ECR2
Economic Crisis: Resilience of Regions

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List of authors and principal contributors

Cardiff University:

Gillian Bristow

Adrian Healy

Laura Norris

FTZ-Leipzig

Rudiger Wink

Aristotle University

Grigoris Kafkalas

Christina Kakderi

Tartu University

Kerly Espenberg

Uku Varblane

Veiko Sepp

Gdansk University

Iwona Sagan

Grzegorz Masik

Manchester University:

Marianne Sensier

Alan Harding

Experian Plc:

Adam Swash

Heather Carey

Contents

1 INTRODUCTION

The ESPON project Economic Crisis: Resilience of Regions (ECR2) examines the geography of the economic crisis across the ESPON territory, and explores why some regions are more able to withstand an economic downturn than others, or are able to recover faster. The project began in April 2012 and culminates in Autumn 2014. This report constitutes the Draft Final Report of the project.

The ECR2 study resonates strongly with the territorial challenges identified for ESPON 2013 projects. That the current economic downturn is having an asymmetric impact on regions and cities is explicitly recognised as one of the seven mega-trends facing the European territory. What makes some regions more resilient in the face of economic crises, and others less so, is a question that has strong relevance in the present economic circumstances.

1.1 Project objectives and structure

The objective of the project is:

"To expose territorial evidence that supports policy-makers at different administrative levels in making the economic structure(s) in Europe and its countries, regions and cities more resilient to economic crises and a sudden economic downturn."

In doing so, the project was asked to deepen our understanding of:

- The impact of the current economic crisis and other recent crises such as the one in the early 1990s;
- The resilience of economic structures;
- The capacity (of regions and territories) to adapt to new socio-economic realities.

The project was also provided with a number of associated policy questions and research questions, that form the foundations for the work undertaken. These were:

1. To identify the territorial impact of the last economic crisis:
   - To identify indicators which present a robust measure of the territorial impact of the economic crisis.
   - To measure the territorial impact of the economic crisis at different geographical scales, to identify and map the distribution of these impacts across the European territory and to identify whether specific types of region have been more affected than others.
   - To identify whether particular economic activities/sectors were particularly impacted by the economic crisis, and the location of these effects

- To identify the spatial and temporal distribution of the territorial impact of economic crises across the European territory.

2. To estimate the territorial resilience of regions:
   - To identify what elements in economic structures and policy responses made a difference to regions' ability to recover from the economic crisis.
   - To identify the qualitative and quantitative factors which form territorial characteristics enabling some regions to resist, or move out of, economic downturn more effectively than others.
   - To identify which regions and which types of territories tend to be more resilient and adaptive to economic crises in Europe.

3. To understand the role of territorial policy responses in promoting economic resilience:
   - To identify the potential role that territorial development policies can play, and are playing, in promoting regional resilience and economic recovery.
   - To estimate the contribution that integrated and place-based actions can play in complementing macro-economic measures aimed at stimulating economic recovery.
   - To consider how policy-makers can enhance the resilience of regional economies for future economic downturn.

This Draft Scientific Report considers each of these elements through a series of exploratory analyses. The structure of the report is as follows:

- Section 2 introduces the methodology adopted for the study
- Section 3 sets out the existing literature on economic crisis and resilience
- Section 4 outlines the recent economic crisis and identifies historical shocks since 1990
- Section 5 explores the territorial impacts of the most recent crisis and considers the effects of historical shocks since 1990.
- Section 6 identifies the economic resilience of regions in the face of the most recent crisis and to historical shocks
- Section 7 presents the findings of quantitative analyses of factors that potentially underpin economic resilience
- Section 8 presents the findings of the qualitative analysis of factors underpinning the resilience, or otherwise, of eight case study regions.
- Section 9 provides reflections on the role of policy instruments in promoting resilience
- Section 10 presents the findings of each of the eight case studies undertaken for this project

1.2 Regional Resilience

Regional Resilience is defined in terms of economic resilience – this does not underplay other forms of territorial resilience (to natural disasters or other hazards for example) but acts as the focus for this study. For definitional purposes it is defined in terms of a regional economy's ability to withstand or overcome a recessionary event in the wider economy. Extending from this, our working definition of resilience for this project is:

The ability of a regional economy to withstand, absorb or overcome an internal or external economic shock.

We capture resilience to economic shocks both in terms of the response of economic output (as measured by levels of total GDP) and employment (measured as total number of persons employed[1]). Other measures that were considered include number of persons unemployed (or rate of unemployment) and levels of household income. Both have their advantages in terms of conceptions of what constitutes resilience but were discounted for methodological reasons and based on wider discussions as to key policy concerns. In practice we have favoured the use of employment as an indicator of resilience, both because it is subject to fewer revisions over time than measures of GDP and because it resonates with the wider public, who tend to be concerned about the ability of an economy to support employment. For the purposes of this work we consider economic resilience at both the NUTS 2 and NUTS 3 territorial scales.

Our approach identifies four categories of resilience:

- **Resistant regions (RS)** – those regions that have not experienced an absolute decline in economic activity following the economic shock.
- **Recovered regions (RC)** – those regions that experienced a decline in economic activity, but have since recovered to pre-shock activity levels.
- **Not-recovered, but in upturn (NR1)** – those regions that experienced a decline in economic activity, have passed the trough of the recession, but have not yet recovered to pre-shock activity levels
- **Not-recovered, still in decline (NR2)** – those regions that experienced a decline in economic activity, which was still ongoing at the time of the analysis.

It is worth noting that resilience to an economic shock does not necessarily imply that the economy is otherwise strong and performing well over the longer-term. It is a measure of how the economy responded to a particular economic shock. Resilience

[1] As part of the analysis we also consider total number of jobs in the economy concerned.

may thus differ from economic growth. Equally, regions that experience a very tight labour market prior to a shock may appear to be less resilient (owing to the difficulty of returning to artificially high employment rates). Furthermore, there may be a trade-off between resilience in the short-term and over the longer-run. These are considerations that are dealt with later in the report.

2 METHODOLOGY

The study has employed a mixed methods approach that has combined quantitative data analysis with qualitative fieldwork. The key methodological stages have been:

- A review of existing literature concerning the definition of resilience, its component features and ways of measuring this
- The collation of datasets through which to assess the resilience of regions in practice
- The analysis of these datasets to assess the factors that might influence observed levels of resilience
- The synthesis of data sources to assess the impact of the most recent economic crisis
- Mapping of key findings
- The completion of eight case studies to examine the effect of the crisis in practice

In the following section we present a brief introduction to the main components of the methodologies adopted.

2.1 Quantitative analysis

2.1.1 Datasets utilised

The quantitative analysis undertaken by the study is based on two principal datasets. Each contains an annual dataseries of key indicators. The key indicators were informed by the literature review undertaken during the study.

The first dataset was provided by Experian Plc., based on their European Regional Forecasting Service. This contains data from 1990 onwards for the following indicators at various spatial scales:

- GDP
- Total Employment
- FTE Employment
- Total Employment by Sector (4 sector)
- Participation rate
- Employment rate
- Unemployment rate
- Household disposable income

- Number of enterprises
- Size of business
- Business birth rate
- Self employment
- Investment
- Innovation
- Hours worked
- Educational achievement (tertiary education)
- Net migration

Owing to identified gaps in the data coverage it was decided to complemented the Experian data through the purchase of Cambridge Econometric's Regional Database. This contained a fuller temporal coverage of key indicators, but at the expense of a slightly narrower geography. The CE data incorporates the following indicators at NUTS 1, 2 and 3 spatial scales:

- GVA (10 sector)
- Employment (10 sector)
- GDP
- Population
- Compensation of employees
- Hours worked
- Active population
- Gross Fixed Capital Formation

The employment data provided by Experian is in the form of total number of jobs. That of CE measures the total number of people employed.

We complemented the annual dataseries with the collection of spatially disaggregated data for a number of additional indicators. This was used to assess the potential role of different territorial features in the level of observed resilience, as well as to provide information on the territorial impact of the economic crisis. Key indicators include:

- Territorial typology - mountainous, coastal, urban, National borders
- Innovation typology
- Government debt
- Industrial transition
- Convergence regions
- Transitional regions

- Trade, exports and inward investment
- Household debt
- House prices
- Migration patterns
- Perceptions of the future
- Perceptions of poverty
- Population at risk of poverty
- Population in low work intensity households
- Youth unemployment

2.1.2 Measuring Resilience

In order to measure the resilience of territories we had first to define the concept of resilience and the indicators to be used. This involved identifying which crises regions were supposed to have been resilient to. There is no standard definition of an economic crisis. Most definitions identify economic crisis as a period, often long-term, of low or declining economic growth. Some definitions also include increasing levels of unemployment and/or falling prices. Most definitions are aspatial, or take a national economy as their territorial unit.

The most accepted measure of economic growth is a change in the level of Gross Domestic Product (GDP). Typically, a decline in this measure for two consecutive quarters (3 month period) constitutes a recessionary event. Of course, GDP does not capture the full operation of the economy. In particular increases in productivity can result in increasing levels of output but declining levels of employment. Employment is also the most visible indicator for a population as to whether their economy 'feels' resilient or not, and has a tangible impact on the absolute and relative well-being and welfare of communities. In calculating GDP the contribution of each individual producer, industry or sector in an economy - known as Gross Value Added (GVA) – is also used. This equates with the 'production' and 'income' estimates of GDP. Expenditure based calculations of GDP are greater that GVA in that they take into account taxes and subsidies applied to goods and services produced.

Thus, in developing our key indicators for geography of the last economic crisis we consider the following (see also Box 2.1):

- A fall in gross annual GDP/GVA – measured in domestic currency to avoid the impact of currency fluctuations
- A fall in levels of gross employment on an annualized basis

Alongside these economic indicators we also consider the breadth of any changes. The proportion of States registering falls in economic performance in any one year varies across the EU, and the number of regions even more so. Our third key indicator is thus to examine the number of economies experiencing decline in any single year.

Box 1.1 Defining economic crisis

We take two standard measures of economic performance as indicators of economic growth or decline.

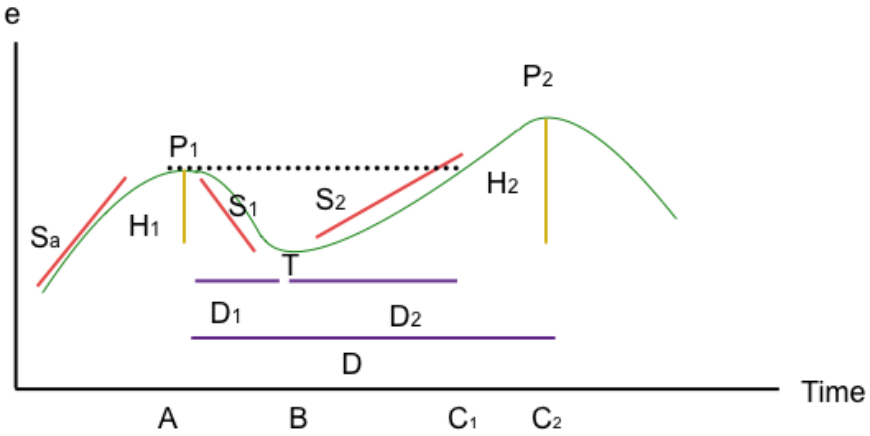
The first is economic output, measured in terms of GDP at constant prices. We have used constant prices in the domestic currency rather than a purchasing parity standard measure. GDP is the conventional indicator used to measure economic decline, with a recession typically defined as two consecutive quarters of negative growth. For the purposes of this work we amend this to a year-on-year decline in economic activity. This provides a stronger measure of longer-term effects, which is more appropriate when considering resilience, and where data availability is stronger.

The second is total employment. Here there are two standard measures: one based on the location of the workplace, and the other on residence. Our preferred measure here is workplace-based, although we test both measures to assess whether significant differences occur. Again, we look to a year-on-year decline in in employment numbers as a measure of economic decline in the territory concerned, partly to avoid short-term fluctuations and partly for reasons of data availability.

The study examines the correlation between these two measures to examine whether the two indicators may lag or lead each other in a consistent manner. We consider employment as our prime indicator of economic activity, owing to the significance of this to residents within the territories concerned.

2.1.3 Operationalising the definition

To operationalise our concept of resilience we refer to the stylized recession in Figure 1, where peaks are marked "P" and the trough "T" and we report the years where these are reached for the NUTS 2 regions. The depth of the recession is measured by the height from peak to trough, the duration of the recession is measured in years by D1 and the duration of the full cycle (peak to peak) is D. We are also interested in the amount of time it takes the region to recover to its pre-recession peak and this is shown by C1 on the graph. The steepness of the recession is calculated as the gradient of the line S1, into recession, and S2, recovery to the next peak.



P = Peak
T = Trough
H = height of economic peak/Trough
S = slope of growth path (decline or recovery)
D = duration of downturn/recovery

Ha = gain in jobs from trough to peak prior to the crisis
H1 = fall in jobs from peak to trough in the crisis
H2 = gain in jobs from trough to peak after the crisis
Da = duration of expansion from peak to trough prior to the crisis
D1 = duration of recession from peak to trough
D2 = duration of expansion from peak to trough after the crisis
D = duration of entire cycle peak to peak
C1 = year reached to get back to peak employment level = D1+D2
D_C1 = duration taken from trough to reach pre-crisis peak employment level
Sa = gradient of trough to peak prior to crisis = Ha/Da
S1 = gradient of peak to trough of the crisis = H1/D1
S2 = gradient of trough to peak of the expansion following the crisis = H2/D2

2.1.4 A business cycle approach

This approach implies using the concept of business cycles to estimate the resilience of a territory, rather than assume that a crisis has a fixed start date. We analyse the Cambridge Econometrics employment and GDP data for NUTS2 regions for EU countries. This investigation centres on the classical business cycle, measuring absolute falls in economic activity rather than deviations around a trend which are referred to as growth cycles (growth cycle facts are computed by first de-trending the data using a filter, see Harding and Pagan, 2002a. Canova, 1994, has shown that the business cycle facts can differ depending on what de-trending filter is used).

The economy can be in either of two mutually exclusive phases: expansion (E_t) or recession (R_t). Our convention is that a peak terminates an expansion and a trough

terminates a recession. To enforce the alternation of peaks and troughs it is useful to distinguish turning points within these two phases:

$$E_t \equiv \begin{cases} EC_t \\ P_t \end{cases}$$
$$R_t \equiv \begin{cases} RC_t \\ T_t \end{cases} \qquad (1)$$

From the expansion continuation (EC_t) we can make a transition to the peak (P_t) or continue the expansion, but not vice versa as only $P_t \rightarrow RC_{t+1}$ is admissible. Analogously, from recession continuation (RC_t) we can make a transition to the trough (T_t) but $T_t \rightarrow EC_{t+1}$ with the probability of 1. The dating rules impose a minimum duration of a phase of 1 year. We also impose the minimum length of the entire business cycle (from peak to peak) to be 2 years. The maximum length of cycle is unlimited and if two business cycle phases occur in quick succession then the highest peak is dated as the start of the cycle and the lowest trough is the end of the cycle, this could then take in two cycles (a 'double dip' recession) or more. Turning points in the classical cycle are dated by taking the annual growth rate of employment and any falls over a year are reported as recessions with the maximum level in employment before the recession dated as the "peak" turning point and the minimum level within the recession dated as the "trough" turning point. We check that peaks and troughs alternate.

Our approach relates to the Bry and Boschan (1971) cycle dating used by the National Bureau of Economic Research (NBER). We prefer this method to the Markov Switching (MS) approach. Harding and Pagan (2002b) state that the NBER method is more transparent, robust and easier to replicate (when they compare this method with a MS model applied to US Gross National Product). With the MS model decisions need to be made as to whether the switch occurs in the intercept or mean, how many business cycles states are required, whether transitions probabilities and variances are constant (or not) along with rules about the magnitude of weighted average growth rates.

2.1.5 Categorizing Resilience

We define resilience on the basis of four categories, based on observed levels of economic activity over the defined reference period. Economic activity is measures either in terms of employment or GDP. A region is "resistant" to recession (RS) if levels of economic activity did not fall during the period of the shock in question. For those regions that experience a fall in economic activity following the shock but return to their pre-recession peak (C1) then we say they have "recovered" (RC). For

those regions that have "not recovered" to their pre-crisis peak, where they have passed the trough of the recession and activity has begun to rise we classify them as not recovered but experiencing an upturn towards recovery (NR1) or, if they are still experiencing employment contraction and the trough is yet to be reached in the last year of our sample in 2011, we classify them as not recoverved and still in decline (NR2). For the purposes of the current study a region is resilient if it has resisted or recovered from the economic shock by 2011. To summarise the four categories:

- Resistant – no downturn in employment (or GDP)
- Recovered – recovered to pre-crisis peak levels of employment (or GDP)
- Not recovered: upturn – not yet recovered to pre-crisis peak levels of employment (or GDP) but upturn recorded
- Not recovered: no upturn – not yet recovered to pre-crisis peak levels of employment (or GDP) and still in decline

2.1.6 Spatial units of analysis

We have measured the observed resilience of regions at the national level (NUTS 0), the NUTS 2 level (broad regional scale) and NUTS 3 (broad local scale). This has been undertaken for employment at the NUTS 0, NUTS 2 and NUTS 3 scales (using only the CE data for NUTS 3). It has been undertaken for GDP at the NUTS 0 and NUTS 2 scales.

2.1.7 Measuring Relative Resilience: Within Country Comparisons

Our approach has also taken into account the potential influence of macro-economic factors by assessing the relative resilience of regions within countries. Our first approach to this was to adapt Martin's (2012) sensitivity index, which compares the percentage change in regional employment (E_R) to national employment (E_N) in a downturn:

$$\beta_R = (\Delta E_R / E_R)/(\Delta E_N / E_N)$$

A Beta less than one signifies that a region is more resistant than the nation and Beta greater than one means a region is less resistant. Our approach adds value to Martin (2012) in that it allows more flexibility in dating business cycle turning points uses rather than assuming fixed turning points for each region. Sensier and Artis (2014) also use the flexible turning point approach in dating employment in NUTS 1 regions of the United Kingdom.

However, this approach was found to be unsuited to a multi-country application and so an alternative approach was adopted which compares the resilience category of the region with that the country as a whole. This takes the observed resilience category of each region and compares it to the national average. The difference between the two is then calculated, providing a range of values where the greatest differential (+/-) is between Resistant national territories (RS) and Non-Recovered: no upturn regions (NR2), or vice versa. In the former case the region would be significantly less resilient than the national territory, in the latter significantly more so. Where regions and national territories have the same category they are described as equally resilient. The drawback of this method is that it does not calculate relative degrees of resilience within categories, but this is not believed to be significant.

2.1.8 Assessing the components of resilience

A key part of the project has been to estimate what features may influence the levels of resilience observed within territories. To do so the project examined a range of indicators drawn from a wider analysis of theoretical and practice-based literatures. Datasets were then developed using the Experian ERFS and Cambridge Econometrics Regional Database. This was augmented with data drawn from Eurostat and from other sources. The quantitative data was then subject to a range of univariate, bivariate and multivariate analysis techniques. The details of these are set out in Section 7. To order the analysis the indicator sets were organised into four categories, broadly relating to:

- Business and economy
- People and population
- Place-based
- Community and society

2.2 Qualitative analysis

2.2.1 Case study approach

To complement the top down approach of our trend data and components analysis, we utilised a bottom up approach to build up our understanding of regional resilience through selected, in-depth case studies of eight case study regions. The selection of case studies was based upon a purposive sample of case studies ensuring we capture a spectrum of regional types and experiences. Key criteria shaping our matrix included:

- Different extremes in relation to the impact of the current economic and financial crisis;
- Historical economic development trajectories
- Evidence of interesting resilient properties from literature, expert advice and trend analysis;
- Economic size

- Governance, financial and institutional structures and contexts (including euro-zone and non euro-zone nations)
- Current fiscal conditions (Member States in receipt of support from Stability Fund, and those at 'risk' of 'contagion');
- Extent to which Regions form 'gateways' into wider economies
- The development of the green economic paradigm and other path diversification strategies;
- Geographical distribution (in respect of the ESPON territory and regional typologies).

We also took into account the examples set out in the Specification for the study and used these as points in our sampling design. The territorial scale of each case study varies depending upon the prevailing governance context. In principle, NUTS 2 regions are identified except in Wales where the NUTS 1 was regarded as more relevant. Where relevant, analysis will also take into account territorial policy approaches at the NUTS 3 level.

Country	*Territory*	*Economic performance in crisis*	*Development path*	*Gateway*	*Eurozone*
Germany	Stuttgart	S	Red-green	S	Y
Finland	South Finland (focusing on Uusimaa)	S	diversified	S	Y
Poland	Pomorskie (focusing on Gdanski)	S	transitioning	S	N
Estonia	Pohja Eesti (considering national context)	M	diversifying	S	Y
Greece	Western Macedonia (considering Kozani)	W	deindustrialising	W	Y
Ireland	South Eastern (focusing on South West)	W	mixed	W	Y
Italy	Apulia (focusing on Brindisi)	W	Greening	W	Y
UK	Wales (focusing on West Wales and the Valleys)	M	Greening	W	N

S=strong, M=mixed, W=weak

Each case study considered:

- The historical evolution of institutional and policy responses to the current early 1990s crises and thus the collection of time-series data matching the period of the quantitative trend analysis (i.e. 1990 – 2010);
- The role of different economic and social structures (employment rate, age structures, influence of migration/social openness) in dampening or enhancing the transmission of economic shocks
- Biographies of particular territorially resilient processes;
- The role of policy in responding to and preparing for economic shocks

The case studies were undertaken guided by a common pro forma. Each was based on a series of semi-structured interviews, with representatives of business, national and regional policy makers and local communities. This was supplemented by the analysis of secondary datasets and at least one workshop or seminar involving a wider audience. *Inter alia*, the case studies examined:
The structure of the regional economy – level of dependence on individual sectors, adaptability of the economy, stress response of economic sectors

The urban structure of the region – extent to which this enables or constrains the more efficient use of regional endogenous sources

Social structures – extent to which these dampen or enhance transmission of economic shocks

All the regions selected have experience of recessions in the past, enabling their recovery paths to be explored. Three of the regions (Wales, Stuttgart and Apulia) have made strong statements towards developing new 'green' development paths, enabling the study to explore the challenges of reorienting regional strategies towards new development paradigms. Some of the regions have been relatively less affected by the economic crisis, whilst others have been strongly adversely affected. The regions are located in Member States which have also had mixed experiences under the economic crisis and exhibit diverse territorial characteristics. This provides a rich resource for territorial analysis, particularly the scope for undertaking regionally initiated policies aimed at promoting resilience and recovery.

2.2.2 Case Study Pro Forma

Economic Resilience: Case Study Guidance, October 2012

Note: this complements the previous template. It is intended to provide advice on the minimum requirement of the case studies and seeks to provide some common guidelines to encourage consistency of approach across the case studies. As ESPON is a research project, we encourage you to adopt additional approaches to extend our understanding of the resilience of regions to economic shocks.

A. Purpose of the case studies:

1. To identify local perceptions as to the responsiveness of the regional economy to the current economic crisis, including views on how 'resilient' the economy is to the current crisis (and past crises).

2. To identify components of economic resilience within the case study territories, to include:

- Business attributes (sectoral structure, mix of firm size, market orientation, levels of innovation etc)
- People attributes (skills of the population for example)
- Community attributes (social capital, levels of net migration, governance systems, attitudes to informal economy etc)
- Place attributes (settlement structure for example)

3. To identify the role that sub-national policies (working alongside national policy contexts) have played in promoting:

- the resistance of the economy to the economic downturn
- the recovery of the economy from this (or past) economic downturns
- the speed with the economy regains past growth trends (renewal)
- the reorientation of the economy towards a new economic mix

4. To identify potential indicators (early warning signs) of resilience (or lack of resilience) based on existing local knowledge (eg business surveys)

The purpose of the case studies is both to test the ideas which are included in the Inception Report (see the review of the literature in particular) and to identify actual practice on the ground – in order to contribute to theory building. We are particularly interested in exploring how resilience might emerge from

- individual behaviour (of firms, persons etc)
- the actions of public authorities

The case studies also play an important role in testing the relevance of the common indicators identified by the study and seeking to explore the value of alternative (perhaps qualitative) indicators which might be more locally-specific.

B. Case study approach

It is expected that the case studies will include:

Contextual review

- A key statistics box establishing key facts about the region in question (including size / area; population; GDP / GNP per capita; key industries; regional 'type' e.g. according to ESPON typology)
- Review of relevant literature and data pertaining to the region in question
- Review of relevant data relating to national context (see for example http://www.oecd.org/gov/regionaldevelopment/oecdregionaloutlook2011.htm(for OECD members)

Policy analysis

- Review of policy instruments identified as relevant to the resilience of the region in question. We do not anticipate an exhaustive review of potential policies. The focus should be on sub-national policies unless particular national policies/approaches are especially important.

Interviews (face to face, telephone and focus groups)

- Interviews lie at the heart of the case studies. It is for the experts involved to identify the most appropriate mix. We have been asked for guidance and suggest a minimum interview requirement of 28-30. This is to include
    - Contextual interviews at a national level (relevant ministries and knowledgeable actors) – 4 minimum
    - Interviews with sub-national governance authorities – 4 minimum
    - Interviews with locally-based businesses or business organisations – 8 minimum
    - Interviews with regional support agencies (economic development/enterprise assistance) – up to 4
    - Interviews with civic groups (eg Trades Unions, community organisations, NGOs etc) – 6 minimum
    - Local/regional contextual interviews with knowledgeable actors – 4 minimum
- We suggest the interviews are structured in the following phases:
    - Phase 1 - Initial context gathering
    - Phase 2 – exploring the extent of and components of resilience within the region
    - Phase 3 – testing the findings (eg with business and civic groups)

- Phases 1 and 2 are to be broadly completed by the end of December (to allow initial findings to be included in Interim Report. Phase 3 should be completed by Summer 2013.

Resilience Seminar

- As part of Phase 3 a resilience seminar should be held within each region.

C. Content for Case Studies

1. Context

Pattern of economic resilience

- Graphs of economic performance (GDP and employment)
- Extent to which 'resilience' is a consideration within regional dialogue and discourse

Qualitative description of key 'shocks' and regional response. Characterise the economy as:

- Un/Able to withstand a shock
- Un/Able to absorb a shock
- Un/Able to overcome a shock

(this is only intended to be indicative. Where responses differ across different 'shocks', or within a region for the same shock, this might provide room for comparative assessment).

Describe the recovery path from a shock in terms of:

- Recovery
- Renewal
- Reorientation
- Resistance

(see Inception Report for definitions. Be willing to identify weaknesses in these categorisations).

Key descriptive facts on

- Economic characteristics
- Population characteristics
- Characteristics of place
- Community characteristics

(Key facts should highlight any significant variations in characteristics across the region).

2. Local perceptions of resilience

Identify local perceptions as to the responsiveness of the regional economy to the current economic crisis, including views on how 'resilient' the economy is to the current crisis (and past crises).

Is there interest in the pursuit of resilience? If so what form does this take?

How have key players (entrepreneurs, firms, development agencies, local and regional governments etc) responded to the crisis?

Was any pre-emptive action taken before the crisis hit?

3. Identifying the components of resilience

The role of economic characteristics

- Economic structure (eg level of dependence on individual sectors and how this affects resilience, advantages/disadvantages of diversity versus specialization, significance of firm size distribution etc)
- adaptability of the economy (eg identification of new markets, innovation, entgrepreneurship etc)
- stress response of economic sectors/employers (release workers, change working practices, reduce/increase investment, close operations)
- stress response of employees (take wage cuts, change working hours, take redundancy etc)
- levels of external and internal connectivity

The role of population characteristics

- Significance of demographic structures
- Significance of skills mix
- Significance of educational qualifications
- levels of external and internal connectivity

The role of place characteristics

- significance of agglomeration/urban structure in resilience
- role of levels of accessibility on resilience
- levels of fiscal autonomy in public sector finances

The role of community characteristics

- Social structures – extent to which these dampen or enhance transmission of economic shocks (eg social capital, role of social transfers (formal and informal), openness etc)
- Consumer behaviour - The role of media in the process of shaping consumers' behavior together with entrepreneurs' attitudes toward the investment activity.
- Governance and institutional structures – eg level of devolution of decision-making, significance of public sector as manager of activities (and as facilitator or animateur).

4. The role of sub-national policies

Identify the role that sub-national policies have played in promoting:

- the resistance of the economy to the economic downturn
- the recovery of the economy from this (or past) economic downturns
- the speed with the economy regains past growth trends (renewal)
- the reorientation of the economy towards a new economic mix

Explain how the interaction of sub-national policies with national (or European) policies has affected the ability of the region to respond to economic crises and the effect of this on resilience.

Consider the extent to which policy is able (or not) to influence the different components of resilience identified as important (and over what time period).

Consider how appropriate is the sub-national level (regional) for different policy actions.

5. Identifying resilience

Identify potential indicators of resilience based on locally-available (quantitative or qualitative) data-sources.

How useful are the indicators suggested by this study (and other studies)?

6. Conclusions and Recommendations

1. Which economic activities/sectors have been most affected by the current economic crisis?
2. What quantitative and qualitative factors have allowed the region to move out of the economic crisis?
3. What quantitative and qualitative factors have hindered the region from moving out of the economic crisis?
4. What elements in economic structure and the responses of key actors in the region made a difference in recovering from this (or previous) crises?
5. What have regional policy makers been able to do to complement macro-economic measures stimulating economic recovery?
6. How can policy-makers enhance the resilience of regional economies for future economic downturn?
7. Is resilience helped by the development of integrated and place-based action?
8. Are there good indicators of resilience available at the local/regional scale?

Annex A Reference list of Potential components of resilience

Please use the following lists as a guide for the components section of the report. Please also complete this as a summary table and provide to us. Rows can be left blank where the influence/role of a particular component is not known. The precise division of potential components across the four categories can be discussed. Feel free to put a short explanation in the appropriate cell.

