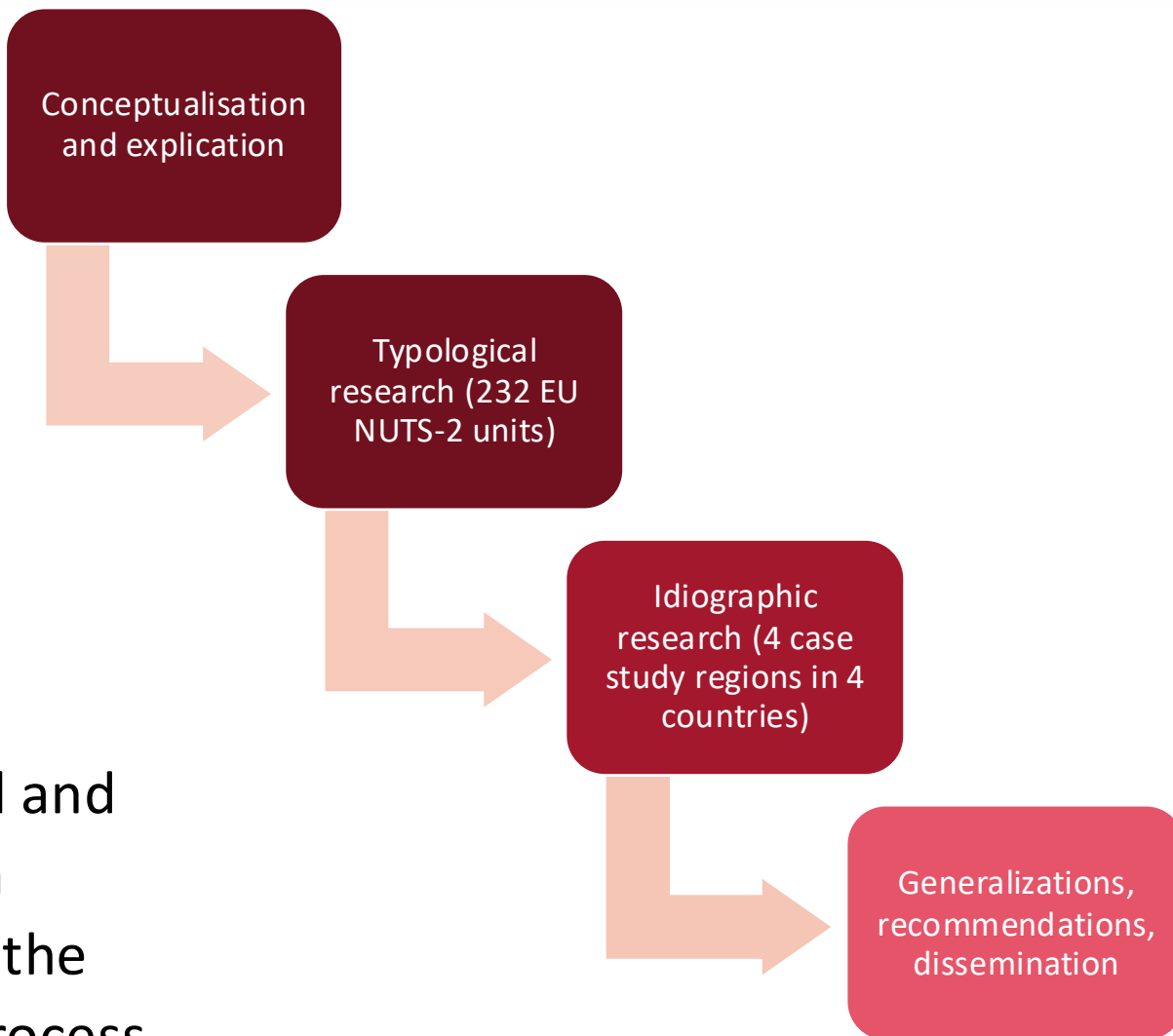


Title of the project:

Regional policy in Europe under conditions of development shocks – challenges of regional development resulting from the socio-economic consequences of Russia's aggression against Ukraine

Aim of the project:

To identify spatial differences in selected social and economic consequences of Russia's aggression against Ukraine and to explain their impact on the transformation of the regional development process and the evolution of regional policy in the EU.





Uneven impacts: impact depends on regions' vulnerability and exposure to the shocks.

Regional resilience: the ability of regions to withstand, adapt to, and recover from shocks.



Conceptualisation of regional resilience

- Return to pre-shock equilibrium.
- Single equilibrium assumed.
- Speed of recovery is the key metric.
- Primarily quantitative methods.
- Best suited to short, sharp shocks.
- (Martin, 2012; Hundt & Holtermann, 2020)

Engineering
resilience



- Absorb shocks while maintaining core structure.
- Multiple equilibria possible.
- Allows reorientation and path switching, but structural core remains unchanged.
- Quantitative + qualitative met.
- (Capello et al., 2015; Wilson, 2018)

Ecological
resilience



- Path-dependent process of creative destruction.
- No equilibrium.
- Focus on actors, learning, institutional transformation and endogenous innovation.
- For slow crises, structural change.
- (Boschma, 2015; Bristow & Healy, 2018)