Business Components

	Significance of component in the response to the crisis in this case				
	Very significant positive influence	Significant positive influence	Not significant	Significant negative influence	Very significant negative influence
Sectoral mix					
Number of enterprises					
Size of enterprises					
Level of self-employment					
Investment by businesses					
Research/Innovation by firms/Research institutes					
Access to markets					

People Components

	Significance of component in the response to the crisis in this case				
	Very significant positive influence	Significant positive influence	Not significant	Significant negative influence	Very significant negative influence
Participation rate					
Employment rate					
Household disposable income					
Household savings					
Hours worked					
Flexibility of labour market					
Skills of resident population					
Beliefs/Perceptions of population					

Community Components

	Significance of component in the response to the crisis in this case				
	Very significant positive influence	Significant positive influence	Not significant	Significant negative influence	Very significant negative influence
Governance structure					
Degree of fiscal autonomy					
Territorial management (planning)					
Degree of social capital					
Entrepreneurial interests					
Community-based (informal) responses					
Level of social enterprise					
Demographic structure					

Place Components

	Significance of component in the response to the crisis in this case				
	Very significant positive influence	Significant positive influence	Not significant	Significant negative influence	Very significant negative influence
Level of migration					
Openness of economy (ie level of external trade – non domestic, non-EU)					
Urban structure – degree of agglomeration,					

peri-urban development, rural					
Presence of natural capital (natural resources, landscape quality)					
Strength of physical capital present					
Availability of spare capacity					
Accessibility of area (different transport modes)					
Property market features					

3 ECONOMIC RESILIENCE: LITERATURE REVIEW

3.1 Introduction: why resilience?

The concept of regional resilience is developing widespread appeal owing to 'the generalised contemporary sense of uncertainty and insecurity' (Christopherson et al, 2010; p. 3). Reggiani et al (2002) produced one of the first discussions on the possible application of the notion of resilience to the dynamics of spatial (local and regional) economic systems, arguing that resilience could help understand how such systems respond to shocks, disturbances and perturbations. Since this time, a number of urban and regional analysts have explored the applicability of the concept to cities and regions (for example, Rose and Liao, 2005; Foster, 2007; Hill et al, 2008; Newman et al, 2009; Christopherson et al, 2010). Resilience thus appears to hold significant analytical potential to help address what Hassink (2010; p. 45) describes as 'one of the most intriguing questions in economic geography ... why some regional economies manage to renew themselves, whereas others remain locked in decline'. However, there remain considerable questions around how regional resilience is defined and ultimately facilitated or achieved.

The resilience of regions to economic crises has been an important issue both in the UK and the EU since the start of the current global economic crisis. As the Brief for this study indicates, "the current picture of the economic situation in Europe looks rather asymmetrical and diverse with regions that were not or hardly touched by the

crises at all, with regions that were touched but that seem to recover rather progressively and with regions that still suffer quite a lot from the crisis. The fast and successful recovery of some particular regions strikes the eye and raises the question of what is behind this success" (p.4). What is needed is a comprehensive assessment and synthesis of what makes some regions more resilient than others to economic crises and what regional policy makers can do to enhance their resilience to future shocks. This is thus the principal objective of this study.

3.2 What is resilience?

3.2.1 Core concepts: system shocks and change

Most people have an intuitive notion of resilience - the capacity to sustain a shock, recover, and continue to function and, more generally, cope with change (Walker et al, 2004). Within the literature that focuses on interactions between people and the environment, 'resilience' has evolved into an intellectual framework for understanding how complex systems self-organise and change over time. Carpenter and Brock (2008; p.40) have described resilience as a 'broad, multifaceted, and loosely organized cluster of concepts, each one related to some aspect of the interplay of transformation and persistence'. In short, resilience has at its core a focus on continuity through change.

Resilience has become one of the leading ideas of our time for dealing with uncertainty and change and is a concept which features in scientific and practice-oriented debates in a wide range of disciplinary fields and domains including engineering, ecology, psychology, critical infrastructures and mega-planning, as well as organisational studies. It features particularly strongly in the literature on natural hazards and disasters such as flood risk management, as well as climate change adaptation research (see, for example, Hutter et al, 2011; Pelling, 2011). This literature usefully highlights how resilience is helping reinforce understanding that uncertainties are inherent for any management strategy, and that both resilience and anticipation are important for dealing with the consequences of natural hazards. This is a literature which, coupled with that from psychology, has not been extensively mined to date in the development of thinking around economic resilience (see section four below). What this highlights above all else is that resilience is concerned with the disturbance that impacts on a system and its effects on functional processes within this system. Two immediate challenges to be addressed in defining resilience are thus firstly to identify the 'system' or scale of analysis (whether individual, region, society, coupled socio-ecological system etc), and secondly, to define the characteristic shock or disturbance under analysis (its source, severity, temporal dimensions etc). In short, in order to utilise the resilience concept, one must first answer the question '*the resilience of what to what?*'(Carpenter et al, 2001).

In the burgeoning literature on territorial resilience, some studies take a broad approach and seek to analyse the social, economic and environmental resilience of 'places' and the communities within them. This thus sees places as part of larger systems, including their ecosystems, and defines them as interconnected territorial systems which embrace the relationships and feedback processes between, *inter alia*, topography, the built environment, use functions, economy and people (see, for example, Resilience Alliance, 2007; Foster, 2007; Lang, 2010; Muller, 2010; Bristow, 2010; CLES, 2010). This allows for a breadth of analysis of potential risks and shocks that may embrace natural hazards and disasters as well as economic crises, and slow-burn challenges such as long-term deindustrialisation, depopulation and demographic change (Pendall et al, 2010). Thus, here 'resilience is about understanding the ability of a place to respond to the challenges that it faces; what enables some areas to respond effectively from shocks, whether they be economic, social, political or environmental, whilst other areas falter and decline' (CLES, 2010; p. 6). This literature usefully highlights that place and context create cultural, institutional and social contingencies which shape territorial development trajectories and create key path-dependent effects (further discussed in section 4 below).

More recently, a number of studies have focused attention on understanding the spatial impacts of specifically economic shocks and disturbances (e.g. Martin, 2012). Hill et al (2011) suggest shocks to an economy can be of three kinds: shocks caused by downturns in the national economy; shocks caused by downturns in particular industries that constitute an important part of the region's export base; and other external shocks such as a natural disasters, movement of an important firm out of the area etc). These shocks are not mutually exclusive such that a regional economy may experience more than one simultaneously.

National economic downturns or recessionary shocks are of particular interest not least because they appear to be an inevitable feature of the global economy and, moreover, since the early 1990s there have been a series of economic slumps and crises which have had widespread and often serious consequences. Indeed, as one authority reported in the late 1990s, the only real certainty with economic crises is that they will occur: "Crises are a recurring phenomenon. In spite of every effort to prevent them, I fear that crises will continue to occur" (Speech 15 July 1998, Lars Heikensten, Vice Governor Sverige Riksbank). As such there are clear analogies with the understanding from studies of natural hazards and seismology whereby the earth is continuously rocked by small scale earthquakes and occasionally subjected to much more powerful earthquakes. In the economy there are similarly numerous small scale disturbances, occasional medium-scale events and, more rarely, significant economic crises. Studies suggest short-term economic shocks are often closely intertwined with unfolding broader slow-burn processes of structural or sectoral change (Pendall et al, 2010). This suggests that recessionary shocks (such as the recent financial and economic crisis) need to be contextualised or understood within evolutionary

processes of economic change and that resilience needs to be analysed in longer-term perspective over a number of economic cycles (Lang, 2010).

Across the ESPON space, the most notable amongst these past economic slumps are those of the early 1990s; the early 2000s, and most particularly the global economic crisis which emerged in 2008 as the financial 'credit crunch' adversely affecting the private sector and, in Europe, has mutated into a crisis of public sector expenditures and significant austerity measures. In practice, the effects of economic downturns are rarely distributed uniformly between nations or indeed different sub-national economies (see, for example, Davies et al, 2010). At a national or macro-economic level Duval and Vogel (2008) identify that three 'types' of economy can be broadly identified:

- those which tend to witness short sharp reactions to shocks but with a rapid recovery
- those with cushioned reactions to shocks but slower recovery times
- those which cushion the initial shock and quickly return to baseline.

Extending this research to the regional scale and developing an understanding of why certain regions are more adversely affected by shocks than others is the challenge facing this project.

3.2.2 Conceptualising resilience: dominant framings

Martin (2012) draws attention to three different (but not unrelated) understandings of 'resilience' which have become particularly prominent in shaping the emerging understanding of economic resilience in regional and territorial studies.

The first is 'engineering resilience' which focuses on the resistance of a system to shocks and the speed of return to a pre-shock state. This focuses on the stability of a system near its equilibrium. The faster the system returns to equilibrium, the more resilient it is (Holling, 1996). In popular terms, this is often understood in terms of 'bouncing-back' to some notion of what is a 'normal' state of affairs. This raises numerous questions around what normality entails and whether indeed a return to normal is a desirable state of affairs (Pendall et al, 2010; Davoudi, 2012).

The second is 'ecological resilience' which focuses on the role of shocks or disturbances in pushing a system beyond its elasticity threshold to a new domain. Here, resilience is thus defined not just in terms of how long it takes for the system to bounce back after a shock, but also how much disturbance it can withstand and remain within critical thresholds (Davoudi, 2012). This draws on the ecological sciences and Holling's (1973) work where resilience is conceived as the capacity of a system to withstand and respond to major external disturbances and shocks such as

forest fires, and to adapt and respond to these rather than simply to wither and die (see also Levin et al, 1998). Resilience from this perspective is thus typically defined as 'the capacity of a system to absorb disturbance and reorganize while undergoing change, so as to still retain essentially the same function, structure and feedbacks' (Hopkins, 2008; p. 54; also Hudson, 2008). The key difference from the engineering definition is that ecological resilience rejects the existence of a single, stable equilibrium, and instead acknowledges the existence of multiple equilibria.

The third definition is 'evolutionary resilience' which derives from the theory of complex adaptive systems (CAS). These are systems which are characterised by complex non-linear dynamics and perpetual uncertainty and change such that they are never in equilibrium (Berkes and Folke, 1998). Complex adaptive systems thinking is a broad body of work that studies the underlying principles that are manifested in all kinds of system regardless of those system's particular components (e.g. ecologies, the internet, social networks, global society, gene networks etc). It provides a rich and useful framework for the cross-pollination of academic disciplines and indeed, there is a developing body of work applying complex adaptive systems thinking to a range of social sciences including economics (see, for example, Beinhocker, 2007). Indeed, it is this definition and body of work which has particular resonance for studying the economic resilience of regions.

3.3.3 Complex adaptive systems

Complex adaptive systems are comprised of groups of heterogeneous individuals or 'agents' (such as cells, consumers, nations, atoms, etc) which are inherently dynamic and inter-related. The agents in complex adaptive systems are constantly reacting to what the other agents are doing and to the environment, and are thus continually evolving through feedback and learning. As a result of their interconnected structure, these systems exhibit unexpected emergent properties – these are structures or patterns that cannot be reduced to the properties of the agents themselves. One such emergent property is self-organisation i.e. organisation that has no leader but is generated spontaneously from the 'bottom-up' by the individual decisions and interactions of the agents themselves. Influence thus tends to be dispersed and decentralised. Furthermore, the dynamics of complex systems are non-linear, which generates path dependency or local rules of interaction that mean history shapes how the system evolves and develops into the future (Holland, 1992). Furthermore, these complex self-organising systems are *adaptive* and have the ability to balance themselves on the boundary between order and chaos: too much order and they rigidify into stasis, too little order and they dissolve into chaos (Waldrop, 1992).

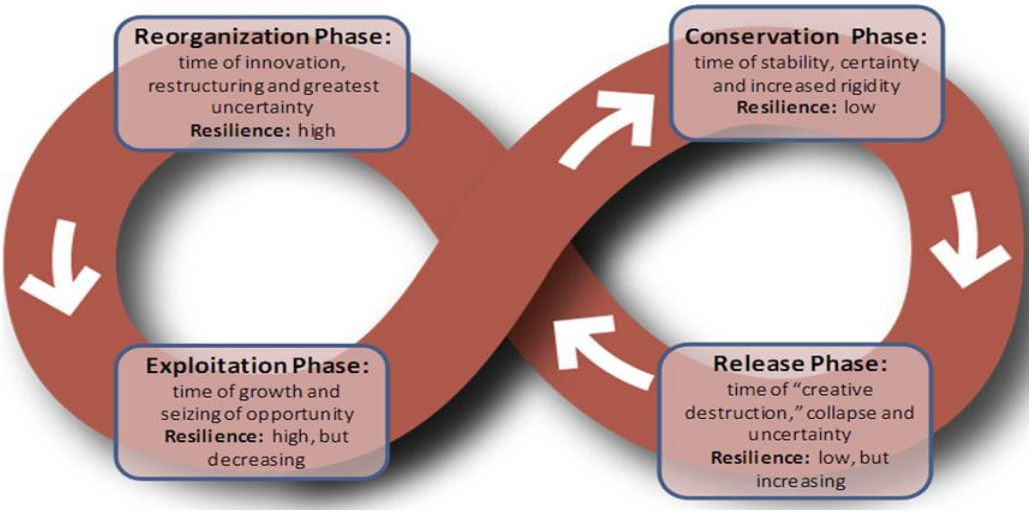
This adaptive capacity is not simply adaptation or change in response to conditions. It is the ability of systems—households, people, communities, ecosystems, nations—to generate *new* ways of operating, new systemic relationships. Hence in complex

adaptive systems, resilience is best defined as the ability to withstand, recover from, and reorganise in response to crises**.**
The CAS or evolutionary notion of resilience challenges the whole idea of equilibrium and instead asserts that the seemingly stable states of nature or society can suddenly change and become something radically new, with profoundly different characteristics. Self-organisation is related to novelty and innovation: it generates inherently new ways of operating, ones
that previously may not have been considered or predicted. Thus, resilience is not viewed as a return to normality, but rather as a dynamic, evolutionary capacity to adapt in response to stresses and strains. In other words, there is no 'normal' but there are certain functions that are either deemed critical to system survival, or are perceived to be desirable for the system to maintain. Thus, functions may be maintained after a shock, but system structure may not be (Carpenter et al, 2001).

3.3.4 The panarchy model

Much of the theorising around resilience from a complex adaptive systems perspective has focused on understanding how changes in system structures and functioning occur over time. Most notable here is Gunderson and Holling's (2002) work on panarchy which accounts for the dual characteristics of all complex systems – stability and change. The panarchy model has provided an important set of ideas framing resilience thinking across disciplines (including economic geography, see below) including its emphasis upon multiple equilibria, tipping points, adaptive cycles of renewal and re-organisation and cross-scale interactions.

Figure 3.1: The Panarchy model of System Change (adapted from Pendall et al, 2010).



Panarchy identifies four distinct phases of change in the structures and function of a system: growth or exploitation; conservation; release or creative destruction; and

reorganization (see Figure 3.1). Thus, as systems mature they experience firstly, phases of system development and stability, and then progress into phases of rigidity and decline. It is in these latter phases when crises can be turned into opportunities and which can thus trigger a phase of renewal and reorganization.

Panarchy has typically been used to understand the functioning and resilience of complex ecological and social systems. The degree to which an ecosystem can maintain a particular identity as it faces disturbances and as it proceeds through the phases of the adaptive cycle depends on the resilience of the ecosystem. Gunderson and Holling assert that an ecosystem's resilience expands and contracts throughout the four-phase cycle as slow variables change. Resilience is thus not a fixed asset but a continually changing, dynamic property or capacity (Gunderson and Holling, 2002). For example, from the release to reorganization phases, when connectivity among species is loose, and when a particular stable state is not yet strictly regulated, resilience is high. As such, 'this is the time when exotic species of plants and animals can invade and dominate future states, or when two or three entrepreneurs can meet and…turn a novel idea into action' (Gunderson and Holling, 2002, p.46). At this juncture, unpredictable critical events can determine the future trajectory of the ecosystem.

The panarchy model usefully highlights that growth and change do not happen in a step by step or linear way. Periodically, there are critical transitions or regime shifts when normal cyclical processes are stressed creating 'tipping points' - moments when structures collapse and innovations or new developments take off. These are not continuities, nor are they predictable phenomena (Holling, 2001; Scheffer, 2009; see also Birkmann et al, 2012; p. 9 for further discussion of the influence of the panarchy model).

The panarchy model also asserts that systems typically function in a series of nested adaptive cycles which operate and interact at multiple scales and in various timeframes. Thus there are overlapping hierarchical structures of complex ecosystems, human systems and combined socio-ecological systems (Holling, 2001). It is to the increasing interest in understanding the resilience of human systems (specifically regional economies) that this review now turns.

3.3 What is regional economic resilience?

3.3.1 Different conceptions exist

Within the developing literature on economic resilience, different conceptions of the term exist. Pendall et al (2010) posit two separate, although not necessarily unrelated, concepts. The first is based on the engineering or equilibrium conception of resilience (as described above). Here economic resilience is construed as the ability to return to a pre-existing state in a single equilibrium system. This is deployed by Duval and

Vogel (2008) in their study of national economic resilience which they define as the ability to maintain output close to potential in the aftermath of shocks. Hence, they argue, resilience comprises at least two dimensions: the extent to which shocks are dampened, and the speed with which economies revert to normal following a shock. This conception is also deployed by Hill et al (2011) in a study of regional economic resilience in the US which they define as the ability of a regional economy (defined in terms of US metropolitan areas) to maintain or return to a pre-existing state (typically assumed to be an equilibrium state) in the presence of some kind of exogenous (i.e. externally generated) shock. In their analysis, a region that is adversely affected by shock is considered resilient if it returns to at least its prior growth path within a relatively short period of time (i.e. within four years). If it does not, it is considered non-resilient. When a shock occurs that does not cause the region to be thrown off its growth path, Hill et al (2011) deem it to be 'shock-resistant'. Being shock-resistant is the best outcome for a regional economy followed by being resilient.

The second definition of economic resilience posited by Pendall et al (2010) defines it in terms of the complex adaptive systems conception described above and relates to the ability of a system to adapt and change in response to shocks. This definition is preferred by scholars working within evolutionary economic geography (EEG) since it has clear resonance with EEG thinking on the path-dependent, evolutionary and non-equilibrium nature of regional economic development. Indeed, much of the EEG literature asserts that the territorial economic landscape is a complex adaptive system inasmuch as it characterised by non-equilibrium dynamics and is non-linear, emergent, uncertain and self-organising. Thus, regional economies are seen as being comprised of multiple networks of interacting agents (firms, workers, governments etc), they are faced with constant change, are always evolving and never in equilibrium and have as a core characteristic an inherent and dynamic adaptive capacity which enables them to re-arrange their internal structure and dynamics spontaneously (Martin and Sunley, 2007). It is worth noting that the meaning of 'region' here is typically understood in generic, conceptual terms and does not rely on or presuppose any specific definitions of a 'regional economy' which might guide analysis of particular empirical regions or spatial units under observation (Martin, 2012). Regional economic resilience from this perspective is thus conceived as the ability of a regional economy to either avoid becoming locked into a suboptimal level of growth path of economic performance or to transition quickly to a 'better' one (Hill et al, 2008). This appears to offer a very fruitful body of work within which to base this study, not least because of the understanding of the continuous presence of varying economic shocks and crises and their capacity to effect perpetual upheaval and disequilibrium (see section 2 above).

3.3.2 Regional economic resilience: a complex adaptive systems perspective

Adopting a complex adaptive systems perspective to conceptualising regional economic resilience suggests it needs to be operationalised in multiple ways. Put

simply, if resilience is understood in these complex adaptive terms, then it cannot simply be defined in terms of the regional economy's speed of recovery or capacity to 'bounce-back'. Regional economic resilience must instead be regarded as a multi-dimensional property embracing not only *recovery*, but also *resistance*, or the ability of regions to resist disruptive shocks in the first place; *re-orientation*, or the extent to which the region adapts its economic structure; and finally, *renewal*, or the degree to which the region resumes the growth path that characterised its economy prior to the shock (Martin, 2012).

The latter two dimensions of resilience are distinct from the first two inasmuch as they capture the notion that in dynamic systems, resilience is more than simply an obdurate property of persistence and adaptability: it also has a transformative element. Crises may in fact often provoke or encourage the transformation of systems and the formation of new system structures and dynamics or the development of new, related or alternative trajectories or niches (Pike et al, 2010). Transformation is thus comparable to second-order change where some of the rules that govern the system change in response to the disurbance, hence spreading its impact. This understanding of resilience resonates closely with the Schumpeterian notion of gales of creative destruction. These serve to destroy some outmoded or unproductive activities and to create opportunities for the development of new sectors and phases of growth (Simmie and Martin, 2010). As such, regional 'systems' may be viewed as being characterised by complex adaptive cycles of growth and decline characterised by both stability and change, with shocks and disturbances having both temporary and lasting impacts on system functioning (Simmie and Martin, 2010; Martin, 2012).

Simmie and Martin (2010) have explored the applicability of the panarchy model to develop a four-phase adaptive cycle model of regional economic resilience. This postulates that adaptation in regional economies follows a sequential cycle of innovation and restructuring, growth and the seizing of opportunities, stability and increasing rigidity, followed by a release phase and eventually the periodic repetition of the cycle over time. As previously however, this model is open to critique inasmuch as it provides an overtly deterministic view of how regions respond to, and evolve following, shocks. In short, a key question becomes how and why do adaptive cycles vary between regions?

Martin (2012) explores the economic notion of 'hysteresis' as a means of illuminating this debate and seeking to understand the different ways regions respond to recessionary shocks. Hysteresis is here defined as a situation where (following Romer, 2001; cited in Martin, 2012) one-time disturbances permanently affect the path of the economy. Hysteresis invariably involves structural change in the economy and, if the shock is severe enough, may alter the behaviour of economic agents, change the sectoral composition of the economy and set the economy on a new trajectory of path-dependent development. Martin (2012) posits that several different possible 'hysteretic' outcomes of a recessionary shock on a region's growth path may

be identified, some negative and some positive. Thus, for example, in some cases a recession may permanently lower the level of output or employment with either a resumption of the pre-recession growth path evident or a permanently lowered growth rate emerging. In contrast, positive hysteretic effects may occur where there is either recovery of the region's pre-recession growth rate or recovery to a sustained higher growth rate. Regional economies that exhibit positive hysteretic effects of either type would be regarded as highly resilient.

This raises further questions around why different regions experience different hysteretic effects (see section 4 below) and when, where, how and why downturns in economic cycles might prompt the search for new development paths in regions. For example, questions surround whether and indeed where crises create tipping points in particular development or growth trajectories which may encourage transformation or 'transitioning' to more sustainable or 'green' modes of economic activity (e.g. Folke et al., 2003; Duit et al, 2010; Shaw, 2012).

The existing literature on regional economic resilience also leaves a number of questions to be addressed around precisely what needs to be made resilient in the regional economy i.e. what functions either need to persist or to be maintained, and when instead do regional systems need to transform. Martin (2012; p. 10) defines regional economic resilience as 'the capacity of a regional economy to reconfigure, that is adapt, its structure (firms, industries, technologies and institutions) so as to maintain an acceptable growth path in output, employment and wealth over time' (Martin, 2012; p. 10). Clearly what is an 'acceptable' growth path in these terms is open to interpretation, as is the focus on macroeconomic indicators and growth itself. Dawley et al (2010) take a broader view and refer to development trajectories rather than growth paths, making a distinction between movement back towards a 'pre-conceived development path' and the different kind of resilience that emerges through opportunities or a decision to leave a path that may have proven successful in the past in favour of a new trajectory. This still leaves room for judgement regarding how 'development' is defined, what path or trajectory is perceived as a 'norm' and how these might vary in different spatial contexts. It is worth noting here that some economists and proponents of community resilience have deployed the systems perspective and permaculture (whole system) ideas to build a notion of economic resilience that develops in tandem with the environment and, critically, without continuous economic growth (e.g. Hopkins, 2008; see also Graugaard, J. D., 2012).

In their study of the economic resilience of US regions, Hill et al (2011) conclude that regional economic resilience 'inevitably has a subjective component' and use an example to illustrate that the perceptions of leaders in a region about a region's resilience may differ from measured economic performance. They cite the example of Grand Forks (a small metropolitan region in North Dakota) which their quantitative data revealed to be non-resilient to the industry shock and flood of 1996-97 and which had established a new equilibrium at an employment growth rate considerably lower

than its previous one. However, interviewees in the region emphasised its successful recovery and resilience, pointing to the population's general satisfaction with continued growth in prosperity. This serves to highlight the importance of combining quantitative and qualitative data on resilience.

Indeed, the literature to date says very little about the intended state of recovery after a shock, or the required adaptations in regional economies or indeed when relevant crises and transformations can be considered to be over (Hudson, 2010). There are thus inescapably normative and political dimensions of resilience (for example, Duit et al, 2010; Smith and Stirling, 2010). In a case study of the Barnim region of Germany, for example, Rohring and Gailing (2010) observe that 'resilience' goals are the subject of social construction through regional discourses and forms of governance. Thus in the Barnim region, there are two competing perceptions of resilience which are a product of the different interests of different actors and the different stabilising elements of the development path they choose to pursue. Thus, one supports and profits from suburban growth and continues to stabilise it, and the other seeks to preserve the qualitative and ecological aspects of the landscape region (see also, Kuhlicke, 2010).

This points to further questions around whether resilience is always a good thing. A resilient regional economy may be undesirable if it is characterised by unsustainable growth or behaviour, widespread inequality or excessive economic fluctuations, or social ills associated with continual upheaval and change. Nevertheless, it may prove very difficult to transform a resilient system from its current state into a more desirable one (Gunderson and Holling, 2002; Walker et al., 2004).

Finally, regional resilience to economic shocks can vary over time not only because of differences in the causes and nature of individual recessionary shocks, but because the features and mechanisms that shape economic resilience may themselves evolve and change (Martin, 2012). A complex adaptive systems perspective again highlights the significance of this dynamism and a need for further understanding of the adaptation, learning and self-organising capacities of the systems in question and the feedback mechanisms they entail (Gunderson and Holling, 2002).

3.4 What helps build or shape resilience?

Alongside the burgeoning literature on the meaning of resilience, there is a developing body of work on the factors shaping it. To date, this literature has primarily focused on factors pertinent to the structural features of regional economies and the agency of businesses or firms. This is perhaps not surprising given the dominance of systems-based thinking in the conceptualisation of resilience. Much less emphasis has been placed upon understanding issues around the agency of other (notably policy) actors in the system. What the existing literature also highlights is that there are no 'magic bullets' that both insulate regions from the harmful impacts

of economic downturns and help them recover quickly. No regional characteristics or public policies do everything that one might like with respect to regional income and employment (Hill et al, 2011).

3.4.1 Structural factors – inherent or innate components of resilience

The structural factors shaping resilience might usefully be labelled as the 'inherent' components of resilience in social systems i.e. the factors which shape innate capacities to react, or the autonomous responses to shocks (Rose, 2004). In economies, for example, such mechanisms might include automatic fiscal stabilisers and the ability of markets to reallocate resources or substitute inputs in response to price signals. Building on complex adaptive systems thinking, these inherent components relate to the system's capacities to self-organise.

The emerging empirical evidence suggests that one set of inherent factors shaping regional resilience to economic shocks is their initial strengths and weaknesses (Davies et al, 2010). This seems to affirm the theoretical assertions from evolutionary economic geography (EEG) that regional resilience is likely to be path-dependent and shaped by a region's industrial legacy, the nature of its pre-existing economy (principally what is happening to the product and profit cycles of its key, particularly export, industries), and the scope for re-orientating skills, resources and technologies inherited from that legacy (Boschma and Martin, 2010; Simmie and Martin, 2010). In a study of the impact of the post-2008 financial crisis and recession on several European regions, Davies et al (2010) have found that factors such as the size of the market, access to a larger external market, as well as endowments in natural resources and in physical and human capital play an important role in shaping variable impacts. Those regions which were weaker or suffering relatively poor economic performance to begin with appear to have been typically most severely affected by a crisis. Furthermore, they are more likely to suffer even more damaging long-term effects from the crisis because the loss of even a relatively small number of jobs and firms in such regions leads to a much wider reduction in demand for goods and services from local firms. This is supported by the wider literature on regional or community resilience in the face of natural disasters. A common finding in this literature is that regions with higher incomes or wages (independent of human capital) tend to recover more quickly from economic shocks (see Hill et al, 2011).

Another critical structural or inherent dimension appears to be the sectoral structure of regions. In general terms, a region's vulnerability to adverse economic shocks is correlated with its sectoral specialisation, although the degree of regional specialisation has decreased in Europe since the 1950s not least due to the growth of public services and some private services in all regions (Davies et al, 2010). Again this appears to support theorising drawing on the evolutionary conception of resilience which has highlighted the merits of 'species diversity' for regional economies (Bristow, 2010). Diversity is deemed essential in complex adaptive

systems both in terms of absorbing disturbance and in regenerating and re-organising the system following the disturbance (Levin et al, 1998).

Studies suggest that regions which specialise in a narrow range of sectors are particularly vulnerable to sectoral shocks and run the risk of suffering permanent reductions in the numbers of firms and jobs (Davies et al, 2010) – or negative hysteretic effects (after Martin, 2012). A more diverse economic structure provides greater regional resistance to shocks than does a more specialised structure since risk is effectively spread across a region's business portfolio, although a high degree of sectoral interrelatedness may limit this (Industrial Communities Alliance, 2009; Dawley et al, 2010; Martin, 2012). Studies in the UK suggest deep downturns which lead to the destruction of a significant proportion of a region's production base are particularly damaging for regions highly dependent upon manufacturing industry (e.g. Industrial Communities Alliance, 2009; Martin, 2012).

This is supported by evidence from the US which demonstrates that regions with a higher dependence upon manufacturing are more susceptible to downturns although are more likely to recover quickly from them (Hill et al, 2011). In contrast, those with a more diversified economic base and a larger number of industries that are major exporters (and thus exhibity portfolio diversification) have tended to better weather recent economic storms (see Hill et al, 2008; 2011; also Gordon, 2012). Regions with a larger percentage of employment in health care and social assistance are less susceptible to downturns (since they are less cyclical). However, these regions exhibit slower recovery from downturns once they occur (Hill et al, 2011). There is also emerging evidence to suggest that firm size diversity may be significant in helping regions cope with shocks. Agrawal et al (2012) find that in the US regions with a greater diversity in firm size have an innovation premium and are more likely to generate spin-out developments. Business diversity also appears to be significant at a more micro-scale. For example, Wrigley and Dolega (2011) demonstrate that UK town centres with greater business (retail) diversity have exhibited greater resilience to the recent economic crisis.