Evolutionary/
adaptive resilience

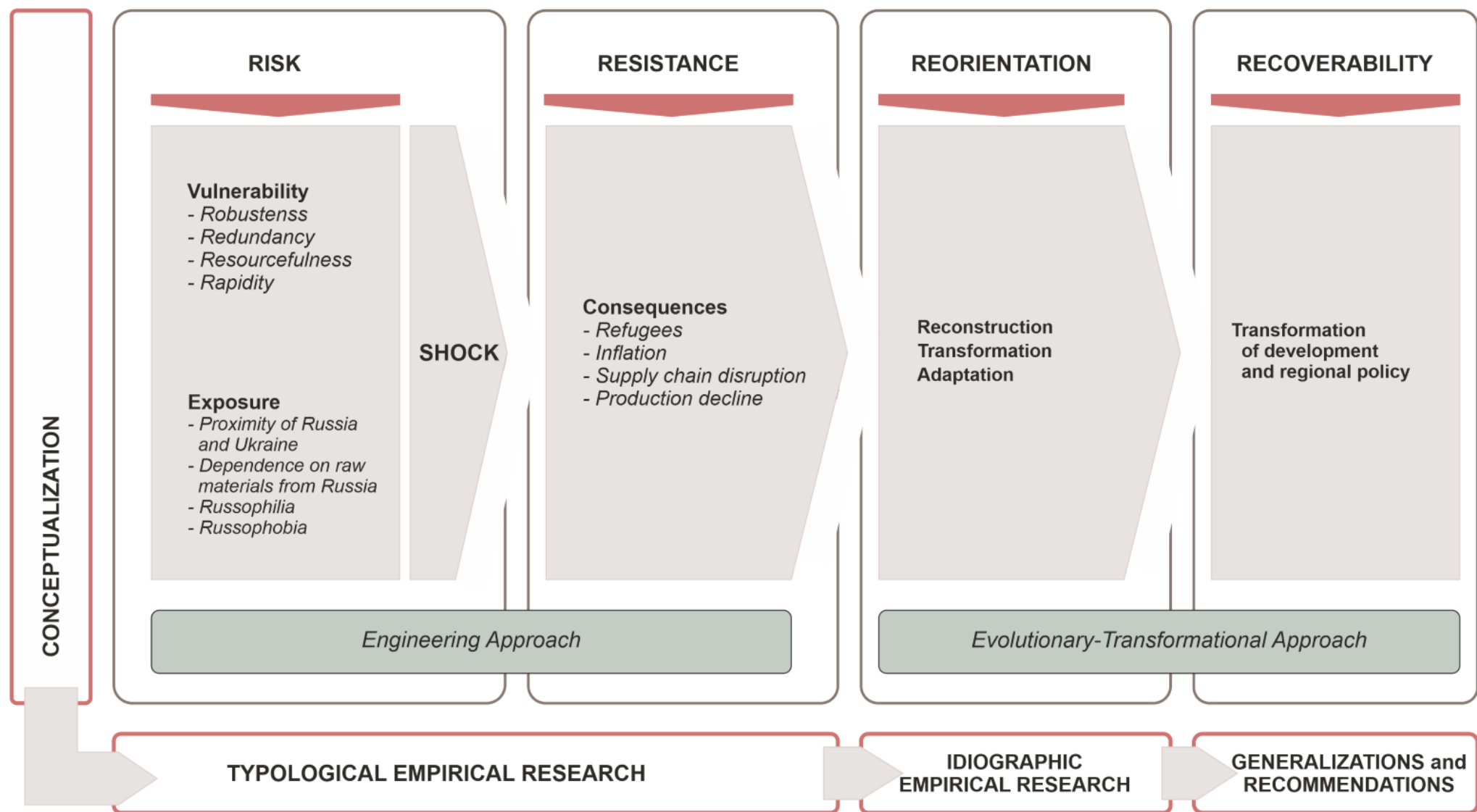


- Capacity to create an entirely new structural configuration when the existing one becomes dysfunctional.
- Systemic transition – fundamental transformation.
- Corresponds to multi-level perspective theory on transition.
- (Sutton et al., 2023)

Transformative
resilience



Linking Resilience concept with Research Plan



Typology of European regions

Vulnerability × Exposure → Consequences

An internal structural characteristic of the region, existing BEFORE the shock, historically conditioned (path dependence). It describes the structural features that may make a region susceptible to disruption, independently of the particular shock.

V - Vulnerability

The channels and intensity of shock transmission – determined by the region's location and external linkages. Primarily relational and network-based, rather than an internal characteristic of the region.

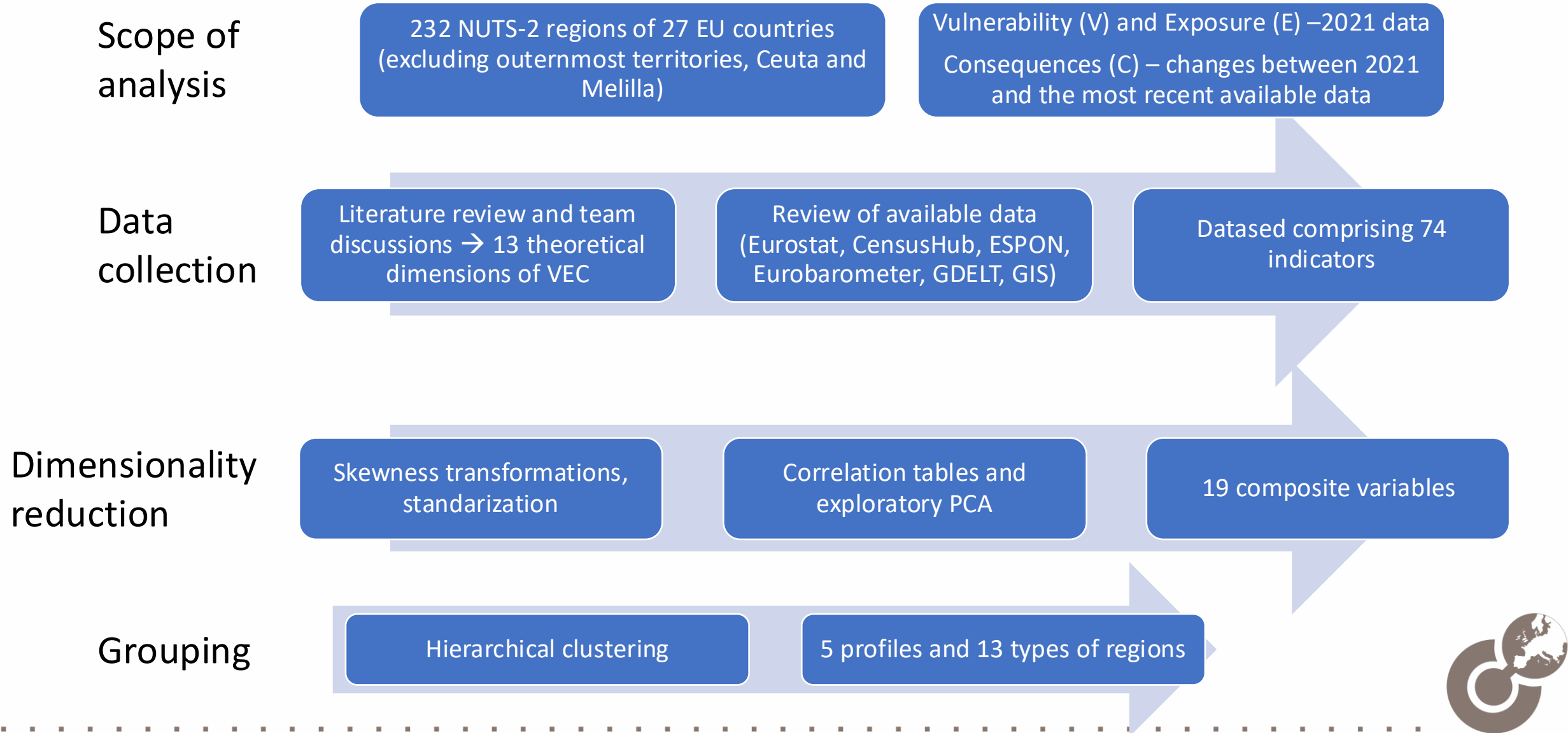
E - Exposure

Empirically observable effects of the shock
– positive, neutral, ambivalent or negative
– in the dynamics of regional socio-economic systems. Dynamic in nature: measured as change or deviation from trend after the shock.

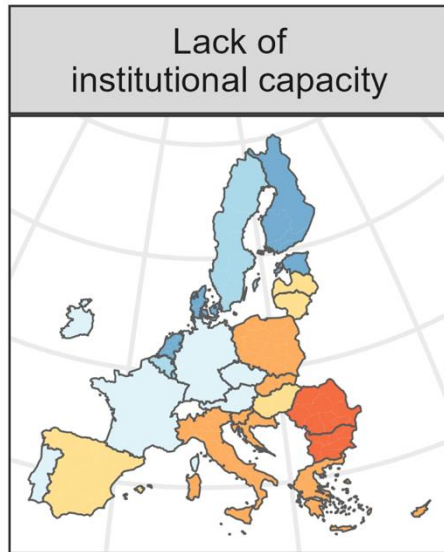
C - Consequences



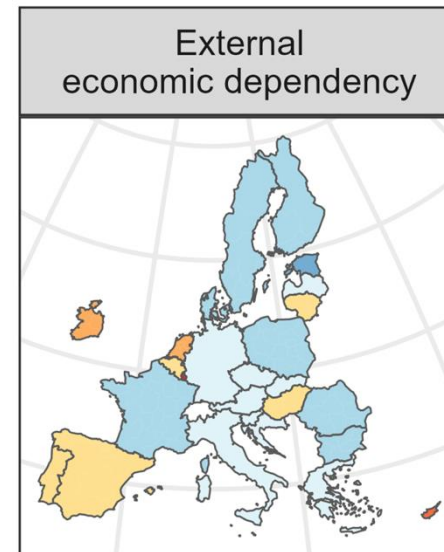
Typology of European regions – methods



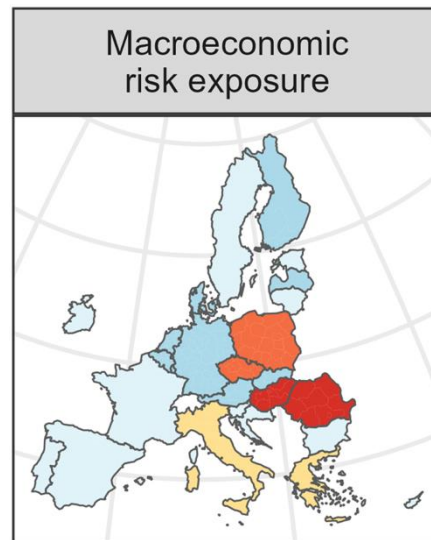
Vulnerability indicators – part 1/3



- ✓ *Share of population very attached to city/town/village (%)*
 - ✓ *Mean of Worldwide Governance Indicators*
 - ✓ *Trust in public institutions (%)*
 - ✓ *Share of population using Internet in interaction with public authorities (%)*
 - ✓ *Global Cybersecurity Index Overall Score*
- Cronbach Alpha = 0.848

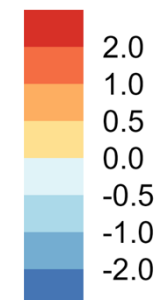


- ✓ *Inward FDI stocks as % of GDP*
 - ✓ *Energy import dependency*
- Cronbach Alpha = 0.693