Some evidence points to the different effects of some innate regional characteristics on different aspects of resilience. For example, Hill et al's (2011) analysis of the resilience of US regions demonstrates that a poorly educated population makes a region more likely to suffer from an employment downturn but makes it easier for the region to recover. Similarly, a high degree of existing income inequality makes a region's income more resilient to economic shocks, but undermines the recovery of employment levels. Other indicators may also have different resilience effects in different spatial contexts. For example, one particular indicator that is cited as positive for resilience in many US metropolitan regions is the vacancy rate in class A (premium) office space – an indicator of a degree of spare capacity. A higher vacancy rate means that there is room for new companies and expansions, whereas a vacancy rate that is too low is problematic because businesses interested in larger blocks of

contiguous space have few options and will often look elsewhere (Gordon, 2012). Martin (2012) suggests a degree of spare capacity to expand output and jobs is also significant in shaping the responses of UK regions to recession. It is of course also possible that spare capacity may be a symptom of decay and decline and deter investors from particular places.

3.4.2 Adaptive capacities – purposeful action and agency

As previously discussed however, complex adaptive systems are also characterised by an *adaptive* capacity (Klein et al., 2003). This refers to the ability of agents in a system to react to crisis situations in positive ways by applying ingenuity and extra effort – in other words, purposive adaptation. In economies, this might embrace actions to increase the input substitution possibilities in individual business operations, or purposive decision-taking to strengthen the market by, for example, providing information to match suppliers without customers to customers without suppliers (Rose, 2004). It is of course also possible that agents act in negative ways to crises and fail to adapt and change and contribute to system lock-in (see Brown, 2011; and Pelling and Manuel-Navarette, 2011; cited in Birkmann et al, 2012). It therefore follows that in social systems, resilience has a strong behavioural element (in contrast to pre-event mitigation which often emphasises new technology and institutions). Resilience thus emerges from the stimulus of private and/or public policy decisions as well as from inherent or innate conditions (Rose, 2004). In short, if resilience is defined in terms of an evolutionary, complex adaptive systems approach, it must embrace an agency as well as a system perspective (Bohle et al, 2009). Clearly quantitative work on regional economic performance can provide descriptive results about the frequency of shocks and those regions which are shock-resistant and resilient. However, it is much less effective at illuminating 'the processes through which regional actors protected their regions from or responded to downturns caused by economic shocks' which remain a 'black box' requiring interrogation through more qualitative, case study work (Hill et al, 2011; p. 61).

There is a developing body of literature (much of it within EEG) examining more specifically the role that industries, sector and groups (often clusters) of firms and their networks might play in building regional resilience. This highlights that individual firms, business leaders and entrepreneurs not only play a key role in effecting the sectoral shifts and diversification noted as important above, but also as collective agents of purposive adaptation through conscious entrepreneurial decisions or by acting as conduits for technological or product innovation. Simmie and Martin (2010) suggest that among the key factors for understanding regional resilience are endogenous sources of new knowledge combined with market driven and conscious entrepreneurial decisions. These shape how places and their relational and technological structures prevent lock-in effects by recombining knowledge in over-lapping technological fields and generating new ones. Thus diversification into areas of 'related variety' is seen to be crucial in providing greater resistance to the

damaging consequences of structural change. The most striking example is the pattern of California's Silicon Valley which has recovered quickly from the aftermath of the internet bubble crash by developing biotech and cleantech as a source of continuous growth (Cooke, 2010). In other examples, Cambridge's resilience is ascribed in part to its ability to 'continually branch out of existing specialised industrial sectors (Simmie and Martin, 2010). Other regions display resilience capabilities by recombining knowledge and reorganising networks and sectors towards emerging technological fields and new consumer paradigms (see, for example, Hill et al, 2011). In this case, resilient processes occur when network structures evolve in such a way that they succeed in disconnecting the regional trajectory to the cycle of technologies, in particular when technologies decline (Suire and Vincente, 2009). [2]

Other analyses suggest regional resilience depends upon the existence of a large number of innovative and well-networked small firms with embedded regional capacities (Clark et al, 2010), whilst others emphasise the role of particular 'pivotal' firms in clusters which act as hubs in the innovation process (Kechidi and Talbot, 2010). Recent work has also suggested there is much to be gained from firms combining external sources of knowledge accessed through so called 'global pipelines' with the 'local buzz' (and vibrancy) that exists within their own geographical region (see Storper and Venables 2004, cited in Hervas-Oliver et al, 2011). This suggests that nurturing relations between resident and other external firms (and bodies) is important for a region's future trajectory; where channels of communication are open and strong links are formed for instance, this can contribute to industrial upgrading.

Whilst there are some interesting and important insights emerging from this developing corpus of work, much less attention has been paid to the adaptive capacities of the other heterogeneous agents that make up the regional economic system – namely, individual consumers, workers or households, citizens, institutions, organisations and policy actors. The EEG school of thought more generally has been criticised for its tendency to privilege the agency of firms and processes of firm learning over the agency of other actors outside the firm, such as the state, labour and civil society groups (Machinnon et al, 2009; Hodgson, 2009; Pike et al, 2010).

[2] Some of this work is being brought together and further developed in the form of a major Open Research Area in Europe project involving researchers from the UK, Netherlands, France and Germany - "Territories and technologies in an unstable knowledge economy: an evolutionary framework of regional resilience".. That project is analysing the role of technological variety and network structures in regional resilience processes. There will be positive opportunities to develop complementary knowledge sharing activities between these projects securing a strong element of added value. Other complementary are being developed with a UK-based ESRC project (ES/1035811/1) led by Professor Ron Martin (Cambridge University) on 'How Regions React to Recession'.

Indeed, both the theorising of and empirical investigation into the role of agency in shaping regional economic resilience is somewhat underdeveloped however and addressing this weakness is thus an important focus for this research. For example, notwithstanding its acknowledgement of the interdependencies of human and ecological cycles, the panarchy model is oriented towards the structures and functions of ecological systems rather than understanding the nature of and responses to shocks in social or human systems. Translating resilience thinking from the natural to the social world thus requires that more detailed attention be paid to the role of human agency and behaviour in adaptive cycles and resilience (see Bergmann et al, 2009). The adaptive cycle theory outlined above has been criticised for appearing overly deterministic and paying insufficient attention to human intervention to break cycles through innovation, ingenuity and foresight. In the social context, interventions in processes may diminish, sustain or enhance resilience (Davoudi, 2012). Residents and businesses may come to believe that their regional economies will always bounce back from shocks, while the social organisation of business in a region can at times work to impede planning to mitigate shocks (Hill et al, 2011).

This highlights a particular, identifiable a need for more qualitative (and particularly case study) research on how and why the adaptive capacities of these agents might vary both *between* and *within* different spatial contexts. As Martin (2012; p. 28) puts it, 'regional and local economies are composite entities, made up of numerous heterogeneous firms and workers. Individual firms and workers differ with respect to the ease with which they can adjust to and weather recessionary shocks, their ability to switch into other activities, the range of local constraints they face, the resources available to them and their economic preferences'. A region may therefore be resilient in certain respects (e.g. in relation to its firms), but not in others (e.g. its labour market). Indeed, individuals may migrate in response to a crisis making the region resilient in terms of its labour market (reducing unemployment) but possibly at risk of a downward cycle of 'brain drain' and the loss of its critical human capital and thus reduced future developmental opportunities. Similarly, individuals may develop resilience to economic crises by seeking refuge in the informal or 'hidden' economy, which may hinder the resilience of the regional economy in terms of the fiscal resources available for recovery and renewal. Citizens and civil society more generally are also increasingly understood to play a key role in finding innovative solutions to key development challenges and to helping build place resilience through social innovation (see, for example, McCarthy, 2010; also Magis, 2010). In this way, human agency seems critical to the 'exuberant experimentation' which Buzz Holling deemed so critical to resilience (cited in Homer-Dixon, 2006).

Understanding the behavioural decision-making of these heterogeneous agents is of course challenging and requires further theorising. Some insights into the different types of behaviour that can be expected may be drawn from a number of pertinent sets of literature however. For example, human agency is increasingly understood to be a key factor in determining how individuals and society respond to environmental

shocks and change, with research increasingly highlighting that behavioural responses and coping (or resilience strategies) are reflexive and dynamic, as well as differentiated socially and temporally (Brown and Westaway, 2011). Further insights may be drawn from studies examining how households are responding to climate change as it plays out in different ways (e.g. through changing energy prices). This shows that individual households reactions are a times spontaneous and at other times planned. Furthermore, they often behave in a reactionary way, whilst other times are passive or anticipatory depending on their short on long-term perceptions of local climate conditions (Smith et al, 2000).

3.5 Resilience: Systems, structure and agency

Conceptualisations of resilience often share a common emphasis on defining resilience in terms of the functioning of the regional economy as a *system*. Resilience is defined in terms of the system's capacity to absorb, resist or respond to a disturbance and at least maintain its functioning, if not necessarily the same system structure (Carpenter et al, 2001). As well as shaping the definition of resilience, this systems-based perspective also extends to its measurement and analysis. Thus, from this perspective economically resilient and non-resilient regions are identified by examining the system's overall economic performance over a period of time, with criteria for a negative economic shock defined, and pre- and post-shock growth rates and trajectories of output and employment measured. Furthermore, analysis of the determinants of resilience then typically focuses upon the structure of the system whether through understanding how inherited regional production structures shape the sensitivity of regions to recessionary shocks and their subsequent recovery (as Hill et al, 2011; and Martin, 2012), or how these structures exhibit distinct phases or adaptive cycles of change in line with complex ecological systems such as panarchy (Simmie and Martin, 2010). Regional economic resilience from a systems perspective is thus understood principally in relation to the system's structure, performance and overall functioning (Martin, 2012).

Whilst valuable in highlighting the potential for resilience to illuminate how regional economies respond to economic disruptions, this system and structure emphasis has resulted in much less attention being paid to understanding the role of human agency in the adaptation at the heart of regional economic resilience. In part this reflects the inevitable degree of determinism evident in translating systems thinking from the natural and physical sciences to the social world where the ingenuity and foresight of human agency means evolutionary paths and cycles are capable of being overridden, broken or substantively changed (Davoudi, 2012).

Developing a fuller understanding of the role that the different actors in regional economies - including local and regional governments - can play in shaping their resilience to economic shocks requires that the systems-oriented perspective outlined above be supplemented with a *people-oriented* perspective. Literatures from health and psychology relating to individual and community resilience in the face of a range of adverse situations (such as natural disasters) are particularly pertinent here, and provide a number of important insights.

These include the notion that resilience is not simply an end point or performance outcome: it is a process or an ongoing development capacity to adapt to change and thrive. Furthermore, this literature focuses much more explicitly on how resilience is shaped by the innate resources or capacities of individuals and collective groups of actors, as well as the intentional actions they take to build up their capacities and respond to and influence the course of change (e.g. Magis, 2010; Kulig et al, 2010; Berkes and Ross, 2013). The literature acknowledges that capacities to develop resilience vary between individuals, groups and communities (places) and that actors have differential abilities to acknowledge, respond effectively to and influence change (Goldstein, 2009). However, the literature also point to a number of characteristics that play key roles in shaping resilience including strong people-place connections, collaborative institutions and governance, strong social networks, well-developed community infrastructures and positive cultures of leadership and readiness to accept change (Berkes and Ross, 2013).

Combining these literatures thus suggests that regional economic resilience is an adaptive notion or *capacity* and can be defined as the ability of a regional economy (as a system comprised of multiple agents) to withstand, adapt to and recover from an external economic shock. It thus represents its ability to adapt and thrive in the face of adversity.

What complex adaptive systems thinking also tells us is that the apparently highly variable behaviour of individual agents in a system can appear collectively highly organised. In ecological systems, for example, insects often swarm or birds flock in a manner which suggests they obey micro-level rules that *in toto* somehow produce an emergent phenomenon. Thus, although it may seem as if agency is missing in these systems and that they are structurally deterministic, they are, in fact, exactly the opposite. As Hartzog (n.d) puts it ‘swarms are entirely comprised of agency, and yet, coordinated behaviour emerges.’ Even when agents are aware and reflexive (as in human systems), emergent system dynamics are still in evidence. For example, studies of crowds have shown that under numerous instances they behave like particles in a fluid, exhibiting what Hartzog refers to as ‘perfect Brownian motion’. Perhaps what this highlights is that a complex mix of local norms and material relations, networks and structures shape the capacities of individual agents of change or what Bang (2005) refers to as the ‘everyday makers’ (Bang, 2005; see also Marsh, 2011). Above all else this highlights that agents are inherently *part of* the complex

adaptive systems being observed or interacted with (Bateson, 2000). Furthermore the abilities, opportunities and organisation of social actors are key determinants of resilience (Bohle et al, 2009).

There is also a literature from psychology which may yield insights into human agency in shaping resilience. This literature focuses on individual, family and community responses to a variety of shocks and traumas such as ill-health, war, social disruption and natural disasters. This literature suggests that broadly resilience is a two-dimensional construct produced by the interaction of the nature of exposure to the shock or trauma and the positive adjustment outcomes or protective factors undertaken in response to the shock or adversity such as purpose in life, positive emotions, communication, teamwork and collective efficacy operating at the individual, family, organisation and community levels respectively. It is deemed to consist of an internal salutogenic (which places emphasis on factors that contribute to health and well-being), and an external social-ecological perspective (which takes into account the influences of social context). It is affected substantially by the social contexts in which an individual is embedded and is a function of the quality of relationships among individual, family and institutional systems. It is thus perceived to be a dynamic process operating at multi-interdependent levels and scales (for a review see, Birkmann et al, 2012; see also Elliott et al, 2011).

Much of the pertinent literature here indicates that critical to shaping behaviour, particularly positive anticipatory behaviour, is learning (Folke et al, 2003). What particularly distinguishes economic and human systems from biological ones, is the role played by learning, adaptive management and the deliberate acquisition of knowledge. Each member of the population or entity in the system is continually searching for new ways of adapting to the environment. Thus knowledge about the environment and how it is changing is the key to self-organisation and the ability of entities to understand how and in what ways they need to adapt in order to survive (Cooke, 2012). Economic agents are pro-active as well as reactive in implementing novel plans to access new energy sources or increase exploitation of old ones. In economic self-organisation both physio-chemical and biological limits on economic development can be transcended. The decay of old investments can variously be planned for (through planned depreciation) and overlooked (depending on commitment levels to specialist organisational structures or market niches). In short, economic self-organisation brings immense complexity through acquired energy and acquired knowledge which in combination yield creativity in economic evolution (Foster, 1997). Creativity and innovation thus play an integral role in system dynamics and indeed, may be regarded as the 'evolutionary fuel' of complex systems (Cooke, 2012). Systems with scope for embracing diverse perspectives, more novel ideas and 'exuberant experimentalism' are more likely to find creative solutions to crises (Bateson, 2000). As such, places with highly open networks for learning and knowledge exchange across business, sectors, citizens and institutions have been posited as more likely to display resilience (CLES, 2010; Bristow, 2010).

These literatures also suggest that critical to shaping these behaviours or micro-level rules is context. The contingency of context (e.g. through cultural norms) shapes adaptive behaviours such as business expectations and entrepreneurship / innovation, consumer confidence, labour market flexibility, migration tendencies and so on, and thus shapes how they emerge to effect regional resilience. Regions are shapers and not simply containers of economic agents and their activities. As well as cultural and social context, physical location and neighbours matter too (Hill et al, 2008). However, more needs to be done within existing theoretical contributions such as EEG to examine the relationship between the 'emergence' of macrostructures from lower-level processes and the 'embeddedness' of these microprocesses in broader sociospatial structures and relations (Peck, 2005). Helping to understand how context shapes regional economic resilience is thus an important element of this research.

3.6 What can policy-makers do to help build resilience?

This discussion of the role of agency in shaping regional resilience inevitably leads to specific questions regarding the role of policy-makers, particularly at the sub-national level, in shaping resilience – a critical focus for this research. Indeed, resilience has quickly gathered credence as a concept with policy-makers and practitioners seeking to understand both why some places are better able than others to cope with economic change, and what they themselves might do to influence these capacities (Dawley et al, 2010; CLES, 2010; Lang, 2010). However, understanding of the institutional and policy dimensions of resilience remains an underdeveloped area of theorising and empirical research, and the literature on this is indeed disparate and somewhat fragmented. This therefore constitutes one of the main gaps in knowledge to be addressed by this research.

Two sets of questions around the role of policy-making emerge from the preceding review. Firstly, if regional economies are complex and self-organising adaptive systems with often unpredictable dynamics, what scope exists for intervention and policy influence? Secondly, if policy-makers have a role in managing resilience, precisely what can they do?

There has been a pervasive pessimism in much of the literature regarding the effectiveness of policy interventions in complex, evolutionary systems. Within the EEG literature, some argue that scope for policy action is limited for a number of reasons including the unique (often accidental) factors that promote successful economic development trajectories in some places over others; the limited window for effective intervention in a dynamic and constantly evolving system; and the significance of entrepreneurial action, the presence and actions of whom are hard to influence by policy (Boschma and Frenken, 2007). For example, Hill et al (2011) conclude that 'because it takes a long time to change the regional characteristics that affect resilience-related outcomes, policies and strategies that are put in place after a

region has experienced an economic shock are likely to be of little value' (p. 65). They do however, suggest that precautionary planning to make regions less vulnerable to shocks may be more beneficial although indicate that more research needs to be undertaken to understand what this might mean in practice. More broadly, other authors have highlighted the potential for resilience to be closely aligned to neoliberal market doctrines which reify fitness to survive amongst people and places and are overtly pessimistic about capacities to manage complex systems (Walker and Cooper, 2011). Davoudi (2012; p. 305) cautions against such pessimism however observing that the translation of self-organisation into ecological systems to self-reliance in social systems is 'misguided' and represents 'a kind of social Darwinism'.

Indeed, other authors drawing insights from evolutionary thinking, and in line with the literature on agency above, have identified 'institutions' more broadly (and those of governance more particularly) as key agents of purposive adaptation (Moore and Westley, 2011). For example, Schmidt, 2011; p. 119) observes, 'institutional context...matters. If 'sentient' (thinking and speaking) agents are the drivers of change, and their ideas (what they think about what to do) and discourse (what they say about what to do) are the vehicles of change, then the institutional context is the setting within which these ideas have meaning, their discourse have communicative force and their collective actions make a difference'.
Furthermore, others argue that governance, particularly through the state, plays a crucial role in shaping the evolution of the economic landscape (e.g. Hodgson, 2006; also Morgan, 2012, who identifies the state as animateur, innovator and procurer). Martin (2012) also suggests that economic and political reforms may build resilience but does not explore these in detail, while a growing number of empirical studies have highlighted the positive role which can be played by regional and local authorities in encouraging territorial adaptation to new socio-economic realities (e.g. Brookings Institution, 2010; Hervas-Oliver et al, 2011). It is also possible of course that institutions of governance may at times act to prevent positive evolutionary change and thus work against resilience (Markvart, 2009).

In terms of theory, a number of key implications for understanding the role of governance emerge from complex adaptive systems thinking. Firstly, institutions of governance and state must be understood as being *within* the system – they co-evolve with all other agents and with the environment (Berkes et al, 2003). Governance or management is itself part of the system in question – they are internal to the system, one of its component parts interacting with others, and not external to it. We have to then see governance as part of a coupled economic, social and environmental system and something which cannot be separated from the context in which it operates. In short, we cannot study governance in isolation – it has to be understand in relation to its connections with the other parts of the system – firms, the labour force, consumers, advocacy groups, the environment. Governance is however itself often fragmented, multi-level and polycentric (see for example Ostrom, 2005).

Secondly, in complex adaptive systems there is no overall controller. Governance bodies must therefore be understood as entities which may 'manage the emergence that they cannot actually control' (Moore and Westley, 2011; see also Lang, 2010). This is particularly the case at sub-national level where the role of local and regional governance bodies and their resources and remits may be constrained within multi-level governance structures.

Thirdly, governance is a unique connector in the system. The system consists of a network of component systems constantly mutually affecting each other. So the regional economy is a networked economy, formed bottom-up by interactions between people in a highly connected marketplace. Any particular agent can have a link to other agents, which in turn link to others through lines of communication, common tasks, market agreements, or other relationships. This network economy thrives when there is space for experimental evolution, in which new ideas emerge and technology is constantly refined. An open network of connections between agents can help create the conditions for emergence to occur. This can change our view of governance and policy – which are thus influenced by the environment and other actors as well as influencing them. Governance is also a unique connector inasmuch as in human systems, governance provides collective agency and scope for more complex communication and co-operation between multiple agents (Martin-Breen and Anderies, 2011).

Finally, in complex systems the acquisition of diverse knowledge is the key to effective self-organisation. Every agent in a complex system has a key role to play in mobilising knowledge of the environment and how it is changing and also acting as a source of innovation and knowledge. In governance terms, this means that opening management systems to gain information and perspectives from multiple sources is key (Martin-Breen and Anderies, 2011).

Further insights into the role of institutions of governance may be provided with new institutionalist literature and approaches (see also the literature on organisational resilience e.g. in Birkmann et al, 2012). New institutionalism helps to understand relationships and processes in urban and regional development policy and opens up particular perspectives on the formation of policy responses to socio-economic challenges. In particular, place and time-specific factors (history and cultural environments), which are created as a result of earlier experience, in turn help structure local decision making processes. Institutional dynamics thus occur within and are constrained by the effects of long-term path dependent processes (Lang, 2010). Furthermore, path dependent processes may be reinforced more broadly by the interconnections and interdependencies between and among institutions within the institutional matrix, and the distribution of influence and authority among actors with different interests (Markvart, 2009).

New institutionalist approaches also devote much attention to agency or how people ('institutional entrepreneurs') create, maintain, and change institutions, and how people are, in turn, influenced and constrained by institutions over time (Markvart, 2009). Using such a framework, Lang (2010) posits that resilience could be view as a systemic 'capacity', closely related to an institutional environment being supportive of the constant advancement of the system. Resilience could then be seen as being linked to a particular culture and form of institutional practice and orientation that constantly advances the key properties (or controlling processes) of the system. Developing this literature and building links between it and complex adaptive systems thinking could be a rich vein of theoretical work.
If governance and agency does play a role in shaping resilience, then further questions surround precisely what form this role takes and what specific actions might be desirable or required. As discussed above, this literature remains somewhat disparate and need of further development. It has indeed been recognised that 'recent departures in evolutionary economic geography help us understand better the evolutionary, diverse and multi-level dimension of regional systems, but still fall short in understanding policy design and implementation' (Uyarra, 2010; p. 117).

The complex adaptive systems theoretical framework arguably provides significant insights into the importance of *what* can be done to facilitate resilience as well as, importantly, *how* policy decisions and actions might be made.

In terms of the specific instruments or interventions that work to actively build regional resilience, Berkes (2007) identifies four strategies that have a high probability of enhancing resilience to future changes in couple socio-ecological systems and which provide a useful typology (with some additions) for understanding interventions for regional economic resilience (and indeed which clearly connect with the factors identified in the literature to date as key to shaping resilience). These are: (1) fostering system diversity (whether ecological, economic and/or cultural); (2) planning for likely changes; (3) fostering learning through facilitating feedbacks; and, (4) improving communication. To this list might be added (5) shared rights and responsibility for resource (assets) management (Nelson, 2007 cited in Graugaard, 2011; see also Ostrom's work on polycentricity and governance of the 'commons'); (6) encouraging modularity so that system shocks can be maintained; (7) strengthening connectivity in the network and between different networks and scales); and (8) fostering novelty and innovation (Bristow, 2010; Martin-Breen and Anderies, 2011). (See also Kuhlicke's work).

There has been some, albeit limited, work to date on what sorts of interventions might be required to facilitate regional economic resilience in practice, or how these ideas might be translated into practice. In their work on local economic resilience, CLES (2010) emphasise the importance of strong relationships between the public, private and social economy sectors, governance, institutions and environment; a strongly pro-active and co-ordinating role by local institutions of governance which facilitates and

brokers these key relationships; a symbiotic rather than parasitic balance between local and global activities and connections; and flexible governance structures which enable rather than constrain the formation of relationships and networks in an area.

Another study has highlighted the central policy challenge of finding ways to make key interventions to support and guide the development of new pathways of growth and development. This has highlighted the enduring role for public policy activism and agency in stimulating change and developing 'de-locking' mechanisms to help build resilience, particularly in peripheral regions lacking many elements of adaptive capacity (Hervas-Oliver et al, 2011). In a study of the ceramics industrial district in North Staffordshire in the UK, Hervas-Oliver et al (2011) draw attention to the challenges for industrial policy in developing resilience in mature industrial districts. In particular, their study highlights the need for industrial policy to be co-ordinated, particularly in drawing links between firms and institutions. In the North Staffordshire case, industrial policy has generally tended to be ad-hoc and limited, often reacting to events rather than anticipating them. Menzel and Fornahl (2007) (cited in Hervas-Oliver, 2011) consider that adapting policies at various stages of the cluster's life cycle - such as through selective (small firm) start-up policies - might be useful to militate against decline and facilitate the emergence of new development paths. Others have pointed to the importance of 'platform' policies which facilitate innovation through making and supporting unusual (cross-sectional) connections and the generation of new ideas and novelty (Wolfe, 2010; also Uyarra, 2010; Cooke, 2012).

The complex adaptive systems perspective also provides some further insights into *how* policy needs to be framed and designed for resilience which may prove useful as a framework for analysis. Two particular insights emerge from the literature which has examined adaptive management and governance for resilience in socio-ecological systems (Folke, 2006).

The first critical insight is that resilience and CAS thinking illuminates the framing of the policy problem and focuses attention in particular not on why change happens, but instead why order emerges. Change is thus the constant and to be expected, if not necessarily accurately predicted. Governance systems are thus required to focus on 'responsive adaptation' rather than 'predictive avoidance' (Hartzog, n.d.). Folke (2006) asserts that the implication for policy is profound, requiring a shift away from policies based on steady-state thinking and the design of policies that stimulate adaptive responses to change in the short- and long-term (see also Hill et al, 2011). The development of future-proofing policy development approaches might perhaps be one tangible expression this (Caputo, 2012). In short, what is required in the development of adaptive governance and policies that work with the grain of evolutionary trajectories that were becoming clear before shocks and crises (see, for example, Wrigley and Dolega, 2011). In other words it must enhance capacities for

self-organisation (Folke et al, 2003) – or support the DNA of regional economies (CLES blog, 2012).

The second key insight is that what matters is not so much the discrete agents of governance themselves but how and in what ways their actions relate to and impact upon other agents in the system and the environment as a whole. Institutional entrepreneurs play a potentially key role in fostering connections that might not otherwise be made (Moore and Westley, 2011; see also Hervas-Oliver for debate on 'policy enterpreneurs'). The CAS perspective highlights that understanding the various interactions and connections in the system is critical to effective policy design (see Graugaard, 2012). The discussion on resilience as an evolutionary concept suggests that it is thus a challenge to a mechanical and linear approach to place making and shaping. Regions need to be understood as an interconnected system; the policy application of resilience is thus a search for qualities and attributes of the territory which make it adaptable and able to thrive on change (Dawley et al, 2010; CLES, 2010) – in essence, this calls for integrated, place-based policies (see also OECD, 2009 for a useful discussion). Shaw (2012) suggests a resilience perspective usefully frames policy thinking away from off the shelf blueprints to more bespoke strategies with a defined cognisance of context and place.

But to fully understand the role of governance in facilitating resilience, we have to also recognise that governance structures themselves need to be adaptive. In order to increase the capacity of the system of interacting agents of firms, consumers, civil society etc to engage in collective action to cope with change, governance actors need themselves to develop a diversity of approaches, make connections, adopt the principles of modular policy-making, strong feedback loops and novelty (Martin-Breen and Anderies, 2011; also Kuhlicke in Birkmann et al, 2012). Thus, for example, some approaches will fail when conditions unexpectedly change; having a multitude of simultaneous approaches allows failure to be withstood. Ostrom's work on the governance of ecological systems suggests a need for polycentric forms of governance where as much diversity is built into the governance of the system as exists in the system itself. She also finds that order and high performance are more likely to be achieved in local economies where large, medium and small governmental and non-governmental enterprises engage in diverse co-operative as well as in competitive relationships (Ostrom, 2005).There is some empirical evidence to suggest that this is a principle that applies to the development of regional resilience. Some studies show that there is a positive correlation between diverse, polycentric governance and regional economic performance (Brookings Institute et al, 2010).

Policy should also be built on the principles of decreased interdependencies - the success of one project should not depend on the success of others. Beinhocker talks about the value of layering diverse but complementary policy approaches rather than having siloed policy thinking (Beinhocker, 2007). (See also Martin-Breen and Anderies, 2011 for further discussion of the importance of strengthened policy

networks, embracing knowledge and learning from all sources in society, and fostering innovation through decreasing the rigidity of disciplinary, organizational, and social boundaries; see also The Health Foundation, 2010 for broader discussion of the policy lessons from a CAS perspective).

Achieving this new way of framing policy-making may clearly be easier said than done however. Levin et al (1998; p. 228) highlight the challenges in building resilience in complex systems, observing that 'policy should be concerned with more than the immediate consequences of incremental actions. It should recognize the potential for an accumulation of small actions, each on their own perhaps quite harmless, to destabilize important natural and social systems. The difficulty is that, while we can predict with reasonable confidence the immediate consequences of an incremental action, we cannot predict the consequences of an entire sequence of actions without understanding the systems potentially being affected by them.' They state that trust (in the state, in society and in security) is also critical to the development of resilience in social systems noting that 'reciprocal altruism is an important stabilizing force, and its evolution and maintenance are enhanced by the local nature of interactions' (p. 232). Dawley et al (2010) point to a number of implications for local and regional development strategies. Political leadership is clearly of paramount importance at the time of a disruption or crisis. However, there also needs to be intelligent institutional leadership in framing and articulating the nature of the event or crisis and constructing a discursive narrative of strategic adaptation or adaptability to enrol key local and regional actors (see also Richards, Vorley and Williams work, Sheffield, no reference). (See also CLES, 2010 for insights into the importance of productive and co-operative relationships between the public, private and voluntary sectors).

This suggests a need for further work on understanding specifically what roles governance and governments might play and when. A number of roles may be variously identified. Governance might at times stabilise (perhaps through regulation or sclerosis); it might compensate for failures; assist recovery, provide a source of energy for change (entropy) perhaps through innovation; facilitate knowledge networks and aid social learning.

4 ECONOMIC SHOCKS AND THE ECONOMIC CRISIS

4.1 Economic shocks

4.1.1 From shock to crisis

Economies are continuously in a state of flux, caused by the interplay of decisions taken by a complex web of individuals, firms, public agencies and other organisations connected through a complex transactional web. Occasionally, the existing pathways of transactional connections of production and consumption are interrupted, with consequences at the individual, local, regional, national or even international level. For the purposes of this work we consider an economic shock to arise where the interruption occurs through shifts in the economic structures of the economy, rather than through a natural event such as an earthquake, although the latter may also have economic consequences, and the effects can be transmitted to more distant places in the form of an economic shock.

Economic shocks are not particularly rare events and their likely occurrence can be broadly foreseen. The consequences of these shocks are much less predictable (Taleb, 2010), as witnessed by the rapid unravelling of the economic order following defaults in the American sub-prime mortgage market. It is the consequences of an event that tends to mark it out as a 'shock' to the system and, certainly, to attach the word 'crisis'.

Analysing crises is not an easy topic, because crises are by definition confusing and contested phenomena, which challenge existing ways of doing and understanding. Crises can disrupt existing institutions and cause uncertainty about future directions, which offers opportunities for substantial change that deviates from locked-in trajectories. Whether or not these opportunities are taken depends on how (causes and solutions) of crises are interpreted. Crises are not self-apparent phenomena, but need to be narrated and explained. During periods of uncertainty, multiple interpretations compete with each other, and the likelihood of institutional change depends on which narrative becomes dominant (Geels, 2013). Blyth (2002) articulated this view, and illustrated it with two case studies of economic crises in the 1930s and 1970s, which both ushered in major institutional changes. He argues that ideas, discourses and narratives are important in crises: "At these junctures, it is ideas that tell agents what to do and what future to construct" (p. 11).

4.1.2 Types of Economic Shock

At the macroeconomic level, economic shocks come in many shapes and guises. Ahrend et al (2011) identify the following possible candidates:

- Financial shocks, such as the banking crisis and credit crunch of the late 2000s, where the availability of capital, rising interest rates and, potentially, increased levels of foreclosure inhibit investment.

- Fiscal shocks, whereby Governments curtail public expenditure and raise revenue-generating instruments, impacting on levels of demand in the economy. The austerity measures introduced across much of Europe, such as in Ireland, Greece and Spain, following the banking crisis provides a prime example.
- Exchange rate shocks, whereby movements in exchange rates make the domestic economy less competitive. An example of this was visible in the early part of the crisis, where euro-denominated loans taken by Hungarian firms and households soared in cost following a relative movement between the Euro and the Hungarian Forint.
- Commodity price shocks, such as the rapid rise in oil prices in the 1970s. However, more recently, substantive increases in energy and food prices have all adversely affected the purchasing ability of European consumers.
- Productivity/technology shocks, where a disruptive technological change adversely affects incumbent industries. The case of Nokia in Finland, where its failure to develop smartphone applications has led to a decline in its competitiveness, is one reason given for some of the difficulties faced by the Finnish economy.

Other shocks that can have an impact include regulatory shocks, whereby the introduction of new regulations adversely affects the viability of existing activities, such as with the effect of new health and environmental regulations on the IVLA plant in Puglia (See Case Study), and capital stock shocks, which Ahrend et al (2011) describe as being more common in the case of natural disasters, where capital stocks are destroyed. At a local level, shocks caused by the closure of local firms may be associated with one or more of the above causes, but may also be caused by other decision-making processes. The ability of an economy to respond to the effects of these shocks lies at the heart of considerations of economic resilience.

Economic shocks also overlie more longstanding transformations of economic structures, sometimes referred to as 'slowburn' shocks in the literature. During the period considered by this study (1990-2014), the European landscape has witnessed a major political and economic upheaval, as former Soviet satellite states make the transition to post-socialist economies and the EU itself has expanded to include 13 new Member States. The economic consequences of these changes were profound for many regions, as productivity enhancements promoted a movement of capital from the old 'EU15' to new Member States and the removal of protected markets and investment in capital goods initially prompted a shake-out of labour in the new Member States.

The challenge for any study is to identify when shocks occur. Taking the argument that an economy is always reacting to changing circumstances, that is never actually in a state of 'equilibrium' (Martin, 2012), means that it is always beset by economic shocks; some minor and some major. It is only when these occur of a certain magnitude, and in a particular context, that the effects become observable. In this

regard, economic shocks can be compared to physical earthquakes, small regular tremors pass without observation except by the most sensitive instruments. More sizeable earthquakes cause greater levels of damage, depending on the extent to which a place had planned and prepared for such an event.

For the economies of the ESPON territory the significance of the economic crisis was not that it was due to one economic shock, rather that it entailed a number of shocks which reinforced the challenges faced in particular economies, enhancing the magnitude of the overall event in those localities. This included financial shocks, fiscal shocks, exchange rate shocks and productivity shocks, together with regulatory shocks and commodity price shocks. In the following sections we explore some of the facets of the economic crisis that enveloped the ESPON economies in the latter half of the first decade of the 21st century.

4.2 The recent economic crisis

4.2.1 Origins of the crisis

For many, the trigger for the last economic crisis was the 'credit crunch' that emerged in the latter part of 2007, although this had its own origins in multiple events of the preceding decade, particularly the easy access mortgage credit and the burgeoning of complex, and intertwined, financial products. The credit crisis began when foreclosure and default rates went up, house prices went down and banks found themselves exposed to heavy potential losses through their investments in derivatives and credit swap agreements. It was thus the bursting of the US housing bubble that brought the global financial structure crashing down in 2008 and which plunged the world into recession (Gamble, 2009, Martin, 2011). The restriction on the flow of credit in the US led house prices to fall as the supply of new mortgages dried up and some of those with mortgages were forced to default. This quickly had significant repercussions across international credit markets owing to the growing incidence of bank and non-bank institutions investing in residential mortgage-backed securities (RMBS) (Aalbers, 2009). From the late 1990s, mortgage portfolios had been widely sold to investors across the world including municipal local governments who saw them as offering high returns for low risk. As investors became wary of the exposure of banks to sub-prime mortgages so levels of interbank lending dried up leading to an increase in the interbank lending rates and precipitating the collapse of several major financial institutions. Central banks began to intervene injecting extra liquidity in a bid to persuade banks to keep lending to one another and to tide the markets over the worst effects of the collapse of the sub-prime market. This led to significant levels of intervention by national governments and international institutions to secure the future of many others.

Action to sustain liquidity and shore up the banks continued throughout 2008 and was increasingly accompanied by fiscal boosts to maintain the level of demand and prevent a descent into slump. By the beginning of 2009 it was clear that the global

economy was facing a major recession and an IMF report published in January 2009 predicted that the recession for advanced economies was likely to be the worst since the 1930s, with a drop in output of 2% (IMF, 2009). If realised, this would be the first time there had been an overall aggregate economic contraction for those economies during the post-war period, with the cumulative output loss being equivalent to the 1974-5 and 1980-2 recessions. Individual countries began to publish very gloomy forecasts of their prospects, with growing fears that in some cases the drop in output could be worse than experienced in 1929-32 (Gamble, 2009). As economic conditions within the European economy tightened, and concerns for future income levels rose, demand for products also fell.

4.2.2 The transmission and spread of the crisis

One of the crucial factors underpinning the economic crisis of 2007/2008 and accounting for its rapid international spread was the interconnection of the global financial markets. Whilst the sub-prime mortgage crisis was initiated in the US, the repercussions were felt rapidly throughout the whole financial system, owing both to the exposure of non-US banks to sub-prime mortgage risks, either due to their ownership of US subsidiaries or to their ownership of US mortgage backed assets/liabilities through RMBS, and to the fear of unknown levels of exposure to this risk within banking portfolios (Aalbers, 2009). Thus, local housing and mortgage bubbles became systematically linked into and destabilised global financial markets and institutions. Local mortgage lending had effectively become globalised by being integrated into global bond markets and flows of investment funds (Martin, 2011). As the crisis spread and other economies ran into their own debt-led crises so the effects of these were felt in non-domestic economies. It is, for example, estimated that around a fifth of the funds invested by the UK Government in the Royal Bank of Scotland and Lloyds Bank were transferred to subsidiaries operating in Ireland[3].

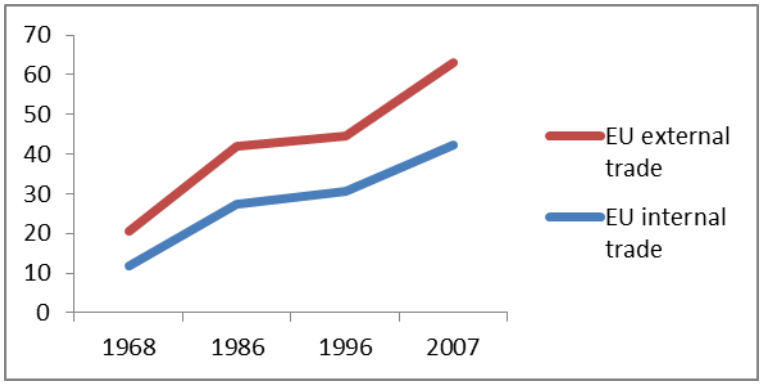
In the run-up to the global financial crisis in 2008, the grip of finance on much of the European economy had strengthened enormously. Spurred by the concentration of the global financial sector in the City of London, financial expansion was most pronounced in the UK, Ireland and Iceland. Indeed, the ratio of financial assets to GDP increased sharply, reaching nearly 600 percent in the EU, nearly 700 percent in France and the UK, and 900 percent in Ireland (Overbeek, 2012). The interconnections between financial sectors in different countries were opaque and not well-understood, so much so that in 2014, the OECD acknowledged that it had systematically underestimated the extent to which a setback to the finance sector in one economy would adversely affect other economies. This had led it to continuously overestimate forecast growth rates following the crisis (Hannon, 2014).

[3] http://www.telegraph.co.uk/finance/newsbysector/banksandfinance/9813358/British-taxpayers-funded-Irelands-14bn-bail-out.html

The transmission effects of external trading links are not confined to the financial sector. The importance of trade across the European single market and with external trading blocs has increased significantly in recent decades (Smith, 2013). What happens in one country now affects trading conditions in many others. Data produced by the ESPON TIGER project demonstrates this increasing openness and interdependence, across all the major global trading blocs (ASEAN, CIS, EU, GCC, MERCOSUR and NAFTA). The position for the EU is illustrated in Figure 4.1.

These trading links are not just in terms of finished products, but rather are the function of increasingly globalised supply-based value-chains, where components are sourced from many locations before being assembled into a finished product. One illustration of these global value chains is the example of the enquiry into technical problems with the Boeing 787 Dreamliner. The enquiry is focusing on the lithium battery, produced in Japan, and the battery charger, produced in the US by a British-owned company, assembled into the aircraft by Boeing in the US, which then ships the finished product to airlines around the world. Similarly, the European aircraft manufacturer Airbus sources parts from numerous geographical locations before assembling their aircraft in Toulouse, France. Thus, regions might no longer specialise in an industry but rather in a Key Enabling Technology (KETs), which can be incorporated into a variety of finished products in a variety of export locations.

Figure 4.1 Proportion of trade undertaken with other EU economies and external to the EU



Source: adapted from data published by ESPON project TIGER (p.11)

This illustrates an important point about the crisis which is that its causes and the diffusion of its effects have been highly geographically uneven (Martin, 2011). The crisis has taken various forms in different national and regional contexts depending upon local conditions and on the form of economic and political integration of each particularly country and region into global financial markets and the international division of labour (Hadjimichalis and Hudson, 2014). In Europe, the first signs of crisis emerged in Spain's real estate sector and the Irish banking sector, and in some central and eastern European countries where increasing reliance on foreign investments and exports paved the way for rapid transmission of the crisis. This was quickly followed by growing problems in southern Europe where problems in the

eurozone were exacerbated by the changing contours of the global economy and the growth in competition in many of its key markets from Asian economies (Hadjimichalis, 2011).

Indeed, as of early 2010, the crisis in Europe mutated from a banking crisis into a sovereign debt crisis. This emerged through two principal causes; firstly, where the private debts emanating from the property-led credit crisis have been transferred to the public sector; and, secondly, where public expenditure commitments have raised fears of the ability of these governments to service levels of debt, particularly in the face of falling fiscal receipts and increasing social obligations. This has led to increases in the interest rates being charged for public debt and significant reductions in public sector expenditure in order to rebalance public finances, further exacerbating the economic crisis in some parts of the European territory. By 2010, general government debt stood at 85% of GDP for the eurozone as a whole (Overbeek, 2012), and extreme austerity measures began to be implemented notably in Greece, Ireland and Portgual by the EU, European Central Bank (ECB) and International Monetary Fund (IMF) (Hadjimichalis and Hudson, 2014).

Early analyses of the crisis were quick to highlight the likelihood that the impacts of both bank bailouts and public sector spending cuts would be highly geographically variable, with spending cuts likely to impact most heavily on structurally weaker nations and regions with a greater dependence on the public sector for employment and welfare and public service provision (e.g. see Davies, 2011). In addition the crisis has led many national governments to be more selective in their approach to industrial policy and support for particular businesses and sectors (Aggarwal and Evenett, 2012).

4.2.3 The day the world changed

As a complex event, occurring across multiple locations, identifying key milestones in the crisis is a challenging process, particularly as it is often the cumulative effects of many small actions that create the real momentum behind an economic shock. It is though, useful to outline some key dates.

Although the economic shock is often dated from the collapse of Lehman Brothers in September 2008, Adam Applegarth, CEO of Northern Rock - which was later taken into ownership by the UK Government - describes 9 August 2007 as “the day the world changed”. This was the date that PNB Paribas became the first financial institution to publicly acknowledge that they could not value the extent of their exposure to their Collaterised Debt Obligations (Guardian, 2012). In September, Northern Rock suffered the first run on a major bank in the UK for 150 years as it faced a substantial liquidity crisis, prompting the UK Government to first provide it with an emergency loan and then, in what was to become just the first of a series of national bail-outs of financial institutions across Europe, to take it into public ownership in February 2008 when it became clear that no buyer could be found.

During 2008 there followed a series of mergers, bankruptcies and national bailouts of financial institutions. In March, Bear Sterns was taken over by J.P. Morgan for less than a tenth of its pre-crisis value, in September Lehman Brothers filed for bankruptcy and Fannie Mae and Fannie Mac, America's two largest mortgage guarantors, were bailed out by the US Government. In the UK, HBOS was rescued by Lloyds TSB, whilst the Irish Government promised to underwrite all of the potential losses to which the Irish banking system was exposed. In October, Iceland's three largest commercial banks all collapsed. As banks restricted their willingness to lend funds to each other through the interbank market, so more banks teetered on the point of collapse, with the UK Government forced to bail out HBOS, Lloyds and Royal Bank of Scotland. The speed with which the financial sector was unravelling, and the lack of knowledge of which institution would be next, caused markets to fall sharply. Moreover, experience of dealing with such a crisis was in short supply as policy makers were forced to react to one situation after another, leading Charles Ferguson, director of Inside Job, a documentary about the banking crisis, to observe that "It was totally clear nobody knew what they were doing" (quoted in The Guardian, 2012).

In January 2009, the next chapter in the crisis opened up as the newly-elected Greek government acknowledges that the hole in Greece's public finances was far worse than originally reported. The Greek government embarks on stringent austerity measures as credit ratings agencies downgrade Greek debt to 'junk' status and so significantly increase the costs of raising public finance. In the UK, the Chancellor of the Exchequer warns that Britain's own public finances could face a 'Greek-style' crisis unless public expenditure is reined in, prompting the introduction of its own austerity measures. Evidence of the spread of the sovereign debt crisis emerges throughout 2010 and 2011 as Portugal and Ireland are also forced to seek international support, leading to the levying of strong internal austerity policies, with commentators concerned that the contagion effects will spillover to the Italian economy too. In Hungary, a new government warns that public finances are worse than expected and might result in a request for a 'precautionary' bailout. The spillover effects were also beginning to affect levels of trade within Europe, with the UK reporting that trade with Ireland, Portugal, Spain and Greece had fallen by 16% (The Guardian, 2012).

Through 2011, the economic impact of the crisis continued to be felt as austerity measures were implemented by more states, including Italy, and measures became still stronger in the worst affected states, such as Greece. At a European level, further measures were put in place to provide support to the worst affected Member States, both to access credit and for investment in infrastructure projects to boost economic activity. These measures were strengthened further during 2012, as the impacts of the recession led to public unrest and demonstrations in the most affected States. In Spain, the public sector deficit was compounded by the inability of many autonomous regions to service their own debt, or to curtail their own spending, contributing to the Spanish government accepting international support in 2012 and regions such as Catalonia, Murcia and Valencia seeking support from a domestic regional 'bail-out'

fund. In 2012, Cyprus was also forced to secure international support, as the liabilities of its banking sector threatened to overwhelm its economy, taking the number of Member States seeking international support to eight (Table 4.1). In December 2013, Ireland became the first Member State to exit from its bail-out support signalling, perhaps, the first signs of Europe emerging from its collective crisis.

Table 4.1 International support for Member States

Member State	*Support provided (€bn)*	*% GDP (2011)*
Greece	245.6	114
Portugal	78	46
Ireland	67.5	43
Spain	41.4	4
Romania	19.6	14
Hungary	15.6	16
Cyprus	12.3	68
Latvia	4.5	23

Source: http://en.wikipedia.org/wiki/Eurozone_crisis, and Eurostat online data (nama_gdp_c and tec00001)

4.3 The geography of previous economic crises

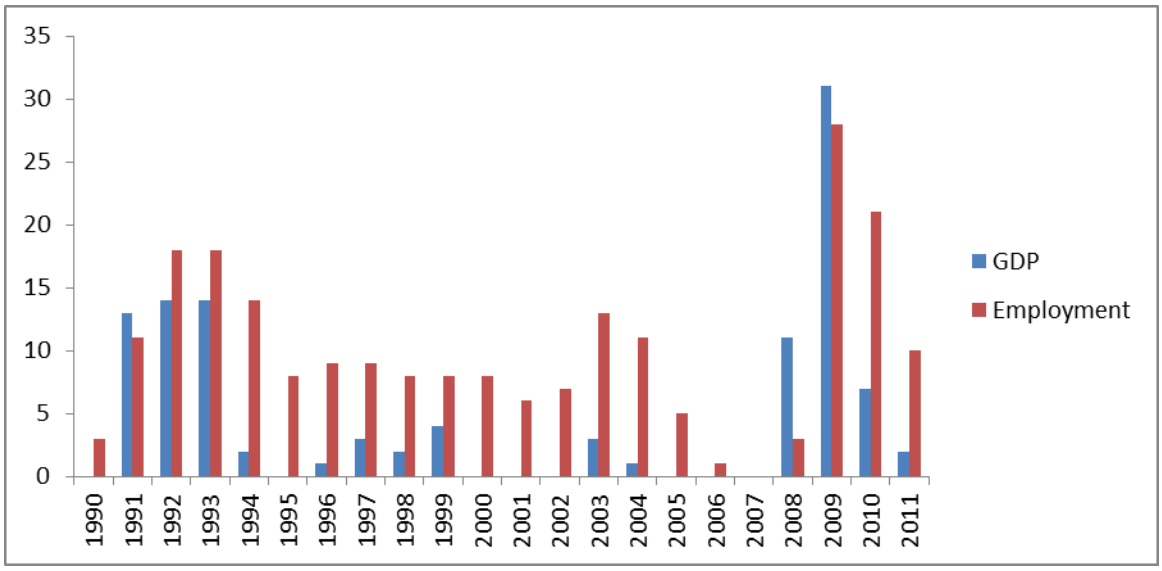
4.3.1 Identifying widespread economic crisis

Since 1990, the beginning of the period considered by this work, the ESPON space has witnessed numerous economic shocks, some with a greater territorial effect than others. Whilst the magnitude of the recent economic crisis has been widely-recognised by academic writers, policymakers and the public, identifying widespread economic shocks is less straightforward. This is perhaps because of, rather than despite, the fact that economic shocks are a recurrent feature of our economy, of which the current economic crisis is just the most recent, but also arguably is one of the deepest for over 70 years.

The approach taken by this study has been to examine when economies have experienced an economic downturn, as an indication that economic shocks have had an adverse impact. As Figure 3.1 illustrates, across the EU there is only one year since 1990 when no national economy has experienced a decline in levels of gross employment. There is less volatility in the number of economies experiencing a year-on-year decline in GDP, but, even here, there have only been 4 years when no economy has experienced a decline, reinforcing the message of the recurrence of economic shocks.

From Figure 4.2, certain patterns can be discerned and it appears that there are two European-wide downturns within the period 1990-2012, one around the period 1992-93 and the other starting around 2008-09. For the purposes of this study's terms of reference these are regarded as 'economic crises', with the latter representing the 'last crisis'. In addition there have two other identifiable periods of downturn affecting an important proportion of national economies: one around 1997-99 and the other around 2003. The 2008-9 crisis appears to have been unusual in that it is the only occasion during the period of observation that more economies experienced a decline in GDP than in levels of employment.

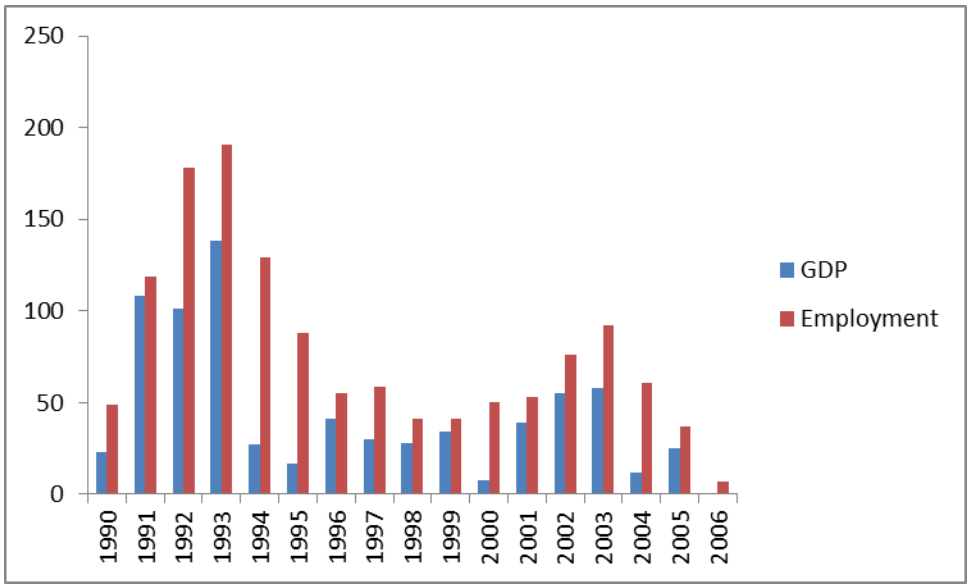
Figure 4.2 Number of national economies in decline across the ESPON space 1990-2011



Source: adapted from study data (n=32, Serbia included only post 2000).

This pattern is replicated at the regional level, although here the significance of the crisis of the early 2000s emerges more strongly, and the high proportion of economies experiencing employment decline in the late 1990s is less observable (Figure 4.3). This is likely to be due to the effects of single region countries, such as Estonia and Latvia, being less strongly represented in Figure 4.3. As with the national data, there is only one year in which no region has experienced a decline in GDP and none in which employment decline has not occurred somewhere. What is also apparent is that a higher number of regions experience employment decline in each year than a downturn in GDP.

Figure 4.3 Annual incidence of employment and GDP decline at a regional level



Source: adapted from study data (n=280)

4.3.2 The effects of these crises

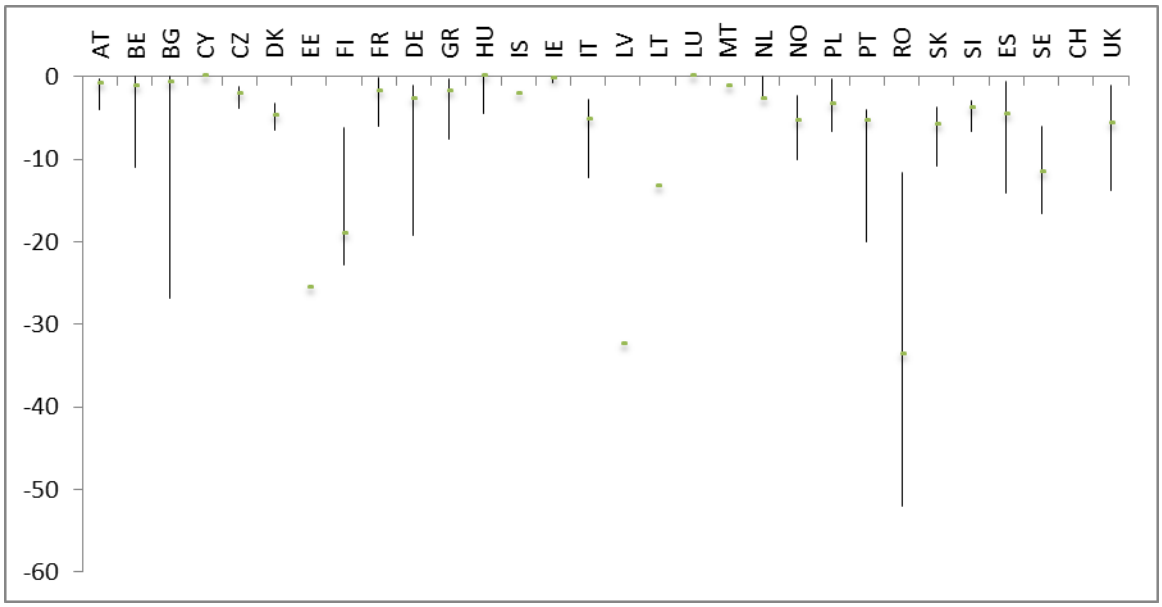
On the basis of the results presented, it appears that the ESPON space has witnessed two substantive economic shocks in the period under consideration. The first downturn occurring between 1991-1993 and the second, less widespread, downturn occurring between 2002-2003. It should be noted that in neither case were the shocks ubiquitous in their geography: the UK, as one example, avoiding the economic downturn of the early 2000s. Equally, in many countries the effects of the shock were visible prior to the peak date and in others the effects were not visible until later. This provides a broader spectrum of dates, in line with our focus on business-cycle analysis, than the narrow windows of when the majority of economies were affected.

The first, and most significant, of our two downturns occurred in the early 1990s. This represented the cumulative effects of a mix of economic shocks, ranging from the continuing aftermath of the financial shock from the precipitous falls in stock market values on Black Friday (October 1987), the trade shock of the collapse of the Soviet Union (1991), with particular significance in Finland, and, in some cases, the costs (particularly in higher interest rates) associated with maintaining currency parity with the German Mark. For those States making the transition to capitalist democracy following the overthrow of their Socialist governments, this was also a period of structural transformation.

Most regional economies in Europe experienced a downturn at some point during this period. Only 13 regions (5%) maintained positive employment growth throughout, although GDP performance was stronger, with 52 regions (19%) maintaining positive GDP growth (Map 4.1). Across the 266 regions which experienced an employment downturn the average employment loss was -6.2% of previous peak employment

numbers, whilst the average fall in GDP, across those regions experiencing a decline, was similar at -6.7%[4]. Figure 4.4 demonstrates the wide variability in employment losses, both between regions within countries and across countries. Regions experiencing employment losses of more than 10% of pre-crisis levels are to be found in Belgium, Bulgaria, Estonia, Finland, Germany, Italy, Norway, Portugal, Romania, Slovakia, Spain, Sweden and the UK.

Figure 4.4 Percentage loss in employment from pre-crisis peak (1990s, by region)

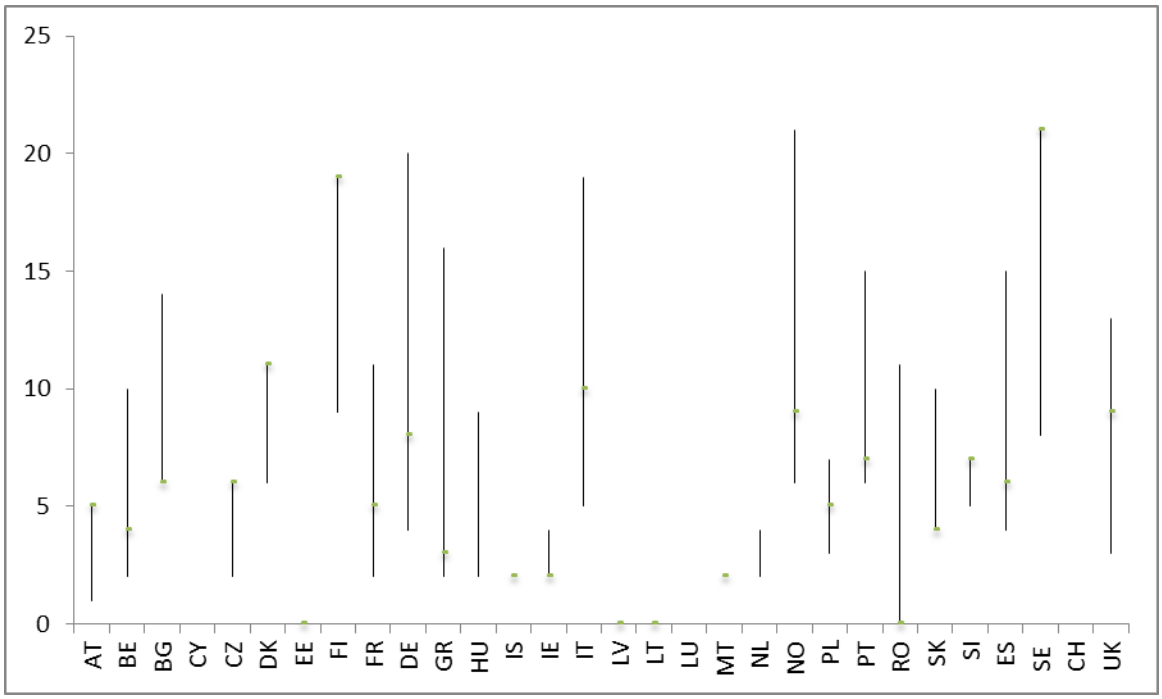


Source: adapted from study data

Most regions recovered from the crisis over the following decade, but this was not always a swift process. The average time taken to recover to previous peak employment levels was 7.4 years. Recovery to previous peak levels of GDP was slightly swifter at 4.7 years. These figures hide a wide spread of recovery durations, with the longest recorded recoveries taking 21 years to regain peak employment levels and 19 years to regain peak GDP levels. As Figure 4.5 illustrates, long recovery durations are not restricted to particular countries. The figure excludes regions that have not recovered to their previous peak.