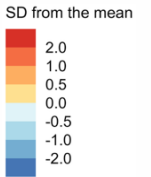


- ✓ *EMU convergence criterion bond yields*

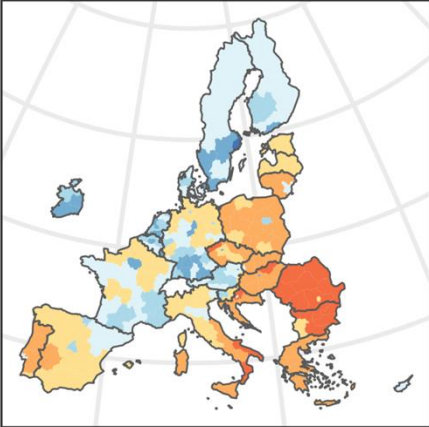
SD from the mean



Vulnerability indicators – part 2/3

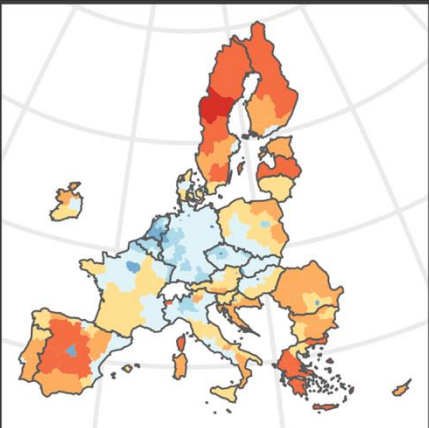


Low economic development capacity



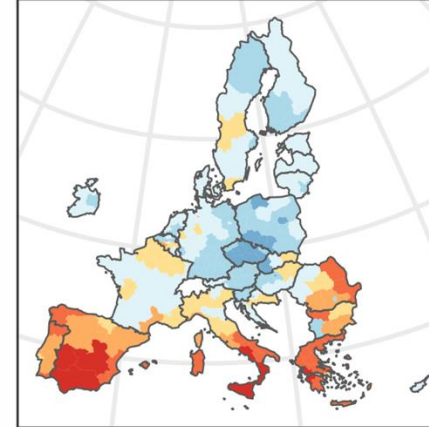
- ✓ *GDP at current prices (Euro per inhabitant)*
 - ✓ *R&D personnel and researchers as % of the labour force*
 - ✓ *Share of GDP spend on R&D in business sector (%)*
 - ✓ *Patents per million inhabitants*
 - ✓ *Share of employed in high-technology manufacturing and KIS (%)*
 - ✓ *Share of population 25 to 65 years with tertiary education (%)*
 - ✓ *Share of foreign-born population (%)*
 - ✓ *Households that have internet access at home (%)*
- Cronbach Alpha = 0.895

Low spatial accessibility and connectivity



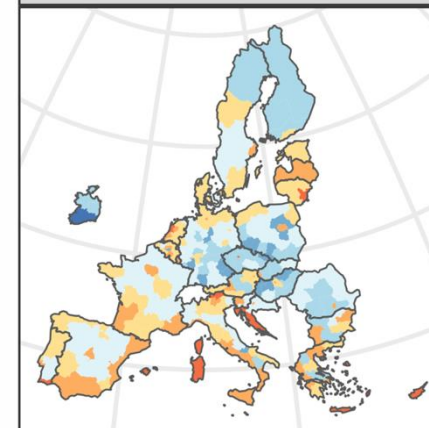
- ✓ *Share of employment in firms below 10 employees (%)*
 - ✓ *Motorways network density (km per 100 km²)*
 - ✓ *Railways network density (km per 100 km²)*
 - ✓ *Average time accessibility to healthcare services (min.)*
 - ✓ *Average time accessibility to primary education services (min.)*
 - ✓ *Population density of urbanized areas*
- Cronbach Alpha = 0.861

Socio-economic disadvantage



- ✓ *Share of population 25 to 65 years with lower secondary education or less (%)*
 - ✓ *Proportion of persons at risk of poverty or social exclusion (%)*
 - ✓ *Unemployment rate among population from 15 to 74 years (%)*
- Cronbach Alpha = 0.809

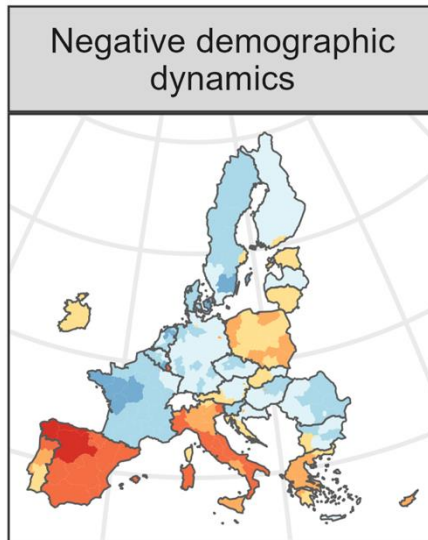
Service-oriented sectoral structure



- ✓ *Herfindahl sectorial concentration index*
 - ✓ *Share of gross value added in Industry (%)*
 - ✓ *Share of gross value added in trade, transport, accommodation and food services (%)*
 - ✓ *International tourist arrivals per 1000 inhabitants*
- Cronbach Alpha = 0.687

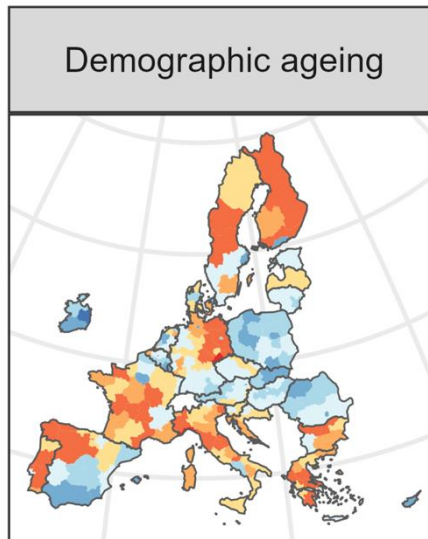


Vulnerability indicators – part 3/3



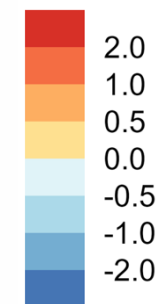
- ✓ *Total fertility rate*
- ✓ *Share of births by mothers over 35 years old (%)*
- ✓ *Share of population who changed their residence between NUTS-3 areas in the last year (%)*

Cronbach Alpha = 0.714

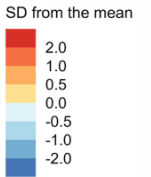


- ✓ *Mean population age (years)*
- ✓ *Old-age dependency ratio 1st variant (population 65 years as a % of population 15 to 64 years)*
- ✓ *Cronbach Alpha = 0.680*