[4] Based on a sample size of 225 regions.

Figure 4.5 Period taken to recover to pre-crisis peak employment (years, by region)



Source: adapted from study data

Despite this crisis occurring more than two decades ago, not all economies have, technically, recovered (Map 4.1). A fifth of regions (52) have never regained their peak employment levels. For four regions (1%), located in Germany, Italy, Portugal and the UK, recovery to peak GDP levels has still not been achieved. This adds weight to the suggestion of the potential for an economic shock to permanently lower levels of economic activity, as postulated by Martin (2012). Here we are likely to be witnessing the amalgam of more slowburn processes of structural change, perhaps precipitated by the shock event.

The second occurred in the early years of the 21st Century, heralded in part by the collapse of the so-called 'dot.com' bubble as the inflated prices of technology stocks fell rapidly across the globe. The introduction of the new Euro-currency unit in 2000 also created uncertainty, as its value fell quickly on its launch. More significantly, the transition of the former Soviet states in Eastern Europe to capitalist democracies over the previous decade, and their evolution to membership of the EU, was creating new economic pressures in the economies of France and Germany.

During this 'Millenium' period fifteen countries experienced a downturn in levels of employment (Table 4.2). At or before the Millenium the economies of the former Socialist states, and Bulgaria, which was still under Socialist rule at this time, all experienced a fall in activity. This was followed in the early 2000s by a fall in employment levels in Austria, Belgium, Germany and, a year later by, Denmark, the Netherlands and Sweden. Slovakia and Slovenia then experienced their own

downturn in 2003 and 2004. In the following short analysis we focus on the experience of regions in the regions that were part of the EU15 at that time.

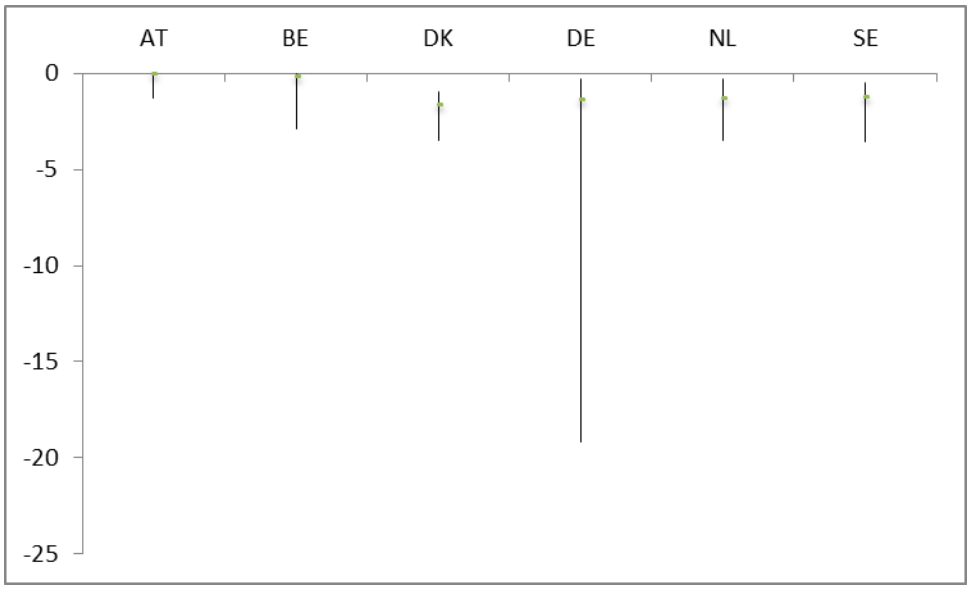
Table 4.2 Economic downturn in the ESPON space (Millenial downturn)

	BG	***CZ***	***EE***	***LV***	***LT***	***PL***	***HU***	
Peak	1996	1996	1997	1997	1997	1998	2000	
Trough	2001	2004	2000	2000	2001	2003	2005	
	AT	***BE***	***DE***	***DK***	***NL***	***SE***	***SK***	***SI***
Peak	2001	2001	2001	2002	2002	2002	2003	2004
Trough	2002	2003	2003	2004	2004	2004	2004	2005

Source : Adapted from study data

Although it is difficult to draw precise comparisons with the previous crisis (of the 1990s), it appears that the effect on the economies of Autria, Belgium, Denmark, Germany, Netherlands and Sweden was less intense and of a shorter duration. The average fall in employment across the regions involved was -2.1% and, on average, regions had returned to their pre-crisis peak employment levels in less than five years. The economies that were most badly affected were those of German regions, with Austrian region less adversely affected (Figure 4.6).

Figure 4.6 Employment losses in selected economies (Millenial downturn)



Source: adapted from study data

5 TERRITORIAL IMPACT OF THE ECONOMIC CRISIS

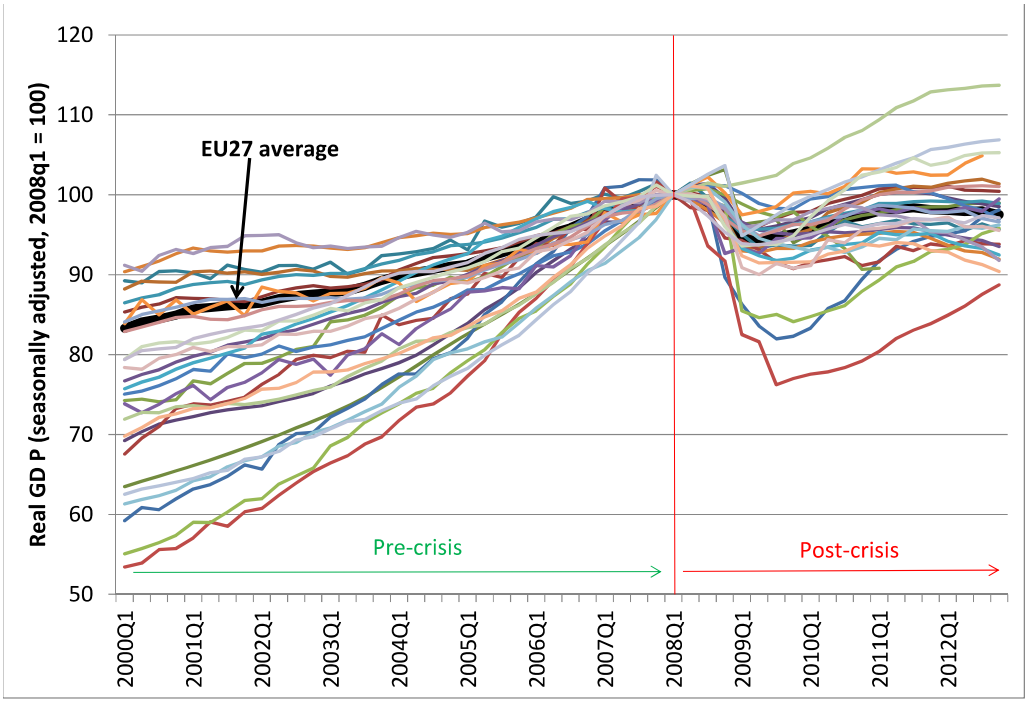
5.1 Dimensions of the recent crisis

The economic crisis did not affect all parts of the ESPON territory evenly (Claessens et al, 2010; Davies et al, 2010; Lane and Milesi-Ferretti, 2010). Some areas entered the economic downturn earlier, others later. Some have experienced a sharper downturn and others a more prolonged crisis. The depth and severity of the downturn also varies. The following section illustrates some of the key territorial dimensions to the economic crisis across the ESPON territory. We illustrate the geography using data for GDP and the number of people in employment, together with selected figures highlighting the effects of the crisis on key indicators.

5.1.2 The temporal geography.

Analysis by Cambridge Econometrics (Figure 5.1) highlights that following a period of uniform growth in the early years of the century, the period since the crisis has shown a marked divergence in performance, with only 6 Member States achieving pre-crisis growth rates (Austria, Belgium, Germany, Poland, Slovakia and Sweden). This is an indication of the 'hysteresis' referred to by Martin (2010) whereby economies may recover from an economic decline but may not renew their pre-crisis growth rates.

Figure 5.1 GDP change in EU economies



Source: Reproduced by permission of Cambridge Econometrics (2013).

Even during the last years of the NICE decade there were, though, isolated regions experiencing some level of economic downturn. In 2006, two Norwegian regions were affected by GDP decline (Map 5.1), and isolated regions in Romania, Germany and the UK all experienced decline in the numbers employed (Map 5.2).

It is from 2007 that we begin to witness the first signs of the emerging territorial impact of the unfolding economic crisis. In this year regions in Italy and Hungary both experienced downturns in levels of economic output (as measured by GDP) and employment, with declining employment numbers recorded in regions in both these countries plus the UK, Germany, Austria, Bulgaria and Portugal (Maps 5.3 and 5.4). Nationally, however, no Member State had yet experienced a fall in GDP or employment (Map 5.5 and 5.6), it was only in the following year that this began to occur (Map 5.7 and 5.8).

During 2008 the crisis gathered pace with four Member States experiencing employment decline, and ten recording falling levels of GDP (Maps 5.8 and 5.7). At a regional level the effects were even more broadly distributed, with regions in 13 Member States experienced falling levels of employment and regions in 17 Member States recording falls in GDP activity (Maps 5.9 and 5.10). Initially, at least, the impact of the crisis was being felt in falling levels of economic output, although the employment effects were not far behind.

By 2009, the effects of the economic crisis were apparent across most of the ESPON territory, at a national level Poland and Switzerland were the only States that had not experienced a fall in levels of GDP output (Map 5.11). Whilst for employment, these two States were joined by Germany, Luxembourg and Belgium in managing to retain pre-crisis employment levels (Map 5.12). The spread of the crisis across the regions of the ESPON territory is apparent in Maps 5.13 and 5.14, where nearly every region in the ESPON territory, outside of Poland, was experiencing a downturn in levels of GDP, and the situation was only slightly less pervasive in the case of levels of employment.

2009 was very much the nadir of the economic crisis across the ESPON territory in terms of the number of regions experiencing economic downturn. From 2010 the first signs of recovering regions is visible (Maps 5.15 and 5.16). Poland, and its regions, continued to maintain their stronger GDP performance, with a minority of regions in Germany, Austria, France, Belgium and the Netherlands, alongside Malta, also managing to avoid the declining levels of GDP recorded across the rest of the ESPON territory. In terms of employment, the stronger performance of Malta, Germany and Southern France is evident in Map 5.16, together with regions in Belgium, Luxembourg and, in isolated examples, the UK, Portugal and the Netherlands.

The marked difference in experience of the crisis is clearly visible in 2011 (Maps 5.17 and 5.18). GDP decline remains a strong feature of the peripheral economies of the

ESPON territories, but growth has been maintained, or regained, in regions across a broad grouping of Poland, Germany, Switzerland, Austria, Slovakia, Netherlands and Belgium. The recovery of GPD in southern France is also notable. This pattern is broadly, though not completely, replicated for employment levels.

5.1.3 Severity of the crisis

The decline in employment associated with the economic crisis has been extensive. Across the ESPON area (ESPON 31) total employment fell by 2.14% by 2011, with the EU15 experiencing a similar decline (Table 5.1). The experience of the Member States that have joined the EU post 2004 is somewhat worse, with an average fall in employment of 2.22%, despite the better performance of the Polish economy. This is dwarfed though by the difficulties evident in the Member States that sought assistance from the European Financial Stability Fund, where employment levels have fallen by almost a tenth. Membership of the Euro currency unit (the 'Eurozone') has been associated with a slightly stronger fall in employment than for non-euro States.

Table 5.1 Employment decline across territorial groupings (%, peak year to 2011)

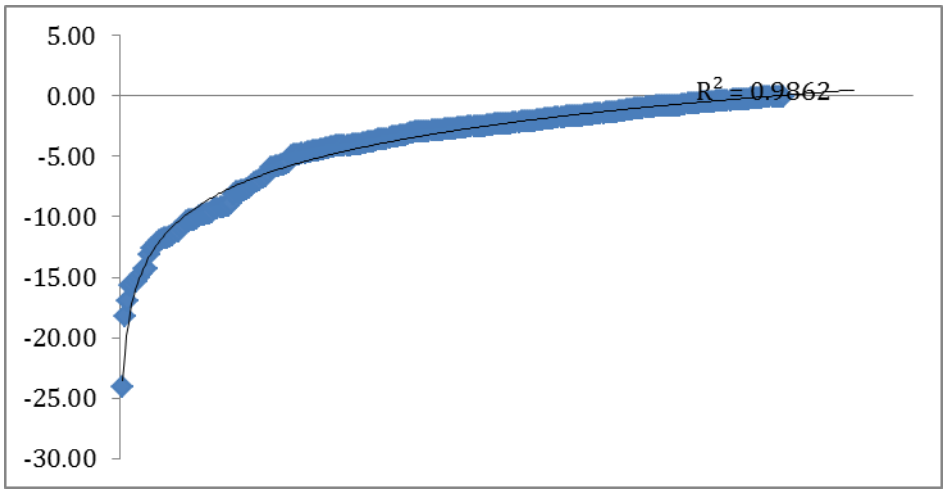
	ESPON 31	***EU27***	***EU15***	***EU12***	***Eurozone***	***Non-Eurozone***	***EFSF***
% employment loss	-2.14	-2.22	-2.14	-2.55	-2.27	-2.11	-9.47

Source: own calculations. EU27 is used as Croatia was not a member of the EU until 2013.

The severity of the crisis has varied within the ESPON territory, with some regions being affected more strongly than others. Figure 5.2 illustrates the proportionate fall in employment in each region. Whilst employment levels fell by less than 5% in most regions, a small number of regions have been affected much more adversely. The most extreme case is Latvia, which has recorded a total fall in the number of persons employed that is approaching a quarter of the numbers employed at the peak of the boom. The distribution of employment changes across regions is non-linear and takes a strong logarithmic form, suggesting that there is a reinforcement mechanism at work.

Map 5.19 illustrates the total employment decline experienced in each region, as a proportion of total employment, and those where no decline occurred at all.

Figure 5.2 Employment decline by region (%, peak year to 2011)



Source: adapted from study data

5.1.4 Duration of the crisis

The duration of the crisis can be considered in two ways. Firstly there is the duration of the economic downturn, the period from the peak in employment to the following trough. Secondly, there is then the period that is taken to recover from the beginning of the downturn to the level of employment present at the time of the previous peak.

From the analysis, it is apparent that all groupings experienced a downturn in employment in 2009, following the 2008 peak. Most groupings experienced the beginnings of recovery from 2010, giving an average duration to the downturn of 2 years. However, in the case of the EU12 and the EFSF groups of Member States employment figures in 2011 were still in decline, indicating that the trough was still to be reached. In no case had any of the territorial groupings recovered to pre-crisis employment levels by 2011.

Table 5.2 Duration of crisis across territorial groupings (peak year to 2011)

	ESPON 31	*EU27*	*EU15*	*EU12*	*Eurozone*	*Non-Eurozone*	*EFSF*
Peak	2008	2008	2008	2008	2008	2008	2008
Trough	2010	2010	2010	2011	2010	2010	2011
Downturn duration (yrs)	2	2	2	(3)	2	2	(3)
Recovery to peak	-	-	-	-	-	-	-

Source: study calculations. EU27 is used as Croatia was not a member of the EU until 2013.

The steepness of the downturn is a measure of how rapidly employment decline occurs. However, as it is an average of the total employment decline experienced and the duration of the downturn (peak-trough) it may provide a false picture for those territories with more extended downturns. Figure 5.3 illustrates that the EU15 has

tended to experience a steeper decline in employment than the EU12, but this may simply be a symptom of the more drawn out crisis in the latter case.

Table 5.3 Steepness of employment decline (%, peak year to 2011)

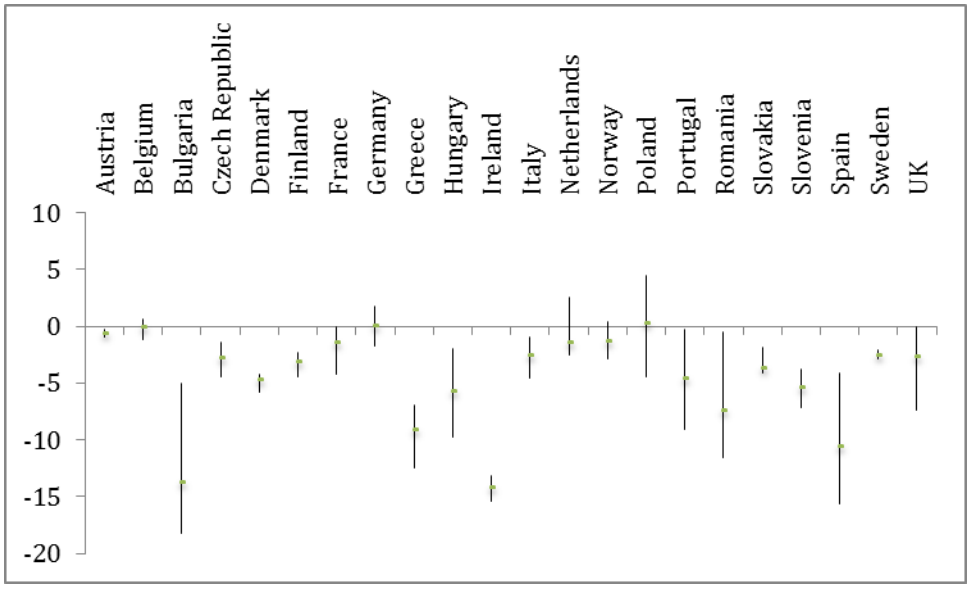
	ESPON 31	*EU27*	*EU15*	*EU12*	*Eurozone*	*Non-Eurozone*	*EFSF*
Downturn duration (years)	2	2	2	3	2	2	3
Recession Steepness (%)	-1.07	-1.11	-1.07	-0.85	-1.14	-1.05	-3.16

Source: own calculations. EU27 is used as Croatia was not a member of the EU until 2013.

5.1.5 The distributional impact

The effects of the crisis are not necessarily evenly distributed within countries, although this can be the case. Figure 5.3 illustrates the distributional impact of the crisis within countries as indicated by the spread of employment losses between those regions most heavily affected within each country and those least affected. The median point within each country is indicated by the green bar. We have excluded single region countries but included all countries containing more than one NUTS 2 region.

Figure 5.3 Impact of the crisis within ESPON states



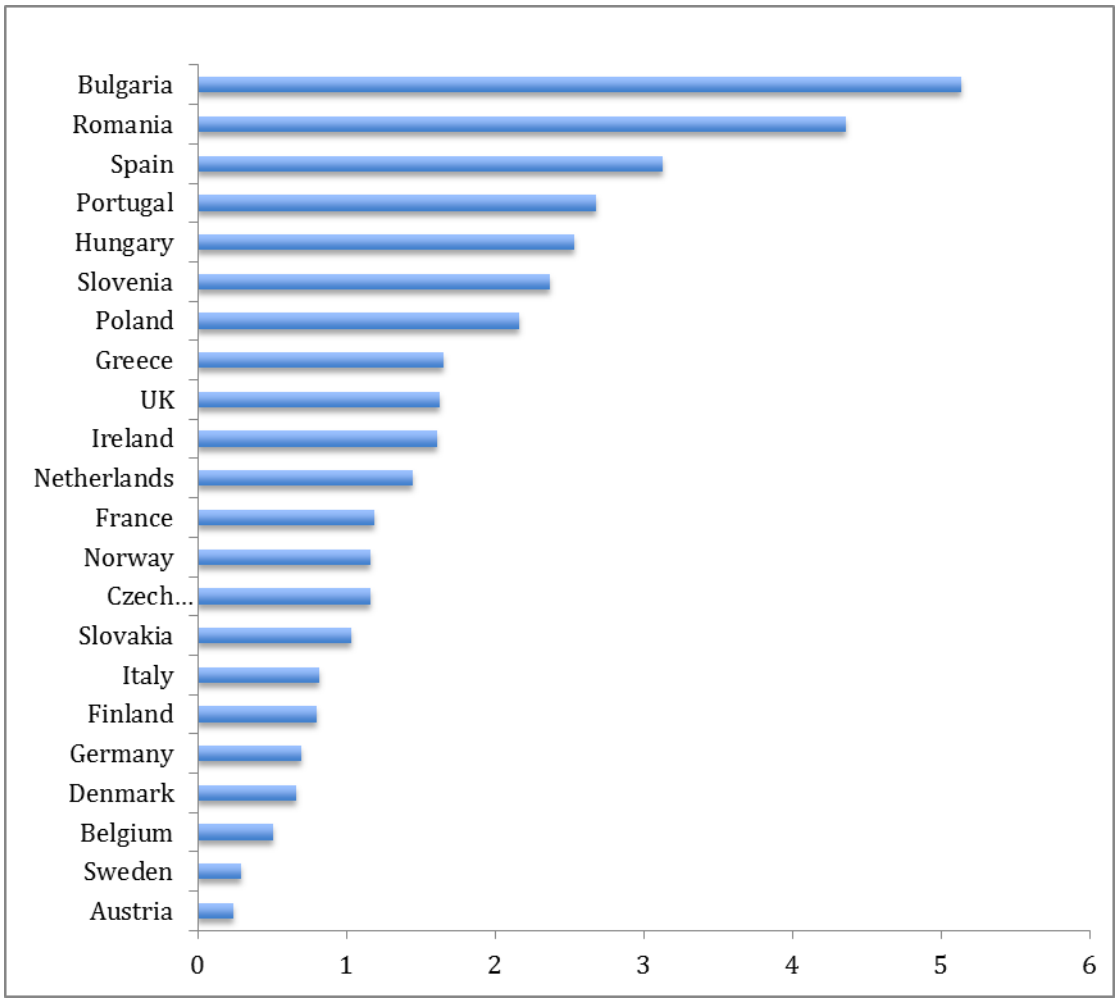
Source: Study calculations

Whilst countries like Austria, Belgium, Denmark, Finland and Sweden all exhibit a relatively small range in terms of the recorded employment impact of the crisis, a much wider range of experience is visible in countries such as Spain, Bulgaria and Poland. Whilst the differential between regions might be expected to be less in small two-region economies this is not always the case. To illustrate the degree of variation

within countries we calculated the Standard Deviation from the mean for each economy (Figure 5.4).

Closer examination of the different groupings lends some support to the argument that the nature of the internal response to crisis within countries may be influenced by the particular form of the prevailing capitalist system (Hall and Soskice, 2001). Those countries with the widest differentials include the Iberian economies of Spain and Portugal, alongside the former socialist states of Bulgaria, Romania, Poland, Slovenia and Hungary. In contrast, the states with the least variation include the Nordic nations of Denmark, Sweden and Finland, alongside Germany, Austria and Belgium. There are, however, also exceptions to this 'varieties of capitalism' argument, which suggests that more nuanced explanations are also required.

Figure 5.4 Intra-country differences in employment experience



Source: Study calculations

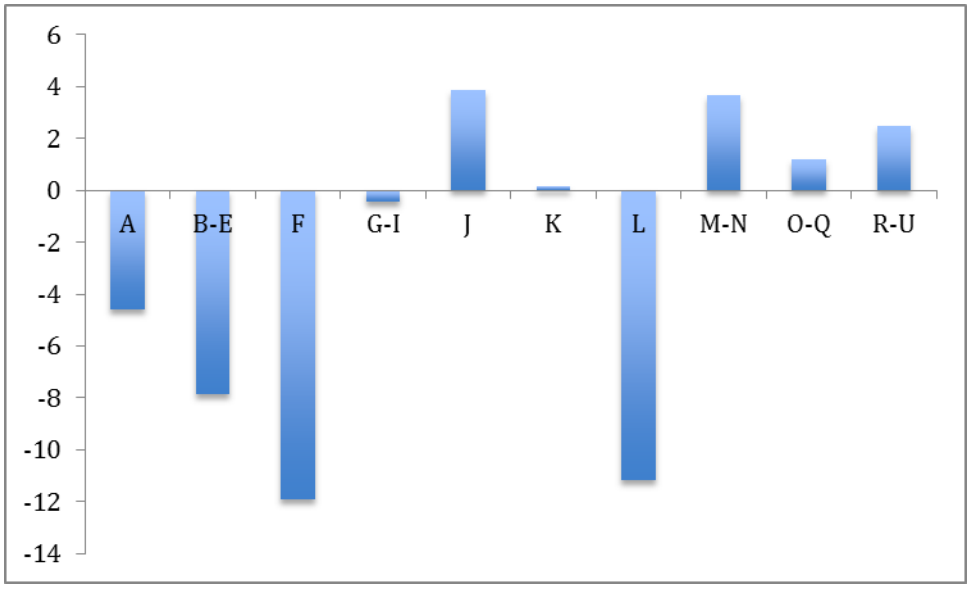
5.2 Wider effects of the crisis

The effects of the crisis are increasingly well-documented, both at the level of the European Union, and at a national level (Davies, 2011; Claessens et al, 2010; Groot et al, 2011; European Commission, 2013). What emerges is a complex and heavily nuanced geography, with some key headline outcomes.

5.2.1 Employment losses in construction, primary industries and manufacturing industry

Although total employment in the ESPON space has fallen during the crisis (by around 2%), this is not evenly distributed across sectors (Figure 5.5). Employment in sectors which have experienced job losses during the period of the crisis peaked in 2008, which has informed our choice of dates for the following analysis. Across the ESPON space, job losses during the crisis have been concentrated in the construction sector (NACE F) and the real estate sector (NACE L), reflecting the significance of the collapse in the property 'bubble' at the outset of the crisis. Other sectors that were badly affected included manufacturing industries (NACE B-E) and primary industries (NACE A). The number of persons employed in ICT (NACE J), Professional, scientific and technical services (NACE M-N) and Arts, entertainment, recreation and other services (NACE R-U) increased over this period; with public sector employment sectors (NACE O- Q) also registering a slight increase.

Figure 5.5 Employment losses by sector (NACE2, 2008-11)

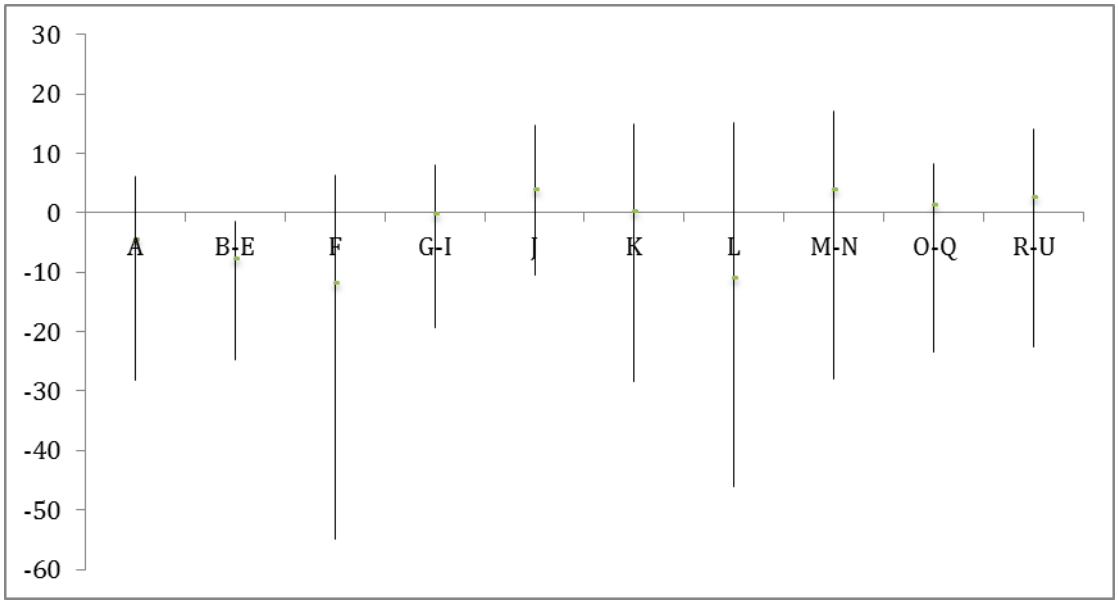


Source: Adapted from CE study data

Experience across the ESPON space varies. Whilst industrial sectors (NACE B-E) recorded employment losses across all countries, all other sectors experienced growth in at least one country). Equally, although five sectors recorded employment gains across the ESPON space, all recorded losses in particular countries. The significance

of employment falls for some sectors in particular countries is evident for both the construction sector (NACE F) and Real Estate activities (NACE L).

Figure 5.6 Variations in sectoral employment change across countries (Max-Min by country, %)



Note: omits outlier of 60% increase in Real Estate (L) employment in Bulgaria.
Source: Adapted from CE study data

The varying sectoral fortunes across ESPON states during the crisis are illustrated in Table 5.4. Whilst some states have experienced employment losses in all sectors (Spain and Latvia) or most (Estonia, Greece, Ireland), others have experienced employment growth even in sectors that were declining across the ESPON space as a whole. Countries where sectoral performance is markedly worse than the community average are highlighted in red, those where performance is markedly better than the average for the sector as a whole are indicated in blue.

Table 5.4 Employment change by sector (2008-11)

	NACE Rev. 2 sectors									
	A	**B-E**	**F**	**G-I**	**J**	**K**	**L**	**M-N**	**O-Q**	**R-U**
Belgium	-11.6	-7.4	3.3	0.8	2.2	3.8	7.1	5.8	6.5	-3.8
Bulgaria	-7.4	-16.4	-35.0	-2.7	5.8	5.8	60.0	-2.2	-12.6	-11.9
Czech R.	-7.1	-7.5	-1.0	8.0	14.8	-28.3	-29.8	-28.0	6.3	14.2
Denmark	-2.5	-15.7	-15.7	-3.2	-1.9	-0.3	6.6	2.1	-2.5	-6.4
Germany	0.0	-2.4	3.3	2.8	6.2	2.8	-1.9	4.2	3.3	2.6
Estonia	4.8	-8.1	-36.9	-5.2	-7.0	1.9	-3.2	6.5	-3.3	-14.7
Greece	-2.4	-16.4	-35.6	-6.9	-5.6	0.2	-7.6	-0.1	-5.5	-3.5
Spain	-6.9	-17.3	-42.6	-4.7	-1.5	-1.4	-5.9	-0.1	-3.8	-4.5
France	-8.3	-7.8	-2.2	0.2	3.5	0.4	-4.3	1.7	0.9	0.2
Ireland	-28.1	-16.5	-55.0	-6.3	5.4	0.6	-1.0	-4.2	-3.5	-15.4
Italy	-3.3	-8.0	-5.9	0.1	2.5	0.0	4.6	0.4	-2.8	6.1

Cyprus	3.2	-7.1	-14.6	-0.1	6.8	5.3	-7.9	6.4	0.8	12.3
Latvia	-14.9	-24.7	-53.9	-19.4	-10.5	-14.9	-11.2	-11.2	-23.4	-22.6
Lithuania	0.2	-22.1	-44.3	-0.5	1.7	5.3	8.6	4.7	-3.2	-6.1
Luxemb.	4.8	-1.4	2.2	3.1	9.2	9.6	15.2	13.3	7.4	4.1
Hungary	-0.5	-3.2	-12.7	-0.3	-1.9	9.3	0.6	12.0	-0.5	-10.1
Malta	6.1	-4.7	-5.1	3.9	7.4	15.0	9.7	16.5	5.5	4.8
Netherl.	-3.5	-5.4	-5.9	-0.4	-6.6	2.6	6.3	1.5	1.9	-0.1
Austria	-2.5	-3.4	2.7	1.2	4.5	6.7	1.8	8.1	3.2	2.5
Poland	-7.6	-5.3	5.9	4.5	12.5	6.5	9.5	8.8	8.3	10.0
Portugal	-9.0	-10.7	-17.4	-3.8	6.8	0.5	-2.8	1.8	0.3	-4.0
Romania	-1.3	-12.5	-7.5	2.0	6.9	1.5	-46.1	17.1	3.0	-11.4
Slovenia	-6.0	-13.8	-20.4	-4.0	6.4	7.5	12.7	8.0	-0.3	-0.7
Slovakia	-10.7	-10.6	-1.2	5.5	4.4	3.4	6.0	4.9	-2.5	2.9
Finland	-3.7	-10.6	-1.3	0.5	5.0	1.0	1.7	0.6	-0.4	6.8
Sweden	1.3	-8.9	6.5	2.3	-2.8	6.2	4.3	7.5	0.8	3.3
UK	2.4	-6.0	-12.0	-4.3	7.9	-4.5	-39.6	9.8	3.6	14.0
Norway	-5.7	-4.7	-3.1	-0.7	5.1	7.4	3.4	5.7	1.4	0.2
ESPON	-4.6	-7.9	-11.9	-0.4	3.9	0.1	-11.2	3.7	1.2	2.5

Source: adapted from CE study data

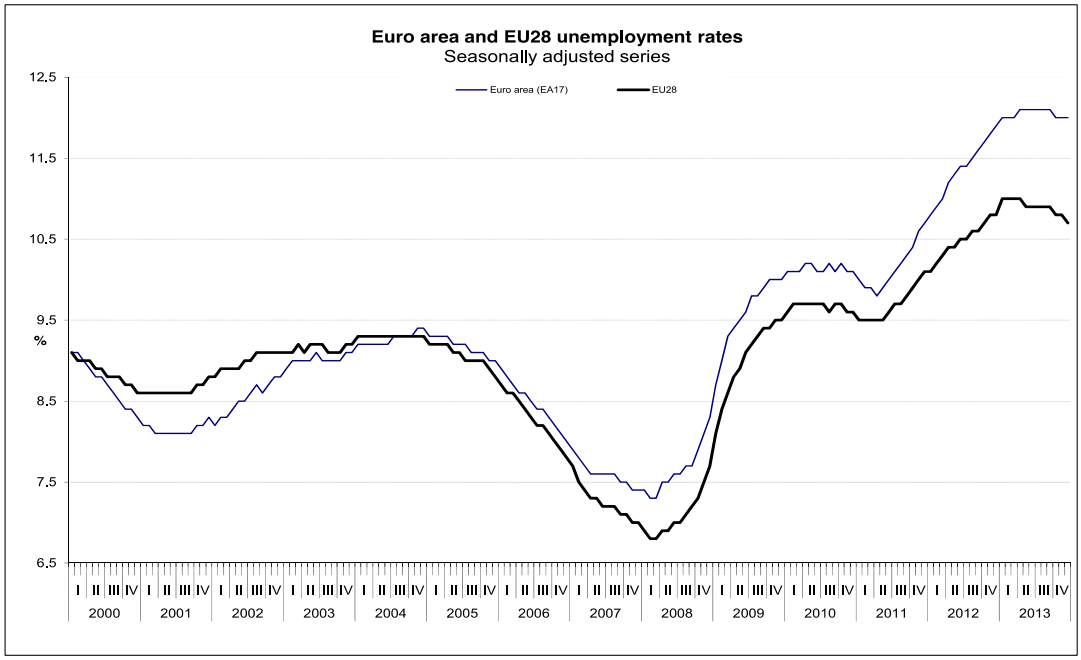
5.2.2 Rising unemployment, and widening disparities

Amongst the headline effects of the crisis have been falling levels of GDP, employment and rising levels of unemployment. We have already considered the effects of the crisis on GDP and employment and so turn our attention here to unemployment. In 2007, seasonally adjusted unemployment rates in the EU were at an historically low level (Figure 5.7), with a median rate of registered unemployment of 6% across the regions of the ESPON space. By 2011 regional unemployment remained on an increasing trajectory. An initial reduction in unemployment rates across the EU in 2010 proved shortlived as the developing fiscal crisis led to a further rise in recorded levels, with the median rate of registered unemployment reaching 8% in 2011. The first signs of a fall in unemployment have begun to emerge in 2013.

In 2007 over a quarter of regions in the ESPON space recorded unemployment rates of 4% or below (a level that is often regarded as the 'natural' rate of unemployment by economists), with regional rates ranging from 2% to 20% (Table 5.5). The regions with the highest rates of unemployment were located in Germany, Belgium, Slovakia and Croatia, with the autonomous regions of Ceuta and Mellila of Spain experiencing the highest levels recorded. In 2011, the autonomous regions of Ceuta and Mellila retained their status as having amongst the highest levels of unemployment, but were now joined by other regions from Spain and Greece. Regions from Slovakia and Croatia also retain high levels of unemployment. The crisis has not affected unemployment levels to the same extent in all regions, 17% of regions continue to experience unemployment levels of 4% or below, of which 34 (71%) are the same as

in 2007. Those regions that have retained their strong performance throughout the crisis are, broadly, to be found in Austria, Germany, the Netherlands, Norway and, in one case, in the Czech Republic. Regions where unemployment rose more strongly are to be found in Iceland, Lithuania, Italy and Denmark (Map 5.20 and 5.21).

Figure 5.7 Unemployment rates in EU (2000-2013)



Source: Eurostat (Euroindicators News Release, January 31st 2014)

Table 5.5 Regional rates of unemployment (2007 and 2011)

Unemployment rate (%)	*Number of Regions (2007)*	*Number of Regions (2011)*
0-4	75	48
5-9	158	134
10-19	53	93
20-30	1	14

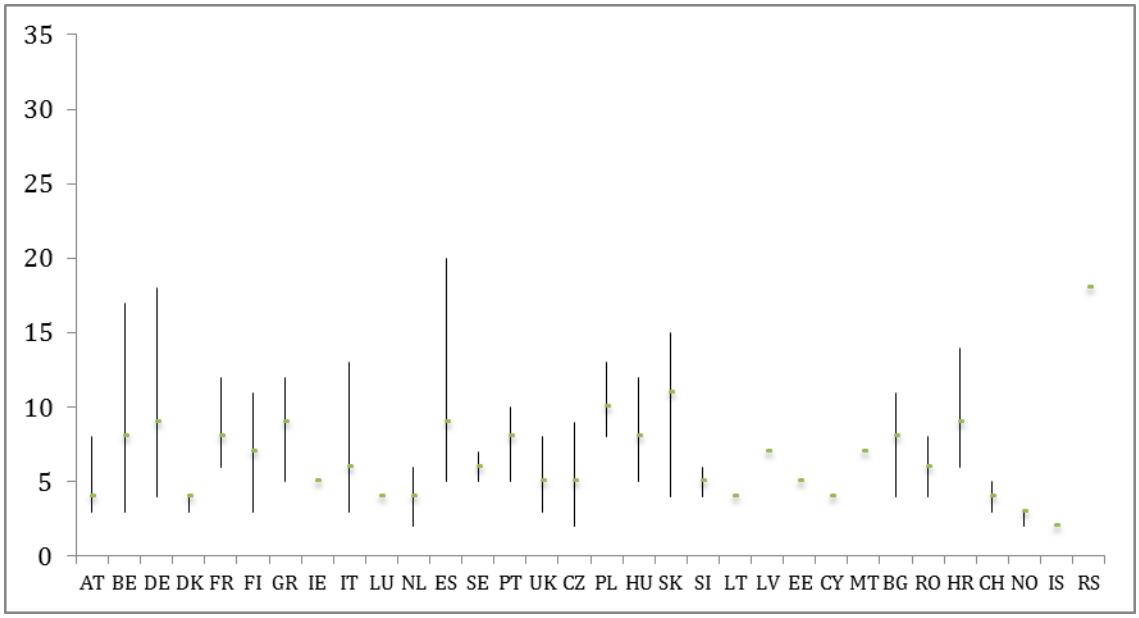
Source: adapted from Experian study data

Figures 5.8 and 5.9 below, illustrate the differential distribution of the unemployment impacts of the crisis, both within and between countries, highlighting how unemployment rates have remained relatively unchanged in some areas, whilst experiencing dramatic increases in others.

Whilst there has been a reduction in the range of unemployment disparities in a small number of countries (Austria, Germany, Finland, the Netherlands and the Czech Republic) and they have remained the same in others (Belgium, Denmark, Poland and Slovenia), this is outweighed by the larger number of countries where disparities have risen between 2007-11 (Figure 5.10). The highest rises have been in Norway,

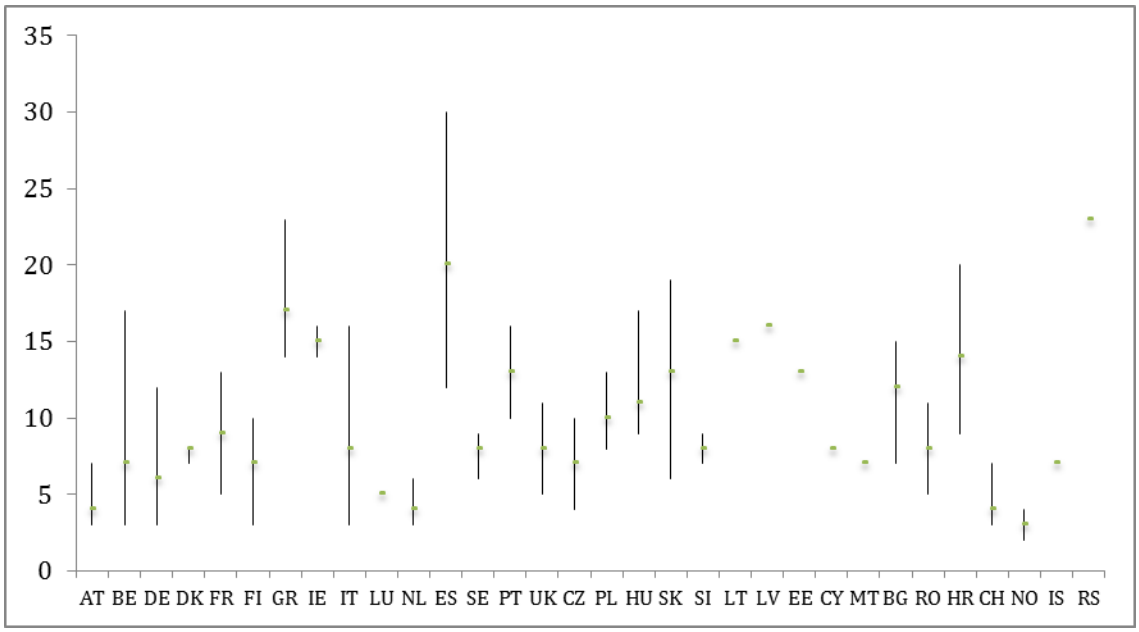
Switzerland and Ireland, all countries where disparities did not previously exist (and so disproportionately represented by the calculation).

Figure 5.8 Regional unemployment rates by country (2007)



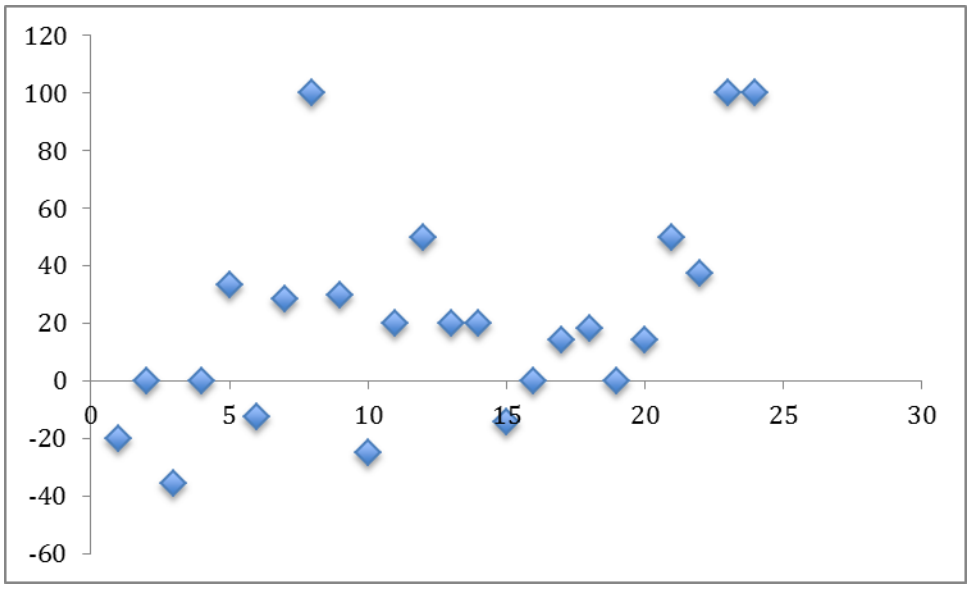
Source: adapted from Experian study data

Figure 5.9 Regional unemployment rates by country (2011)



Source: adapted from Experian study data

Figure 5.10 Change in range between highest and lowest unemployment (2007-11, by country)



Source: adapted from Experian study data

In Table 5.6 we illustrate the data in an alternative style, locating economies according to whether the change in disparities has been accompanied by an increase or reduction of the peak rate of regional unemployment in the country. This clearly demonstrates that the reduction in disparities has relied on peak rates of unemployment falling (or remaining the same) rather than faster rising rates of unemployment in better performing regions. Only in the Czech Republic has this latter case been evident.

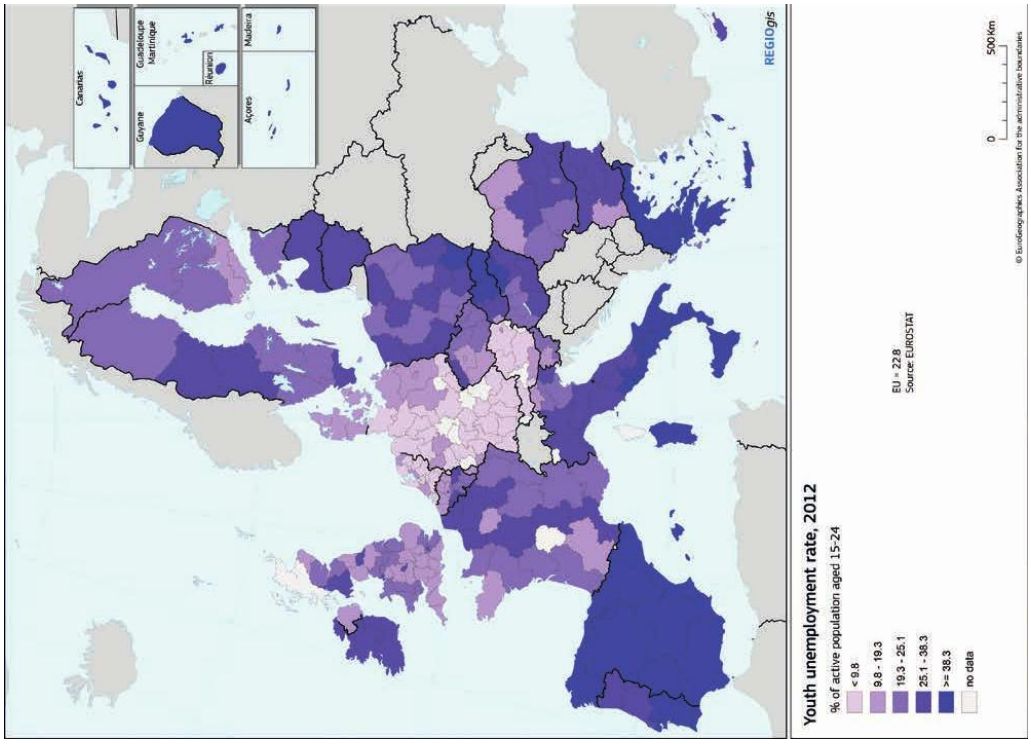
Table 5.6 Change in peak regional unemployment and disparities within states (2007-11)

	Lower peak unemployment	No Change	Higher peak unemployment
Widening disparities			FR, EL, IE, HU, IT, ES, SE, SK, PT, UK, BU, RO, NO, HR, CH
No change		BE, PL	SL, DK
Narrowing disparities	AT, DE, FI	NL	CZ

One of the real impacts of the crisis has been the dramatically rising level of youth unemployment, particularly, but not only, in Spain, Portugal and Greece (European Commission, 2013). Concentrations of youth unemployment are visible across much

of the EU, outside of the core heartlands of Germany, Austria and the Netherlands (Map 5.22). Rates of youth unemployment are particularly affected by labour market opportunities, but also by labour market policies and practices, which can preferentially protect older workers at the expense of younger workers on more flexible contracts.

Map 5.22 Youth Unemployment Rate (2012)

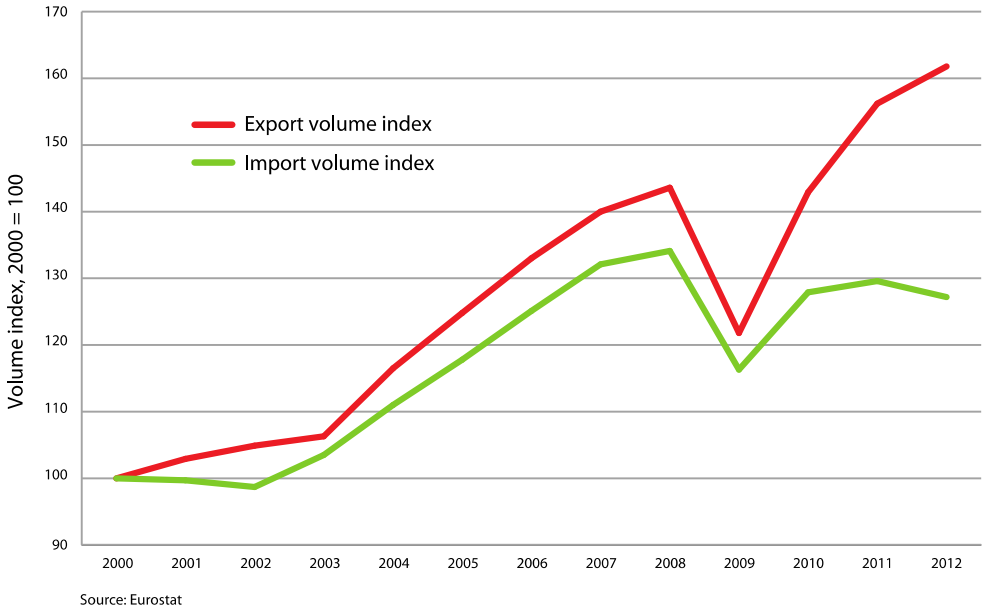


Source: European Commission (2013, p.37)

5.2.3 Fall and rise of trade, exports and inward investment

One immediate impact of the crisis was falling levels of credit availability as banks faced a crisis of liquidity and confidence. This affected private firms who were unable to access credit terms or investment finance. This, together with falling levels of confidence, led to reducing level of trade and falling volumes of inward investment (European Commission, 2013). The decline in inward investment flows occurred both within the EU and from sources outside the EU. The gradually recovery of inward investment flows from within the EU from 2009 and from external locations from 2010 highlights the recovery of the global economy. However, levels of domestic demand for products in the EU remain depressed, reflecting the tight economic conditions of EU markets in the face of austerity policies and high levels of household debt in many countries. As Figure 5.11 illustrates, following a reduction in export and import volumes post-2008, export volumes have regained their growth trajectory, but the volume of imports remains muted, signaling lower levels of domestic demand with the EU economy.

Figure 5.11 Changes in EU trade volume, 2000-2011

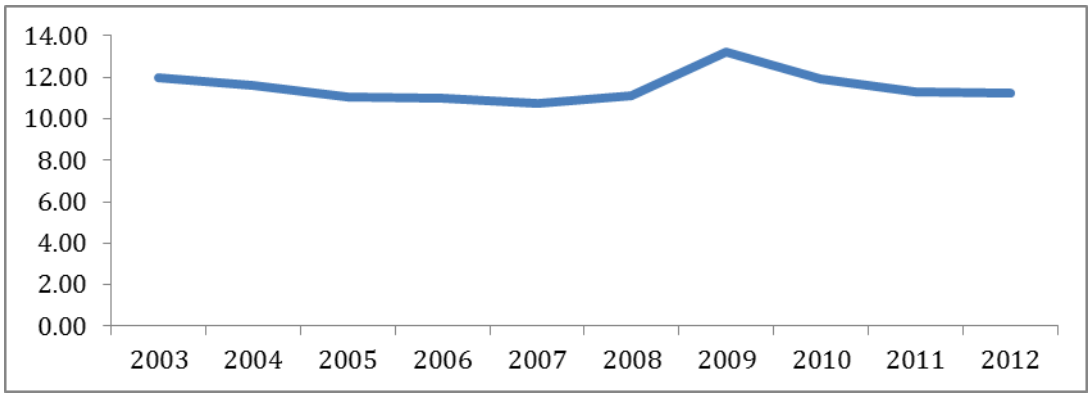


Source: European Commission (2013, p.9), based on Eurostat data

5.2.4 Increasing indebtness overall, but some exceptions

Across the EU, the gradual decline in household debt as a proportion of income during the economic boom came to an abrupt halt as household incomes fell and their debts rose (Figure 5.12).

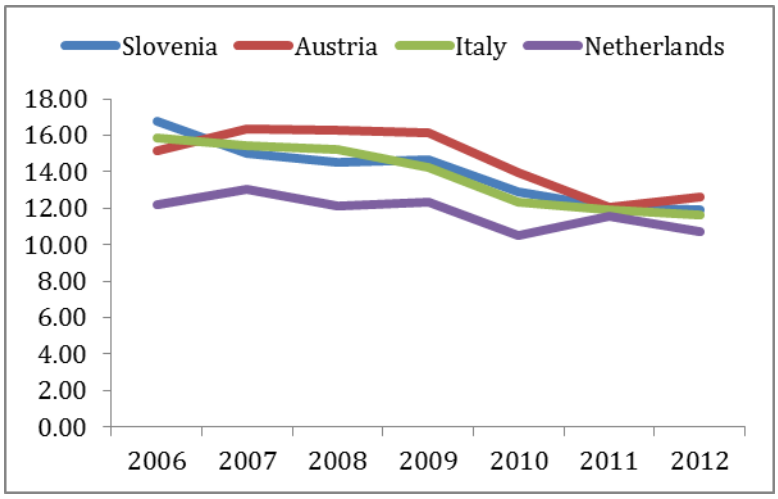
Figure 5.12 Ratio of gross household debt to income (EU28)



Source: adapted from Eurostat (nasa_ki)

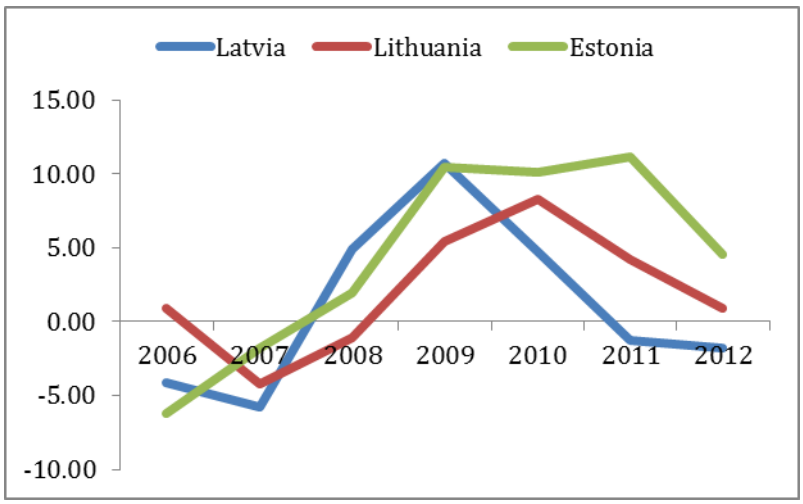
The aggregate figure for the EU hides some strong differences between countries (Figures 5.13a-e). In four Member States levels of debt, relative to income, have generally declined over the period of the crisis, although this is the exception. In most Member States, the debt:income ratio rose. It did so sharply, from comparatively low ratios, in the case of the Baltic Member States, before falling back.

Figure 5.13a Declining household debt:income ratios



Source: adapted from Eurostat (nasa_ki)

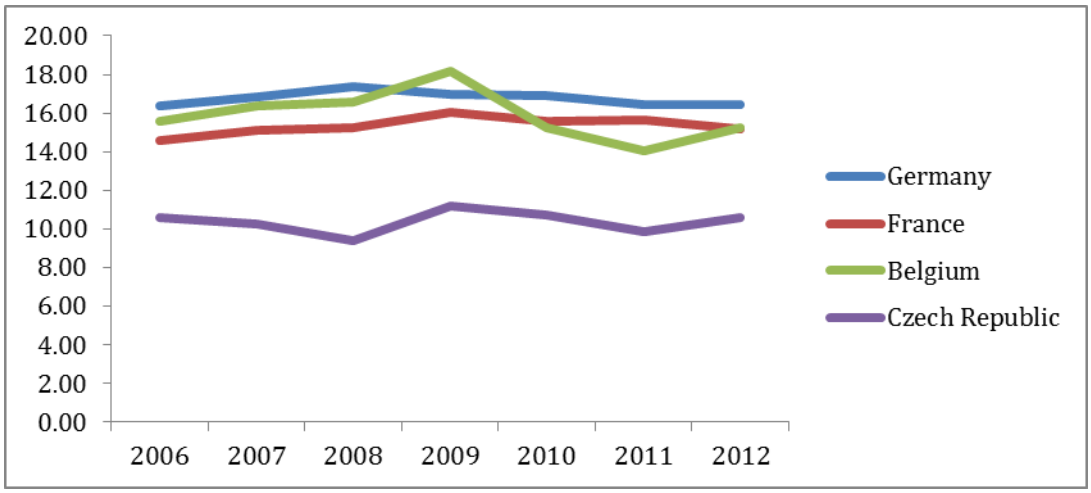
Figure 5.13b Rapid increase-decline in household debt:income ratios



Source: adapted from Eurostat (nasa_ki)

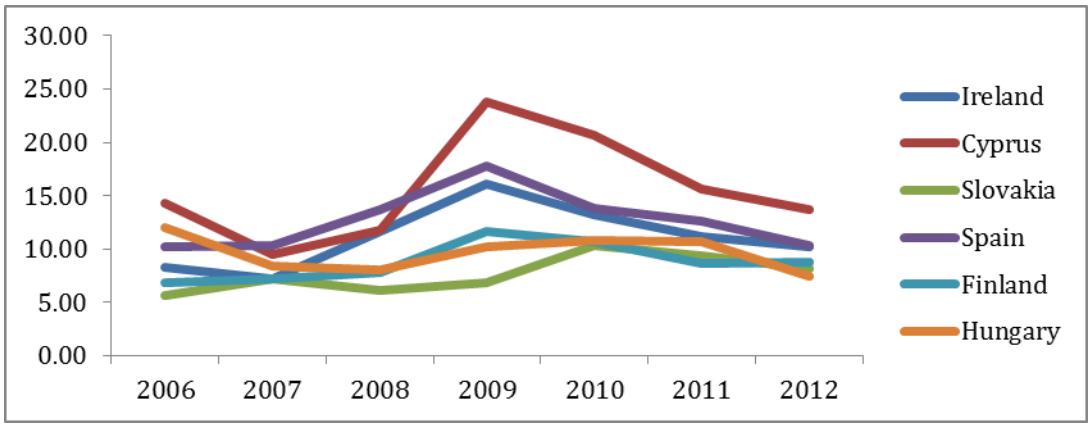
In France, Germany, Czech Republic and Belgium income:debt ratios rose slightly before falling back (Figure 5.13c). A similar, albeit, sharper response can also be seen in a further six Member States (Figure 5.13d).

Figure 5.13c Gradual increase-decline in household debt:income ratios



Source: adapted from Eurostat (nasa_ki)

Figure 5.13d Marked increase-decline in household debt:income ratios

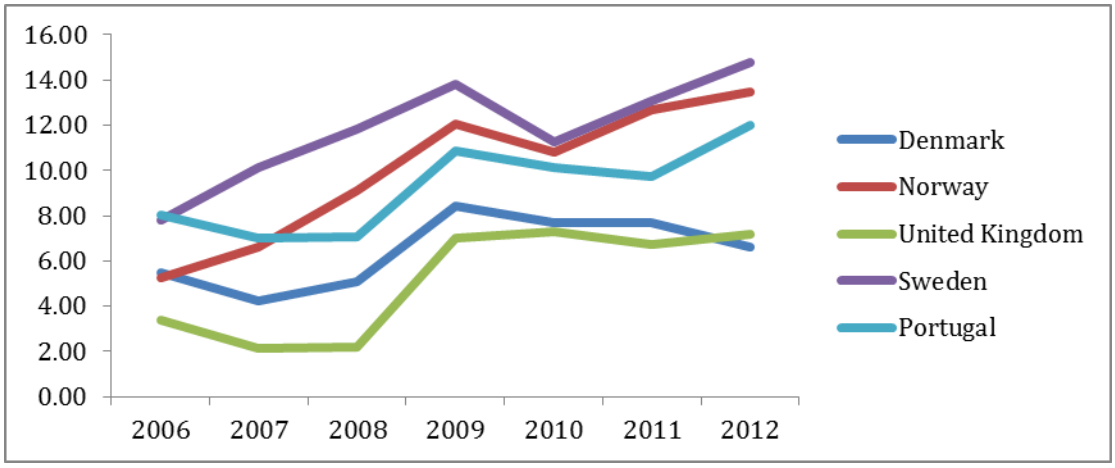


Source: adapted from Eurostat (nasa_ki)

Finally, rising levels of debt:income ratios have also been recorded in our last group of Member States. However, here ratios are rising again, having a period of reduction or are, at best, broadly stable (figure 5.13e).