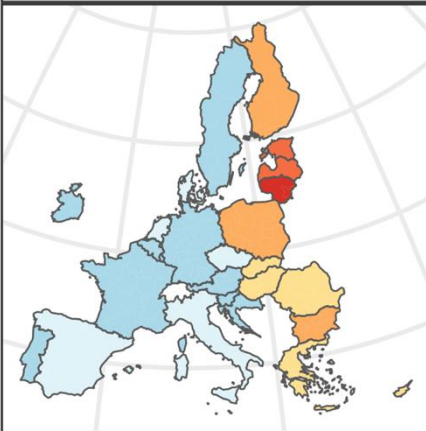
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Exposure indicators



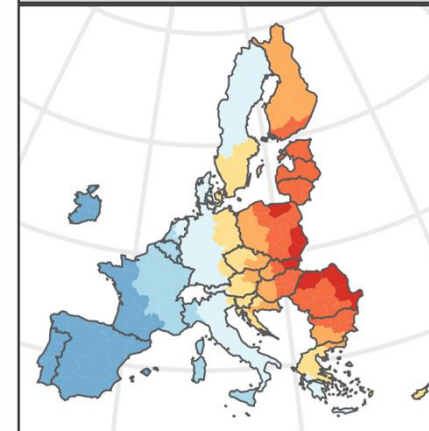
Geopolitical economic exposure



- ✓ Share of international tourists coming from Russia and Ukraine (%)
- ✓ Share of Russia and Ukraine in international trade of the country (%)
- ✓ Share of import from Russia in total import of fertilisers (%)
- ✓ Share of import from Russia in total import of fuels (%)
- ✓ Share of foreign value added from Russia in total country export of industry (%)

Cronbach Alpha = 0.897

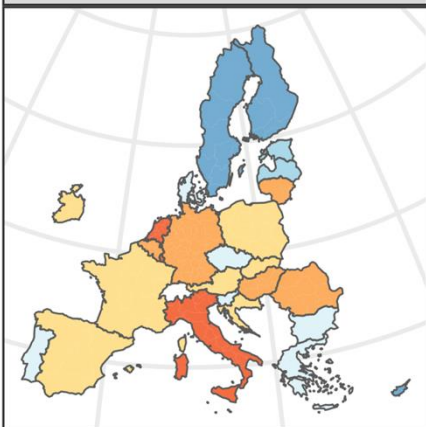
Geographical proximity



- ✓ *Distance from the war zone (km)*
- ✓ *Distance from border of Ukraine or Russia (km)*

Cronbach Alpha = 0.932

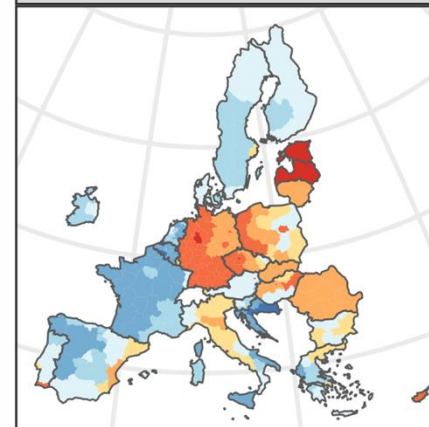
Energy mix exposure



- ✓ Share of natural gas in energy use households (%)
- ✓ Share of natural gas in energy use in industry (%)

Cronbach Alpha = 0.649

Migration ties

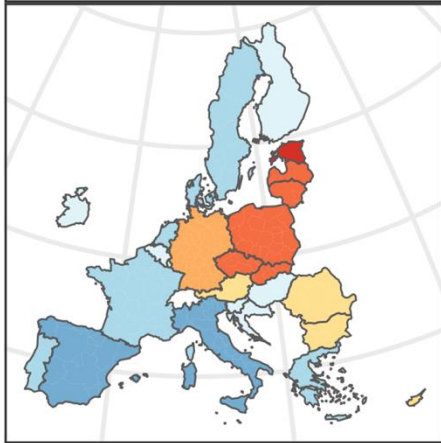


- ✓ Share of population born in Ukraine or Russia in total region population according to census



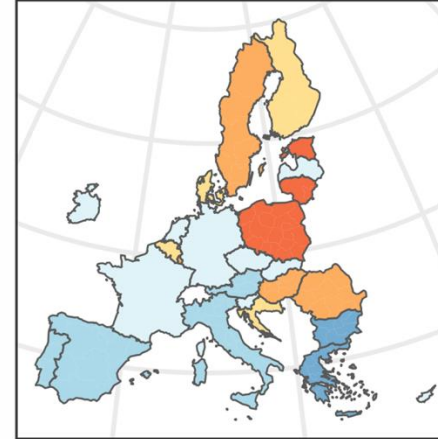
Consequences indicators – part 1/2

Macro-level social impact



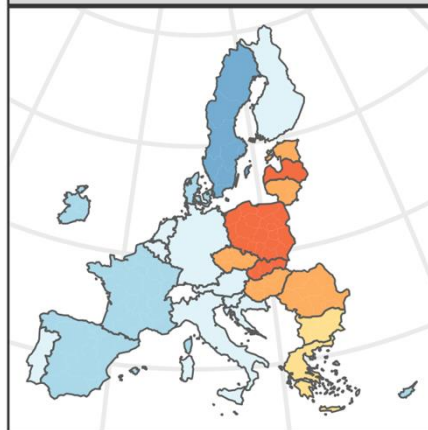
- ✓ Ukrainian citizens beneficiaries of temporary protection per thousand persons
 - ✓ Share of country Internet news mentions covering events that happen in Ukraine or Russia (%)
- Cronbach Alpha = 0.760

Fiscal policy response



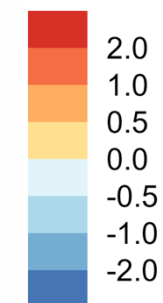
- ✓ Change in the total general government expenditures (%)
 - ✓ Change in the share of expenditures on defense in total general government expenditures (%)
 - ✓ *Change in the share of expenditures on social protection in total general government expenditures (%)*
- Cronbach Alpha = 0.697