The general trend of increasing indebtedness during the crisis, is mirrored by a trend of rising general government debt (Figure 5.14). By 2012, the ratio of Government debt to GDP had reached almost 160% in Greece. In contrast, in Estonia, also badly affected by the economic crisis, Government debt was just 10% of GDP. In two States (Sweden and Norway) there has been a noticeable decline in debt levels over the period of the crisis, whilst in other states, levels of Government debt are beginning to fall after rising during the crisis itself. Strong increases in debt levels in Portugal, Greece, Ireland and Cyprus are clearly visible in the graphic.

Figure 5.13e Increasing household debt:income ratios



Source: adapted from Eurostat (nasa_ki)

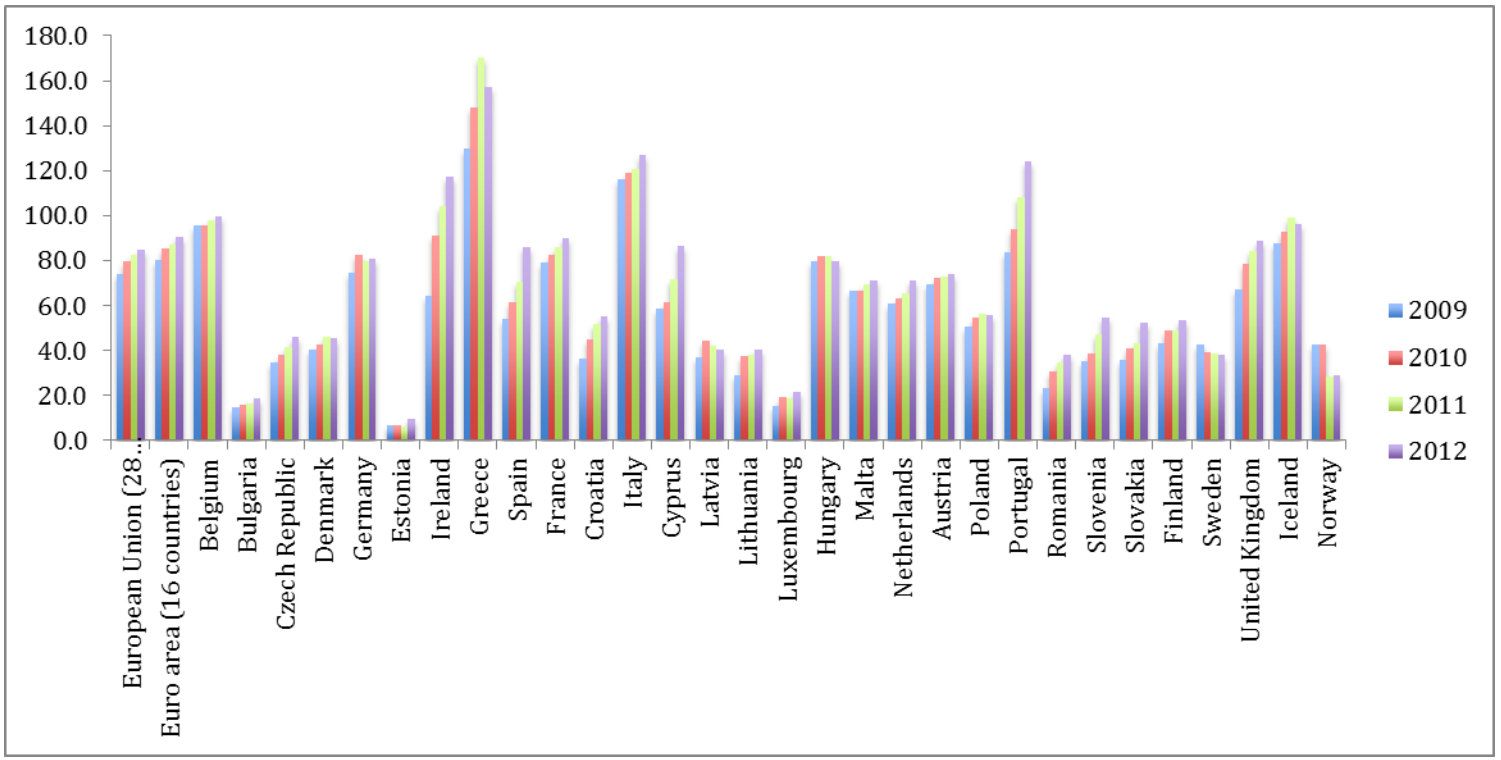
5.2.5 Falling wages, reduced working hours and rising levels of low work households

The crisis has been marked by a slight rise in the proportion of people living in households with very low work intensity, where adults worked less than 20% of their total work potential (European Commission, 2013). The impacts of the crisis can clearly be seen in Figure 5.15, with significant increases in low work intensity households in Iceland, Lithuania, Spain, Latvia and other economies badly hit by the crisis. In contrast, reductions in the proportion of the population living in low work intensity households can be seen in Germany Poland and Austria, as well as the Czech Republic and Austria. In 2012, the top five countries in terms of the proportion of their population living in low work households were: Ireland (24.2%[5]), Croatia (16.2%), Spain (14.3%), Greece (14.2%), Belgium (14.1%) and the UK (13%).

Overall, the crisis has also been marked by a slight increase in the number of hours worked (by 1% between 2005 and 2011). This marks a strong disparity in experience across the ESPON space (Figure 5.16). The fall in the number of hours worked in 12 of the worst affected economies, matched by a rise in hours in 14 economies.

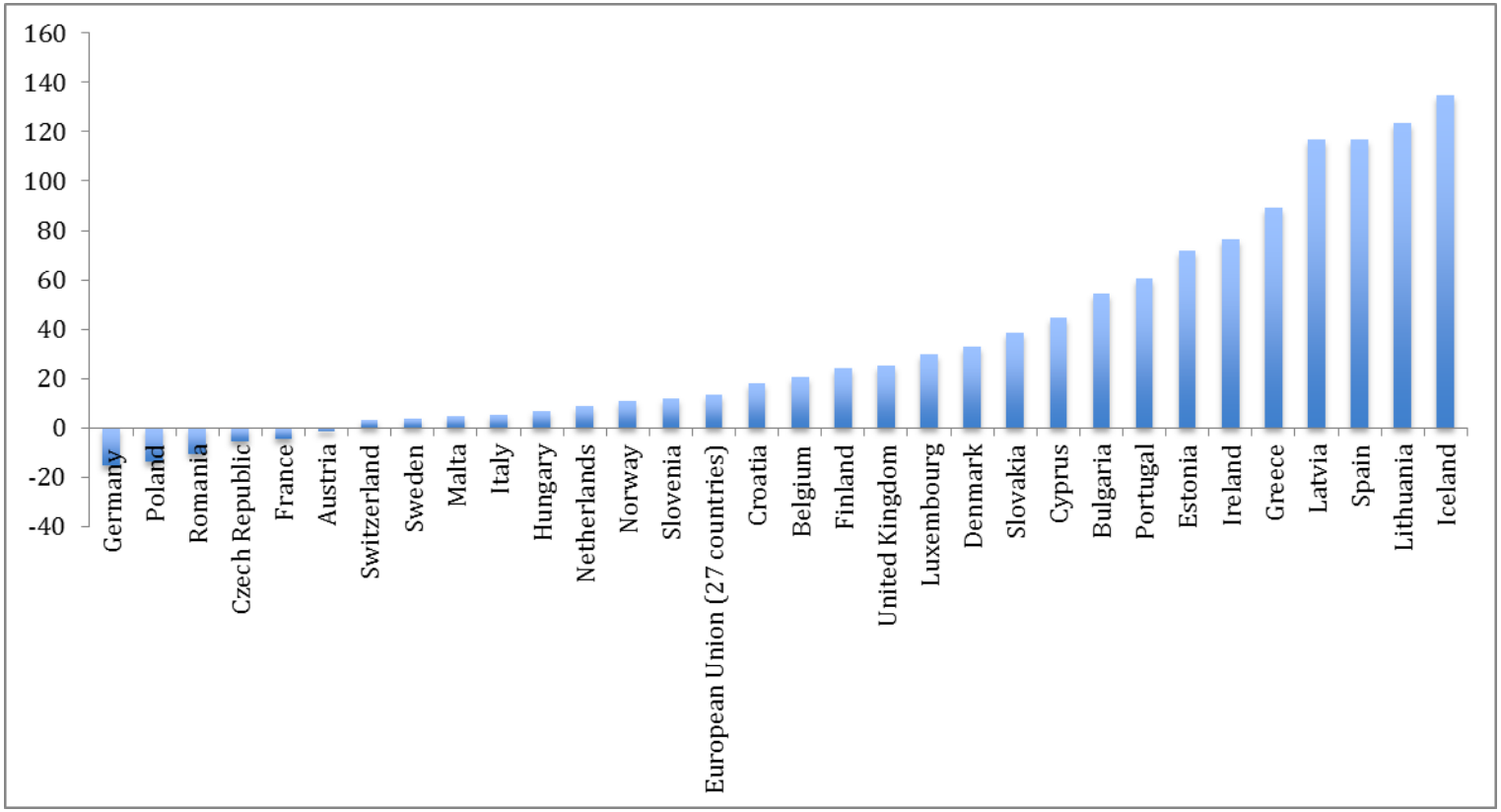
[5] In 2011, no data available for Ireland for 2012.

Figure 5.14 Trends in Government debt (% GDP)



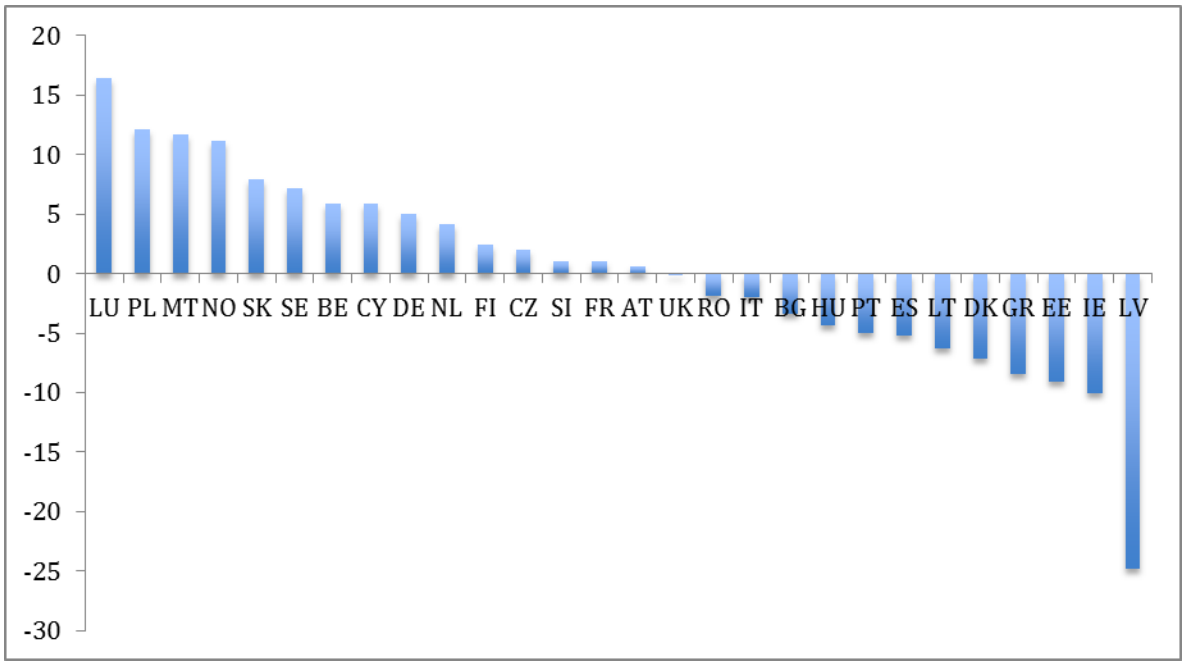
Source: adapted from Eurostat (gov_dd_edpt1)

Figure 5.15 Change in proportion of population living in low work intensity households (2008-12, %)



Source: Adapted from Eurostat (ilc_lvhl_11). Ireland 2008-2011, Croatia 2010-2012

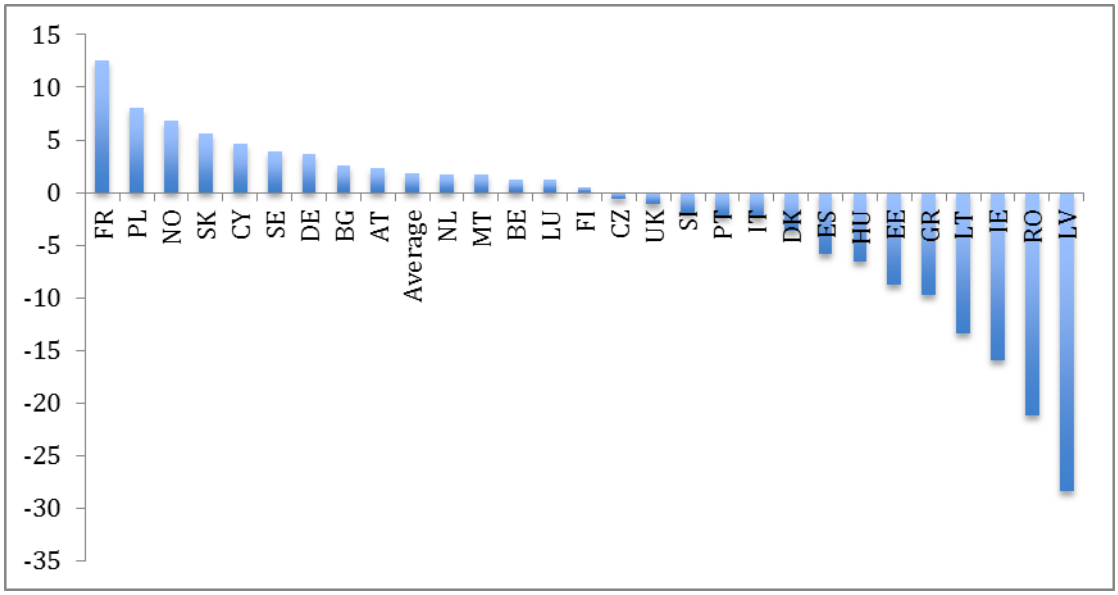
Figure 5.16 Change in the total number of hours worked (2005-2011, %)



Source: Adapted from CE study data.

Across the ESPON space the real compensation of employees (wages) has risen by around 10% between 2005 and 2011 (Figure 5.17). However, since 2008, compensation levels have increased by less than 2% (measured in 2005 prices). Levels of compensation, in real terms, have fallen in 14 countries of the 29 countries for which data is available. Falls have been particularly marked in Latvia, Romania, Ireland and Lithuania. Ireland, Greece and Hungary all have lower levels of compensation in 2011 than was the case in 2005. Increases in compensation levels have been greatest in France during the period considered.

Figure 5.17 Change in total level of employment compensation (2008-11, %)

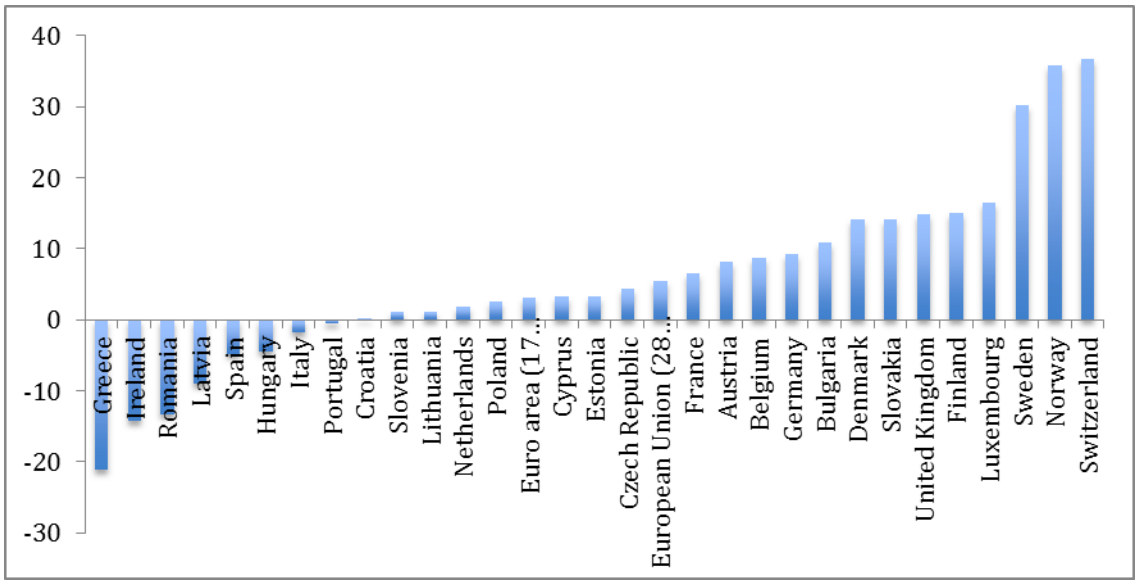


Source: Adapted from CE study data.

5.2.6 Rising household incomes, but mixed messages for proportion of population at risk of poverty

Across the ESPON space average disposable household incomes have risen by around 12% between 2005 and 2012. However, examining the period between the pre-crisis peak (2008) and 2012 the rise is around 6%. During this period household disposable incomes have fallen in eight countries, with significant falls recorded in Greece, Ireland, Romania, Latvia, Spain and Hungary (Figure 5.18). In Ireland and Greece, household disposable incomes were lower than was the case in 2005, the only two economies where this was so in the ESPON space. The principle increases in household disposable income was to be found in Switzerland, Norway and Sweden.

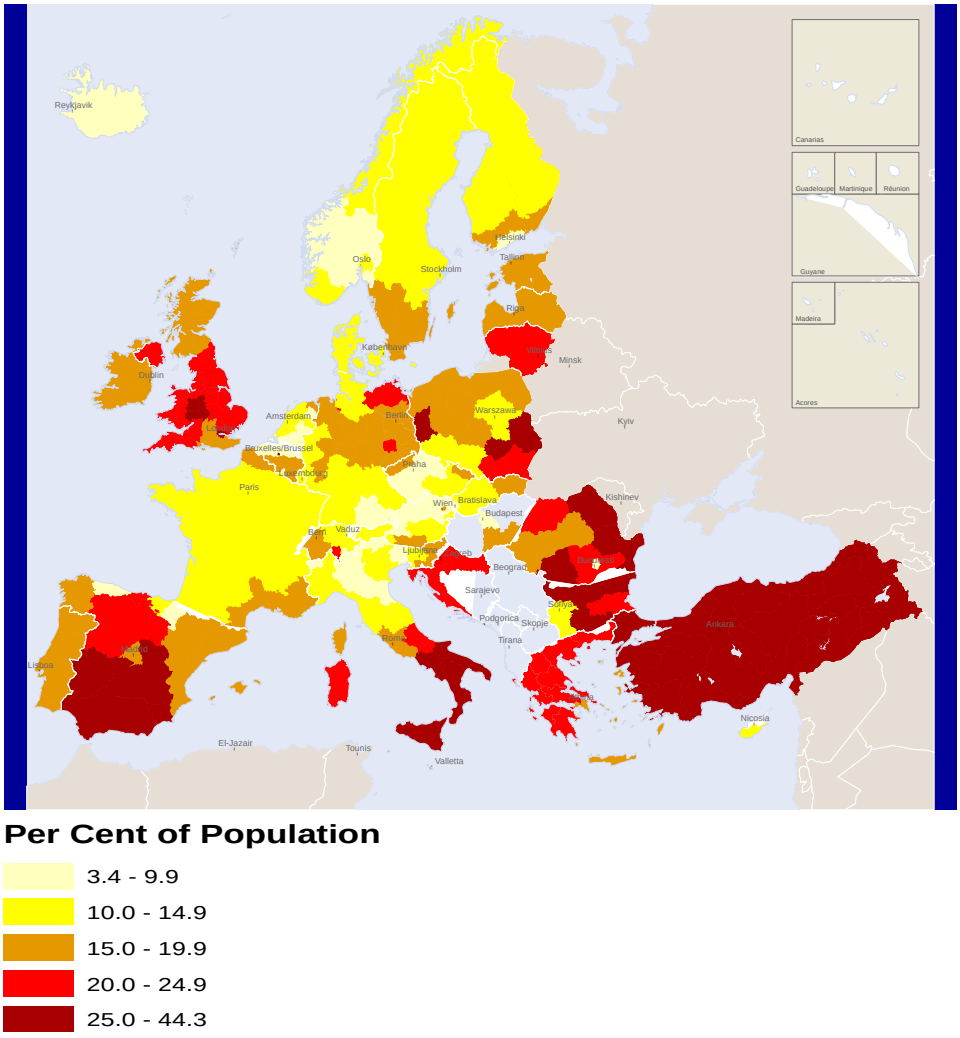
Figure 5.18 Change in total household disposable income (2008-12, %)



Source: Adapted from Eurostat (nasa_nf_tr)

One possible consequence of the economic crisis is an increase in the proportion of the population at risk of poverty. The ESPON TiPSE project suggests that this is concentrated in southern Europe, but with important 'hotspots' identifiable elsewhere (Figure 5.19). Drawing on material from Eurostat, TiPSE identifies the significance of national welfare regimes as a mediator of the extent to which national populations are exposed to the risk of poverty.

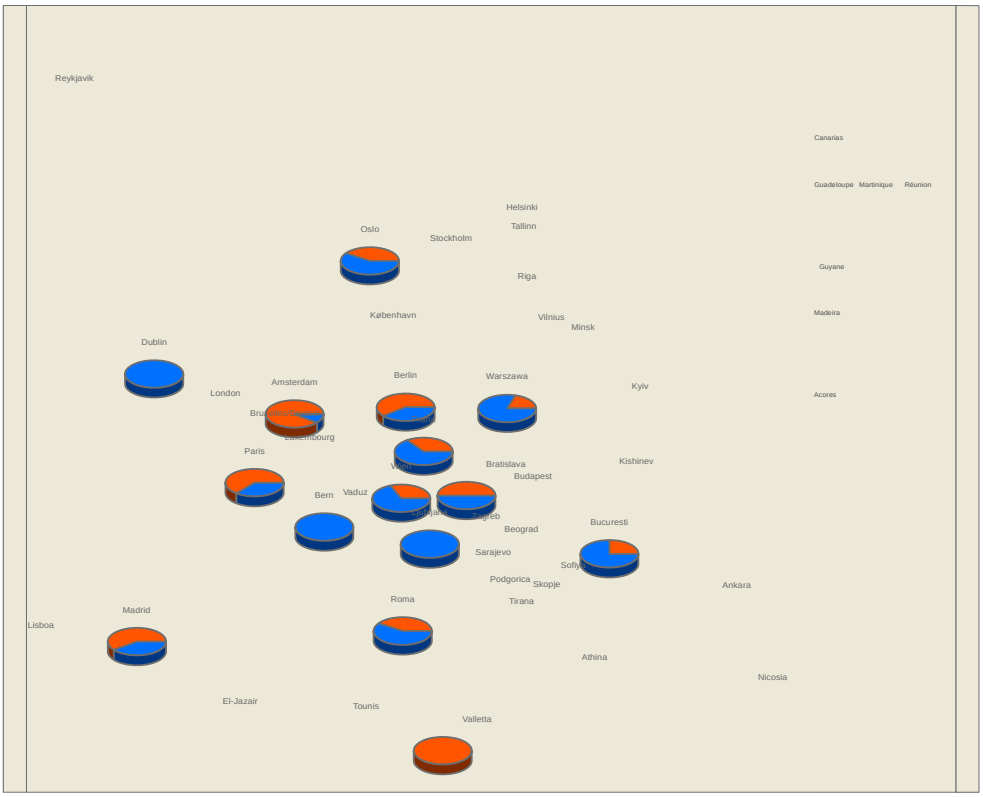
Figure 5.19 Population at risk of poverty (2011)



Source: ESPON TipSE. Presentation made to DG Regio Open Days (Oct. 2013)

As this is a relative measure (to median incomes), the European Commission has estimated that, relative to 2005 poverty threshold rates have risen in Estonia, Ireland, Greece, Latvia, Spain and Lithuania, following steady declines from 2006 to 2009 (European Commission, 2013). Overall, the proportion of the population at risk of poverty has remained relatively constant at between 16% and 17% of the population (ibid). At a NUTS 2 level the ESPON project TiPSE has calculated the change in the population at risk of poverty during the crisis (Figure 5.20). In their example, the blue shading of each disc represents the proportion of regions within a country where the population at risk of poverty is reducing, and the orange portion the proportion of regions where it is increasing. The mixed picture is clearly evident. One reason for which is the effects of changing median income levels, another is the influence of national welfare programmes.

Figure 5.20 Changes in proportion of population at risk of poverty (NUTS2)



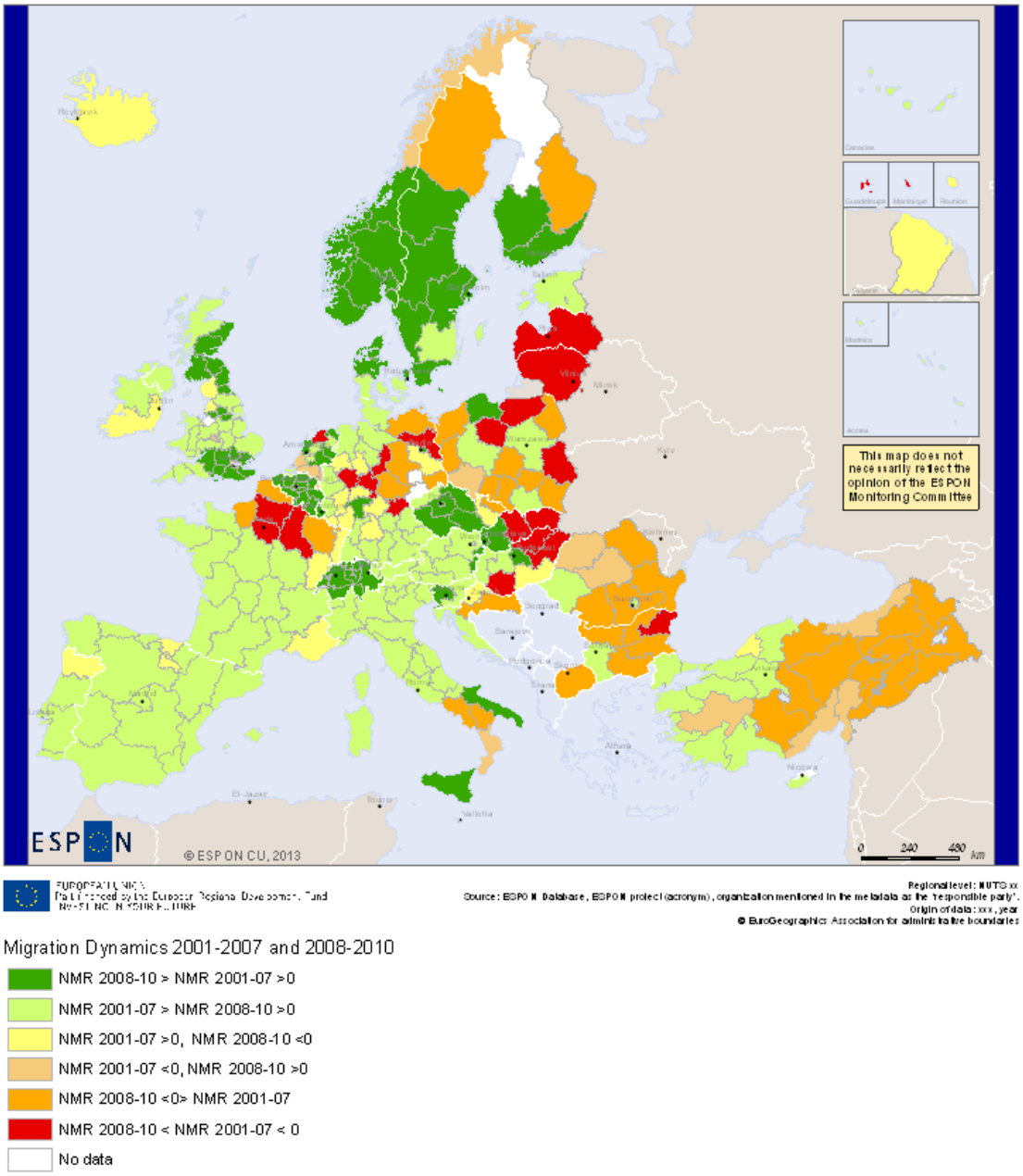
Source: ESPON TipSE. Presentation made to DG Regio Open Days (Oct. 2013)

5.2.7 Changing migration patterns

Overall there has been a reduction in levels of migration across the ESPON space, as labour markets tightened and changing economic circumstances reduced the attractiveness of late-career migration. In Figure 5.21, regions in green continue to attract positive net migration in the period 2008-11, the lighter shades indicate that levels of net migration are less than in the period 2001-07. Regions in red continue to experience net out-migration and regions in yellow represent regions that now experience net out-migration, where previously they recorded net in-migration. Regions in pink have experienced net in-migration during the crisis, compared to a net out-migration experience prior to the crisis.

The net migration figures available at a regional level, are not able to distinguish local effects, such as those highlighted in some of the case studies for this work, nor the reported out-migration of young adults from Spain, Ireland and other struggling economies in search of work in the more vibrant economies of countries such as Germany and, more often, globally.

Figure 5.21 Comparative net migration rates (2001-07, 2008-11)



Source: ESPON project ATTREG. Presented at ESPON Internal Seminar, Vilnius Dec. 2013.