Macroeconomic impact



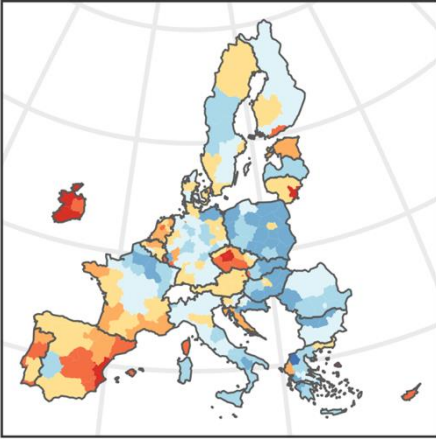
- ✓ Change in effective exchange rates
 - ✓ *Change in net position of non-financial corporations 2021-2024 as a % of GDP*
 - ✓ *Change in the share of import from Russia in total import of fuels (%)*
- Cronbach ALpha = 0.635

SD from the mean



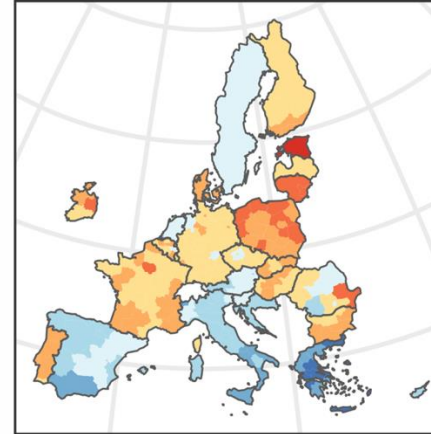
Consequences indicators – part 2/2

Demographic change



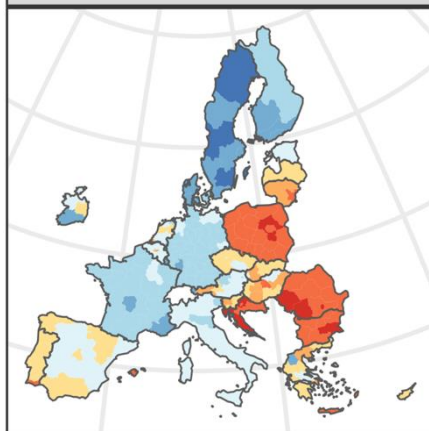
- ✓ Change in population (%)
 - ✓ Net migration (per 1000 pop.)
- Cronbach Alpha = 0.904

Labour market adjustment



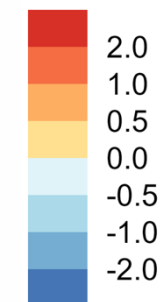
- ✓ Change in unemployment rate among population from 15 to 74 years (%)
 - ✓ Enterprise deaths per 1000 enterprises
- Cronbach Alpha = 0.515

Economic performance



- ✓ Change in gross domestic product (GDP) per inhabitant at current prices (%)

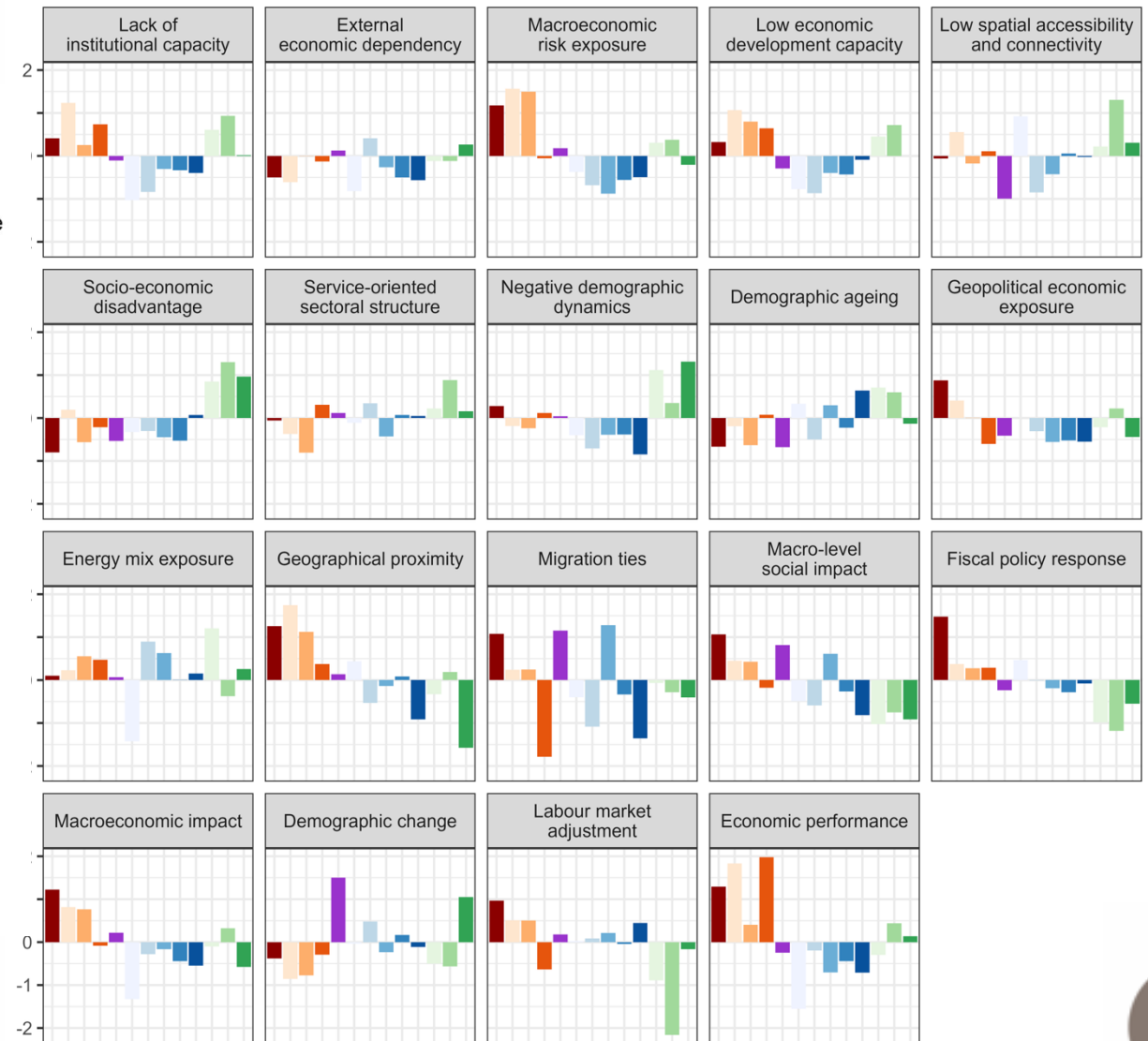
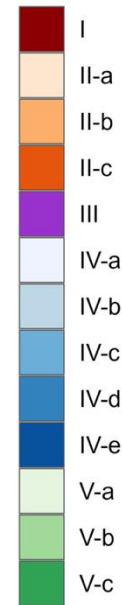
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Typology of European regions



Profile and type



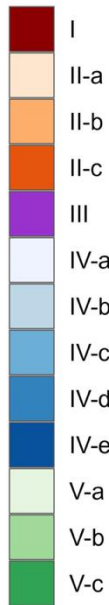
Profile and type



Typology of European regions: profile I



Profile and type



Profile I: Geopolitically Exposed Regions with High Reactivity

V: relatively favourable socio-economic conditions, spatial peripherality, moderately constrained development potential

E: proximate to the conflict zone, integrated into trade networks with Ukraine and Russia, sizeable diaspora communities from both countries

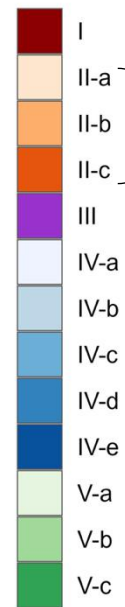
C: the largest scale of refugee inflows, significant labour market pressures, increase in public expenditure, maintenance of positive economic growth



Typology of European regions: profile II



Profile and type



Profile II Regions of Peripheral Structural Vulnerability with Differentiated Energy Exposure

V: relatively low level of economic development, elevated macroeconomic risk and persistent institutional deficits

E: dependence on Russian fossil fuel supplies, territorial proximity to Ukraine

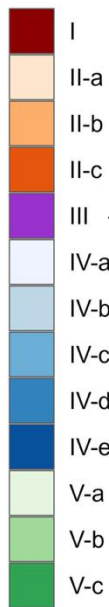
C: comparatively favourable economic performance, limited integration into value chains linked to the conflict zone, deepening depopulation is simultaneously deepening, weaker fiscal policy response (than in profile I)



Typology of European regions: profile III



Profile and type



Profile II Transitional Regions with Migration Exposure

V: comparatively well developed, well connected, low levels of deprivation, strong export orientation renders them more susceptible to broader economic disruption

E: migration corridor, strong population-based ties to Ukraine and moderate geographical proximity, no significant energy dependence on Russia

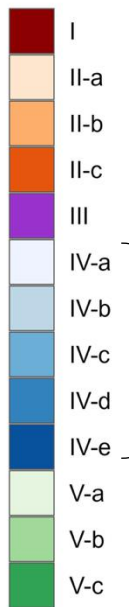
C: substantial influx of refugees and increased pressure on public services, whilst labour market conditions and economic output have remained relatively stable



Typology of European regions: profile IV



Profile and type



Profile IV Resilient Core Regions with Adaptive Fiscal Response

V: the highest level of economic development, low poverty rates, well-developed transport infrastructure and robust institutional frameworks, although the more service-oriented among them may prove susceptible to external demand shock

E: mixed energy dependence and trade links:
German/Dutch types affected by the disruption of Russian gas supplies and international trade, while the Nordic countries maintain limited economic ties with Russia

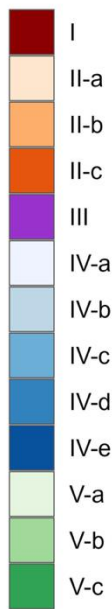
C: increased public expenditure and deteriorating economic performance in several member states



Typology of European regions: profile V



Profile and type



Profile V Mediterranean Service-Sensitive Regions

V: a combination of high dependence on tourism and services, elevated poverty levels in parts of the area, advanced population ageing and a prolonged structural decline in fertility

E: predominantly indirect: despite distance from the frontline, regions have been affected by the decline in tourist arrivals from Russia and Ukraine and by rising energy prices

C: limited social effects, absence of an expansive budgetary response to the shock, and differentiated economic outcomes ranging from relatively contained effects to a marked deterioration in economic performance in Italy



Typology of European regions: conclusions

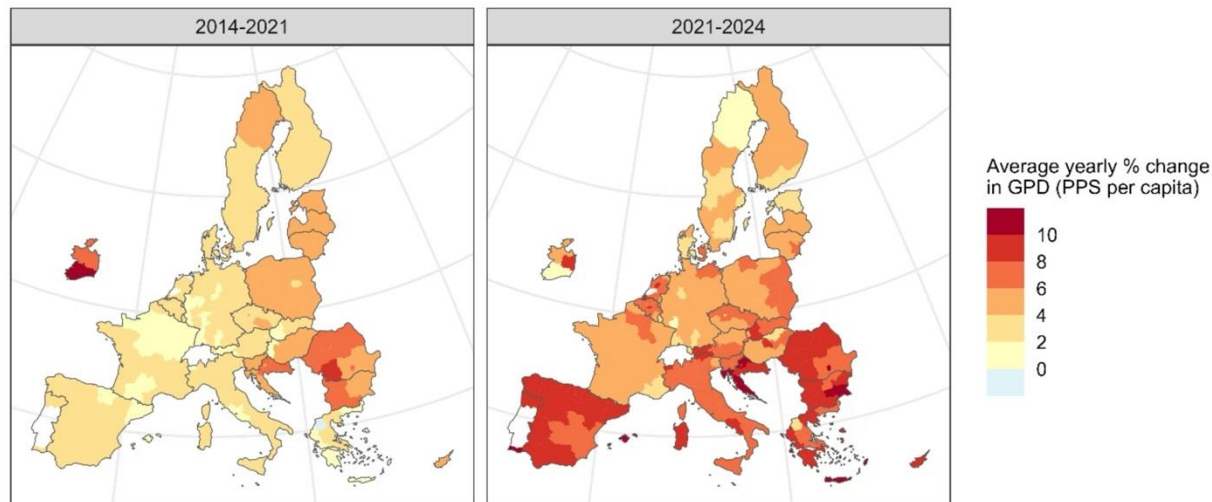
- The resilience of EU regions to geopolitical shocks has a multidimensional character and is a product of a specific configuration of structural vulnerability, exposure channels and the capacity to absorb consequences.
- Regions with the highest levels of exposure do not invariably record the most severe economic outcomes.
- Core regions and Mediterranean regions, despite lower levels of direct exposure, experience the effects of the shock through distinct channels, the energy costs and demand-side constraints.



Next steps

Explanatory statistical analysis modelling changes in GDP and unemployment dynamics based on economic vulnerability and exposure channels.

Case studies in 4 regions of EU from different exposure types and major exposure channels



Stage 1 — An in-depth analysis of public policy documents to identify measures aimed at strengthening regional adaptive capacity.

Stage 2 — Survey research conducted among residents

The survey will measure residents' perceptions of regional vulnerability, exposure and the consequences of the shock, as well as perceived adaptive and transformative capacities.

Sample: 500 respondents per case-study region.

Stage 3 — Individual in-depth interviews with regional and local stakeholders.

An in-depth analysis of the mechanisms of resource mobilization, sequences of actions, learning processes, and transformative trajectories from the perspective of key local actors.

Respondents will include:

- Local government employees
- Entrepreneurs
- NGO representatives
- University representatives (expert interview)

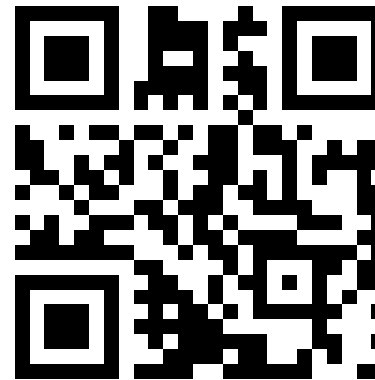


WORKING PAPERS OF RECOURU PROJECT

REINTERPRETING REGIONAL RESILIENCE IN THE CONTEXT OF THE WAR IN UKRAINE: A CASE STUDY OF EUROPEAN REGIONS



01/2026



<http://recoru.amu.edu.pl/>

Churski P., Adamiak C., Dubownik A., Pietrzykowski M., Szyda B., 2026.
*REINTERPRETING REGIONAL RESILIENCE IN THE CONTEXT OF THE
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Working Paper of RECOURU Project. Faculty of Human Geography and
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Paweł Churski,
Czesław Adamiak,
Anna Dubownik,
Maciej Pietrzykowski,
Barbara Szyda,

Corresponding author: Paweł Churski chur@amu.edu.pl

ABSTRACT: Over the past decade, European regions have confronted a succession of major shocks, including the global financial crisis, the COVID-19 pandemic, and Russia's aggression against Ukraine. These events, combining sudden disruptions with "slow-burning" pressures, have exacerbated spatial inequalities, positioning regional resilience at the forefront of public policy. The confluence of acute and chronic stressors creates a complex environment that complicates mitigation efforts, particularly at regional and local levels. Consequently, addressing these challenges requires a reinterpretation of resilience grounded in a precise identification of shock sources and their impact on regional development trajectories. The aim of this analysis is to develop and implement a methodological framework for operationalizing regional resilience, specifically to categorize European Union regions based on their capacity to withstand the impacts of Russia's aggression against Ukraine. By integrating the VEC components (vulnerability, exposure, and consequences) with a multidimensional assessment encompassing social, economic, infrastructural, environmental, and institutional factors, this study adopts an evolutionary, multi-phase perspective on resilience. The results of the typology provide a basis for selecting test regions for idiographic studies aimed at identifying the process of evolutionary and transformational change in regional socio-economic systems occurring in response to the development shock in question.

KEY WORDS: regional resilience, vulnerability, exposure, consequences, Russia's aggression against Ukraine, typology, EU regions.

Paweł Churski - Faculty of Human Geography and Planning, Adam Mickiewicz University Poznań, Krygowskiego Street 10, 61-680 Poznań, Poland, chur@amu.edu.pl, ORCID: 0000-0002-4152-1211
Czesław Adamiak - Faculty of Earth Sciences and Spatial Management, Nicolaus Copernicus University in Toruń, Lwowska Street 1, 87-100 Toruń, Poland, czeslaw.adamiak@umk.pl, ORCID: 0000-0003-3307-5079
Anna Dubownik - Faculty of Earth Sciences and Spatial Management, Nicolaus Copernicus University in Toruń, Lwowska Street 1, 87-100 Toruń, Poland, a_dubownik@umk.pl, ORCID: 0000-0003-0813-7961
Maciej Pietrzykowski - Department of International Competitiveness, Poznań University of Economics and Business, Niepodległości Street 10, 61-875 Poznań, maciej.pietrzykowski@ue.poznan.pl, ORCID: 0000-24 0003-0802-6871
Barbara Szyda - Faculty of Earth Sciences and Spatial Management, Nicolaus Copernicus University in Toruń, Lwowska Street 1, 87-100 Toruń, Poland, bszyda@umk.pl, ORCID: 0000-0002-9221-6284

Faculty of Human Geography and Planning, Adam Mickiewicz University Poznań,
Krygowskiego Street 10, 61-680 Poznań, Poland
<http://wgzeigp.amu.edu.pl/>