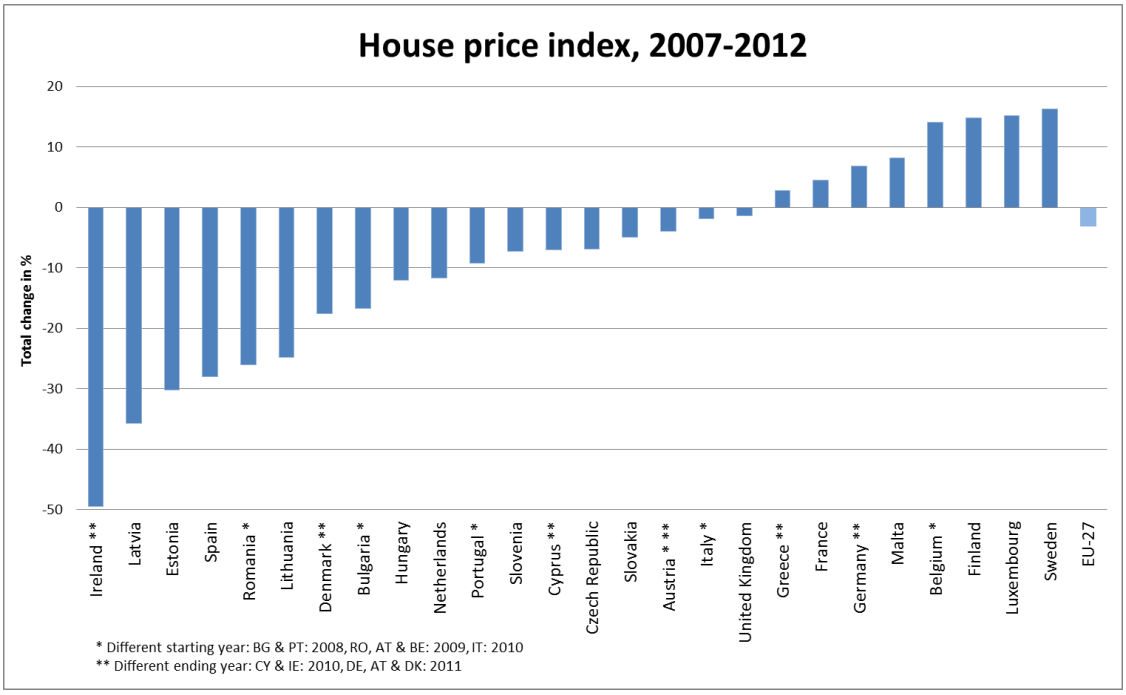
5.2.8 Wide differences in house price experiences, but overall a small fall in prices

Across the EU most countries have experienced a fall in housing prices (European Commission, 2013). This is partly a consequence of the housing bubbles which were present in a number of European economies and which contributed to the severity of the economic crash. The risk of significant falls in housing prices is that it locks households into negative equity, which limits the ability of a household to move and also reduces overall levels of consumption in the economy as households seek to service their debts. It is likely that the low interest rates maintained throughout the crisis have limited the extent of the worst potential effects of the fall in housing

prices. A fall in house prices could have a beneficial effect in promoting better housing affordability, which may provide foundations for future recovery.

The extreme effects of national property crashes in Ireland, Latvia, Lithuania, Estonia and Spain are clearly visible in Figure 5.22, alongside substantial falls in the Romanian property market. Rises are particularly visible in Sweden, Luxembourg, Finland and Belgium.

Figure 5.22 House price index 2007-12



Source: European Commission (2013, p.27)

5.2.9 Negative perceptions of the future

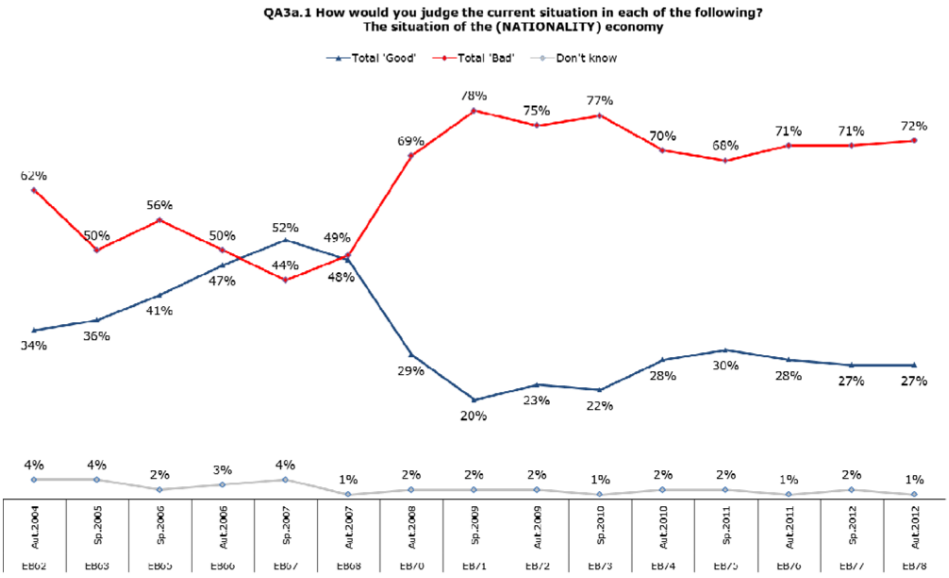
One of the under-reported elements of the economic crisis is individuals' perceptions of the economic climate they face. These perceptions can have an important influence on individual and household consumption patterns, as people make decisions on what they anticipate the duration and severity of an economic downturn may be. Qualitative data can also provide insights into the effects of the crisis on the incomes available to households.

Although data is not available at a regional (NUTS 2) scale across the ESPON territory, Eurobarometer has undertaken a series of valuable surveys at a national level across the EU.

The onset of the crisis can be starkly seen in Figure 5.23. Taken from the Standard Eurobarometer 78 (Autumn 2012), it clearly illustrates the gradual increase in public confidence in the national economies of the EU from Autumn 2004 until a sudden

reversal of confidence in 2007. The peak of the public's negative perceptions of the EU economy was reached in Spring 2009, although the gap between those who feel the current situation is good and those who feel it is bad has remained around 40% since Autumn 2010.

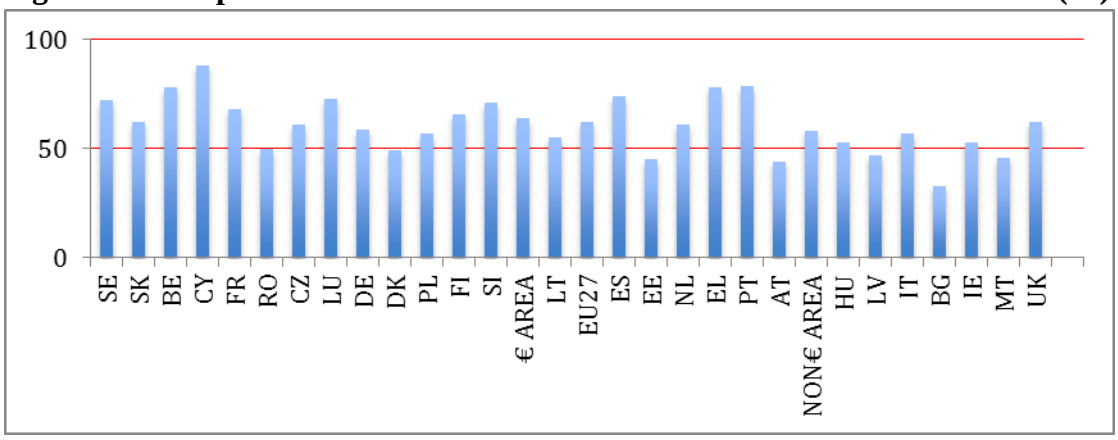
Figure 5.23 Public perceptions of their national economy



Source: Eurobarometer (2012) Standard Eurobarometer 78 (Autumn 2012) p. 6

Looking forwards from the 2012, most citizens of the EU believed the worst of the crisis remained ahead of them. This was particularly the case in Spain, Greece, Portugal and Cyprus, but also includes citizens of Sweden, Belgium and Luxembourg (Figure 5.24). Only in seven countries did most citizens believe that the worst is now past, and even here it was, on the whole, a fairly slim majority.

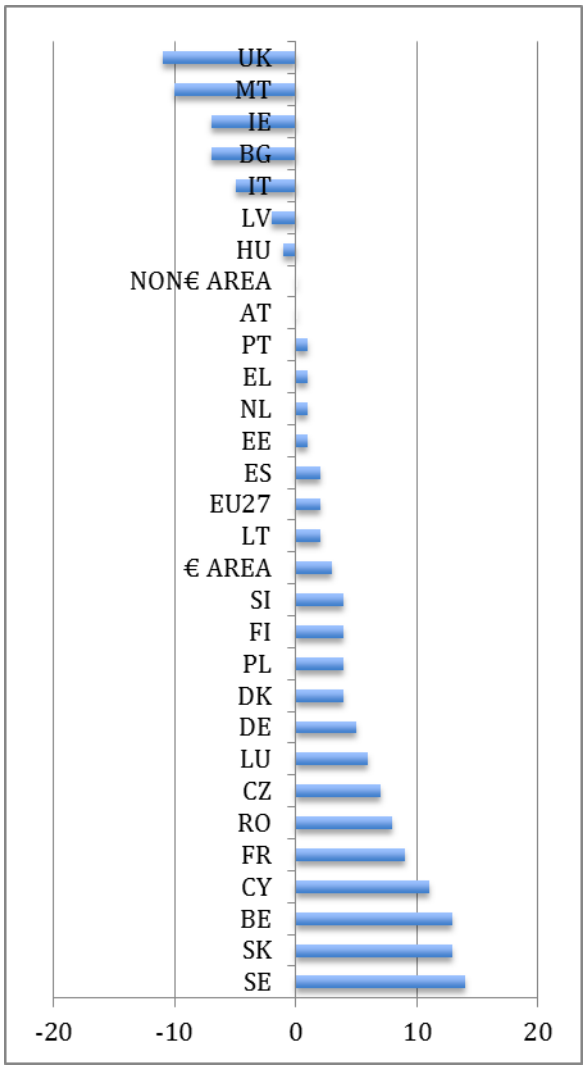
Figure 5.24 Proportion of residents who believe worst of crisis is still to come (%)



Source: adapted from Standard Eurobarometer 78 (2012 Autumn)

Over the year from Spring to Autumn 2012 perceptions as to whether the employment situation will worsen reduced in seven economies but increased in all others, particularly across the Eurozone (Figure 5.25). The change in sentiment is particularly marked in Sweden, given its apparent resilience to date.

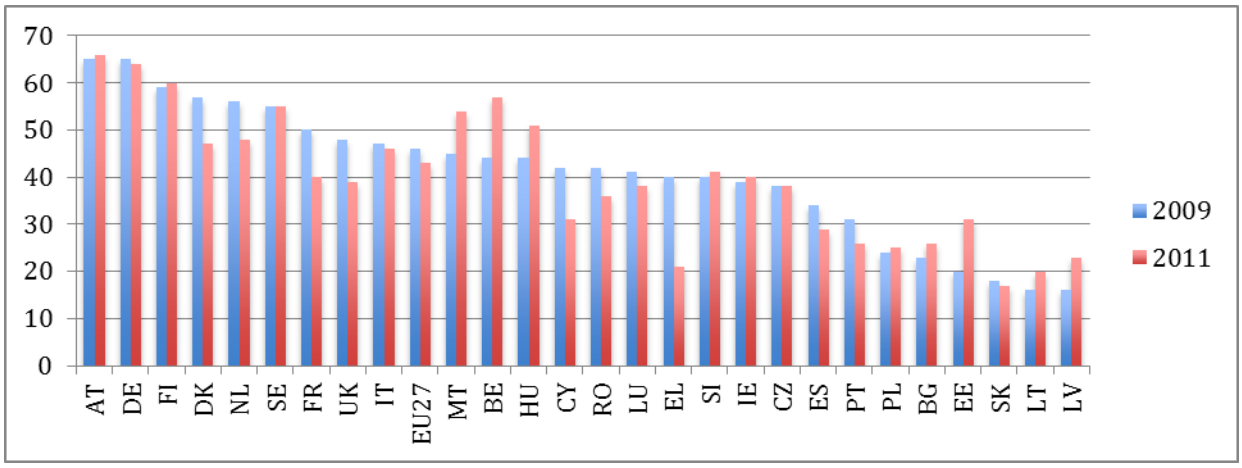
Figure 5.25 Change in proportion of residents who believe worst of the crisis is still to come



Source: adapted from Standard Eurobarometer 78 (2012 Autumn)

The effects of the economic crisis on individuals' perceptions of the future can be seen in their levels of confidence of being able to retain employment. Between 2009 – 2011 there was a marked change in the proportion of citizens who were very confident about the security of their employment (Figure 5.26). The highest levels of confidence can be found in Austria, Germany and Finland. Significant falls the proportion of respondents expressing confidence are noticeable in a number of countries particularly Greece and Cyprus, with increases in those feeling very secure recorded in the Baltic States, Belgium, Hungary and Malta.

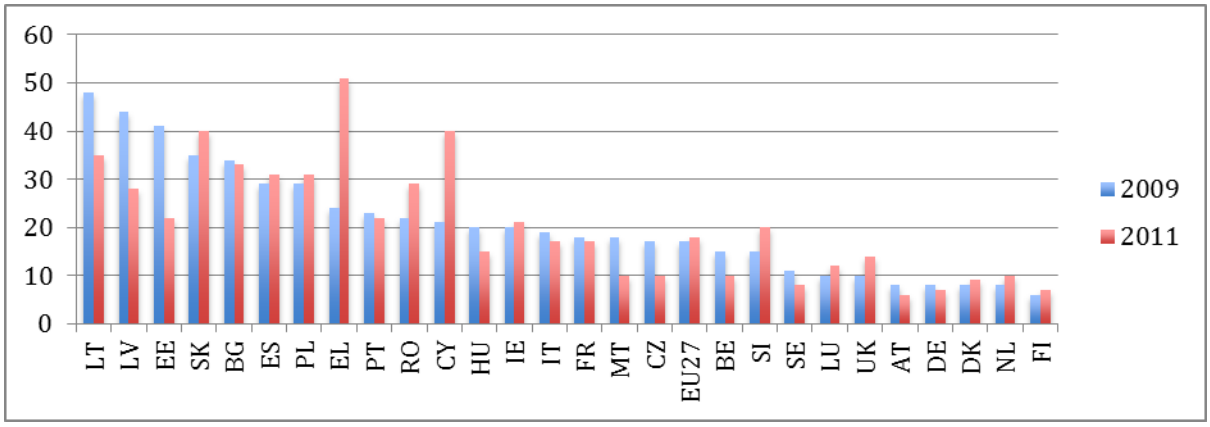
Figure 5.26 Proportion of respondents Very Confident in their ability to keep their job (%)



Source: adapted from Eurobarometer Flash EB no 286 (2010) and Flash EB no 338 (2012) Fieldwork in 2009 and 2011 respectively

The corollary to those that feel secure in their employment prospects are those who feel insecure. Looking at the same Eurobarometer data for the proportion of residents who are not at all or not very confident about their ability to keep their job starkly illustrates a changing geography to the economic crisis (Figure 5.27). In 2009 residents of the Baltic States were feeling least secure in their employment prospects, by 2011 this had changed to residents of Greece and Cyprus, with residents of Slovakia persisting in their feelings of insecurity.

Figure 5.27 Proportion of respondents Not At All or Not Very Confident in their ability to keep their job (%)

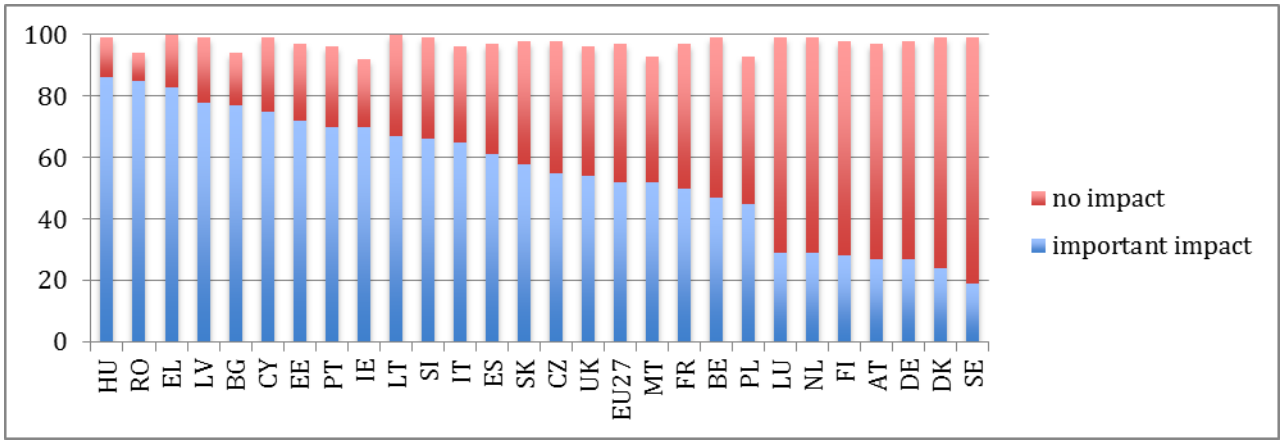


Source: adapted from Eurobarometer Flash EB no 286 (2010) and Flash EB no 338 (2012) Fieldwork in 2009 and 2011 respectively

In terms of the effect that the economic crisis is having on different parts of the EU, a survey undertaken in 2010 gives a very strong indication of the varying territorial impact. When asked whether the crisis was having a major impact or no impact, more than 80% of respondents in Hungary, Romania and Greece felt that it was having an important impact (Figure 5.28). In contrast, respondents in Sweden, Denmark,

Germany, Austria, Finland, Netherlands and Luxembourg were most likely to feel that the crisis was having no impact on their personal situation.

Figure 5.28 Extent to which the crisis is having an impact on your personal situation (% respondents)

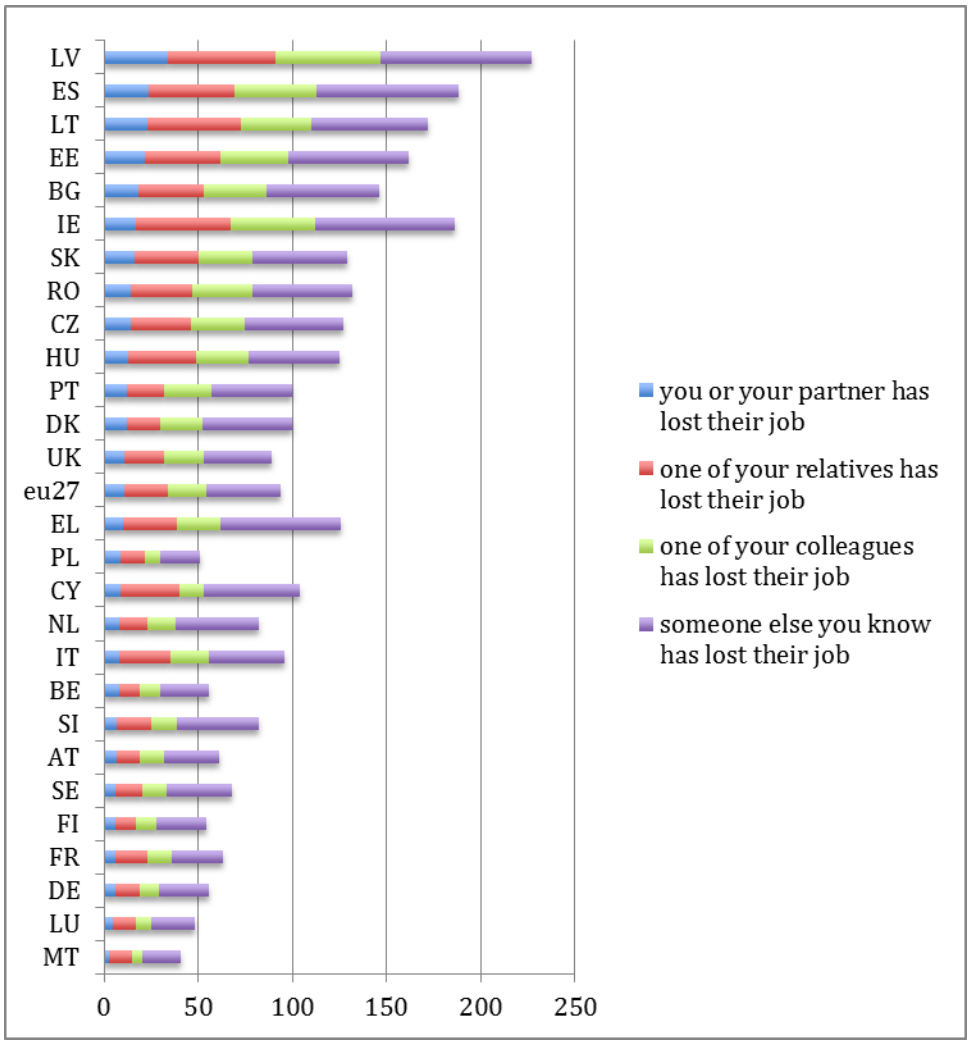


Source: adapted from Special Barometer (2010): Europeans and the Crisis

Looking at respondents responses in terms of the employment effects of the crisis (Figure 5.29) it is clear that the effects were strongest in Latvia, Lithuania, Spain, Estonia, Bulgaria and Ireland. Whilst this accords with the macro-economic data identified earlier in this report it does not fully account for why residents in Romania and Bulgaria identified such strong adverse impacts of the crisis. However, one explanation may be that small economies are more likely to witness effects which are closer to individuals than larger economies. Again the least effected economies are those of Luxembourg, Germany, Finland, Malta and, in this instance, France. Of course, business cycle effects mean that a single survey point across the EU will pick up economies at different points in their business cycle, but nevertheless this provides a useful indication of the territorial distribution of the effects of the last economic crisis.

From the qualitative data available it is clear that remaining in employment is not the only influence on whether respondents to surveys felt that the crisis was having an important impact on their personal situation. The economic impact of the crisis can also be seen in differences households report in their ability to pay household bills and credit commitments. This may reflect changes in household income levels but, crucially, also reflects changes in the cost of goods and services facing households, their ability to access credit and levels of disposable income in the face of, potentially, rising taxes. From Table 5.7, it is evident that households in nine economies identify the strongest difficulties in meeting household bills and credit commitments. The situation has also worsened somewhat between 2009 and 2011. In contrast to this, households in five economies do not report significant difficulties in either 2009 or 2011.

Figure 5.29 Employment effects, as a direct response to the crisis



Source: adapted from Special Barometer (2010): Europeans and the Crisis
Note: Total will not sum to 100 as each category is an independent value. All values expressed as a % of responses

Alongside their own situation EU residents are also asked to comment upon their perceptions of poverty in the area in which they live. These data should be taken with a certain degree of caution as recent research by the EU illustrates that EU citizens typically overstate the level of economic 'bads', such as unemployment, and underestimate levels of economic 'goods', such as rates of economic growth[6]. However, even taking this into account, the reported responses support the broad picture of the territorial impact of the last economic crisis. When asked about the situation in the year up to 2009 (Figure 5.30), respondents from Latvia, Bulgaria, Hungary and Greece were most likely to feel that poverty had strongly increased, whilst those from Sweden, Denmark and the Netherlands were most likely to feel that it had stayed the same.

[6] Eurobarometer (2010) Eurobarometer 323 January

Table 5.7 Households ability to keep up with household bills and credit commitments (%)

2009				
	falling behind with some/many bills	keeping up but it is a constant struggle	keeping up but struggle to do so from time to time	keeping up without any difficulties
BG	15	30	40	15
EL	14	44	22	20
LV	13	32	34	20
MT	13	31	32	23
HU	13	24	36	28
LT	13	26	24	35
EE	12	26	29	32
RO	11	22	41	23
CY	7	37	31	23
ES	7	17	31	45
IT	6	20	34	40
PT	5	35	34	24
IE	5	11	39	43
CZ	5	20	30	43
eu27	5	15	33	45
UK	5	12	32	50
BE	3	11	39	46

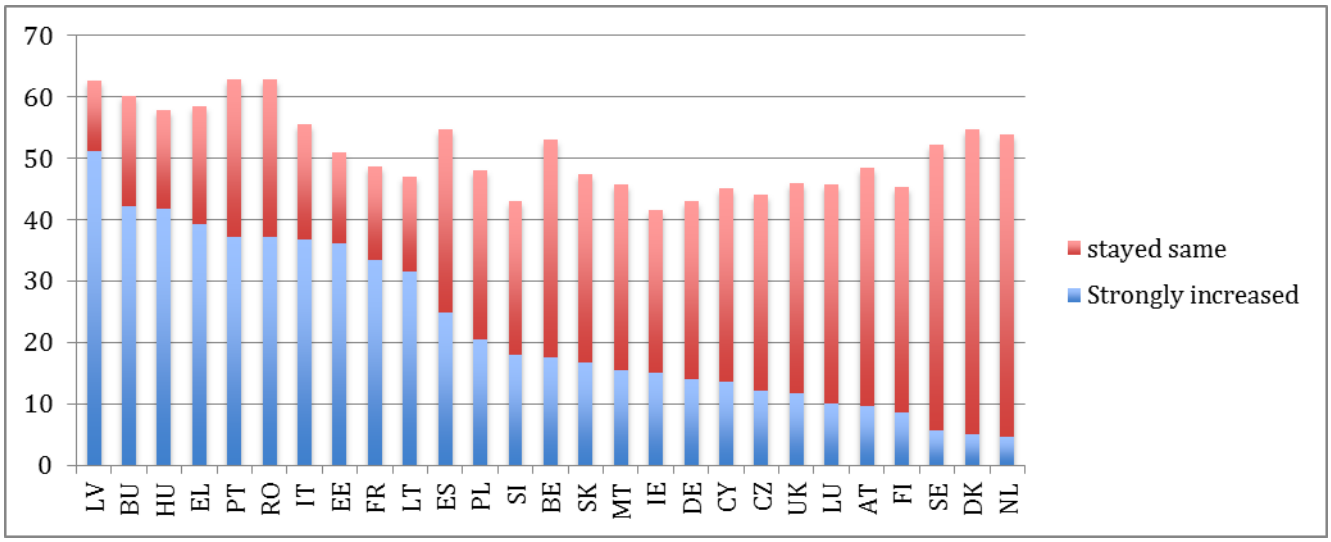
2011				
	falling behind with some/many bills	keeping up but it is a constant struggle	keeping up but struggle to do so from time to time	keeping up without any difficulties
EL	28	45	18	9
CY	23	36	27	13
BG	16	26	42	15
LV	14	21	37	27
HU	12	22	38	27
RO	10	15	47	27
MT	10	32	28	30
IE	10	17	41	31
LT	10	14	30	45
SK	7	21	29	41
IT	6	25	35	33
EE	6	25	26	42
PT	5	20	40	33
ES	5	19	34	41
eu27	5	16	34	44
CZ	5	20	30	44
UK	4	13	39	42

FR	2	15	40	42
PL	5	9	35	50
SI	4	10	35	51
SK	4	15	24	57
DE	3	11	35	50
LU	3	6	24	66
AT	2	5	29	63
FI	2	7	25	66
SE	1	4	18	75
NL	1	2	20	76
DK	1	2	14	82

FR	3	19	40	37
SI	4	11	33	52
PL	4	6	37	53
LU	3	7	35	53
BE	3	10	33	53
AT	2	10	32	55
FI	3	7	27	63
DE	2	11	29	56
NL	2	4	24	69
DK	2	3	16	79
SE	1	5	17	77

Source: Eurobarometer Flash EB no 286 (2010) and Flash EB no 338 (2012) Fieldwork in 2009 and 2011 respectively

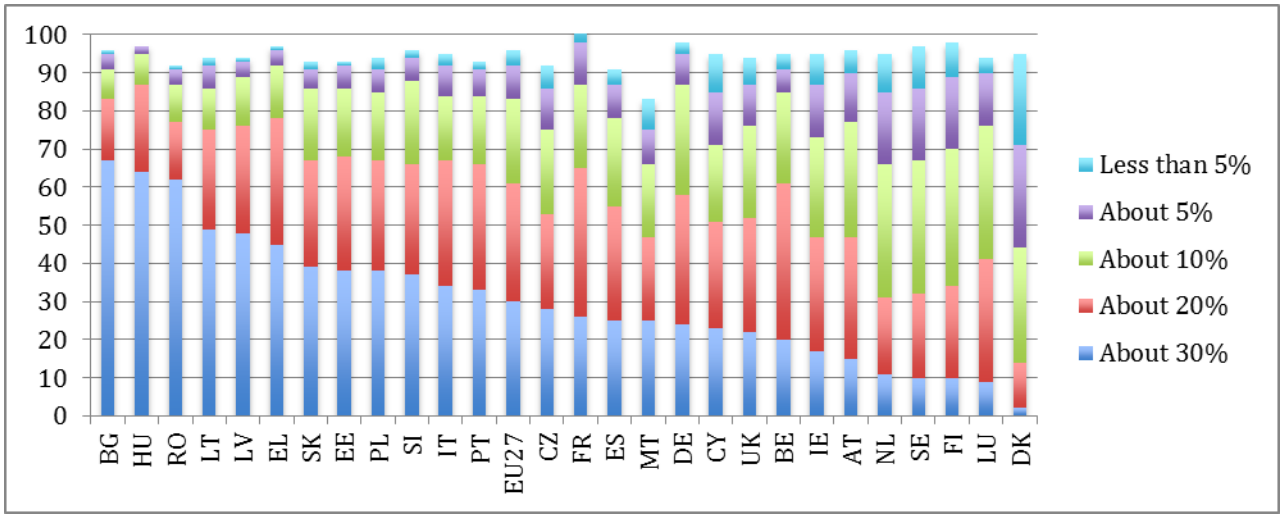
Figure 5.30 Perceived change in level of poverty in past 12 months in area where respondents live (% all respondents)



Source: adapted from Eurobarometer: Monitoring the Social Impact of the Crisis (Flash 276)

Similarly, when estimating the proportion of residents within their locality who live in poverty, estimates were highest by residents of Bulgaria, Hungary and Romania in 2009, and lowest by residents of Netherlands, Sweden, Finland, Luxembourg and Denmark (Figure 5.31).

Figure 5.31 Perceived proportion of population in area living in poverty in 2009 (% respondents)

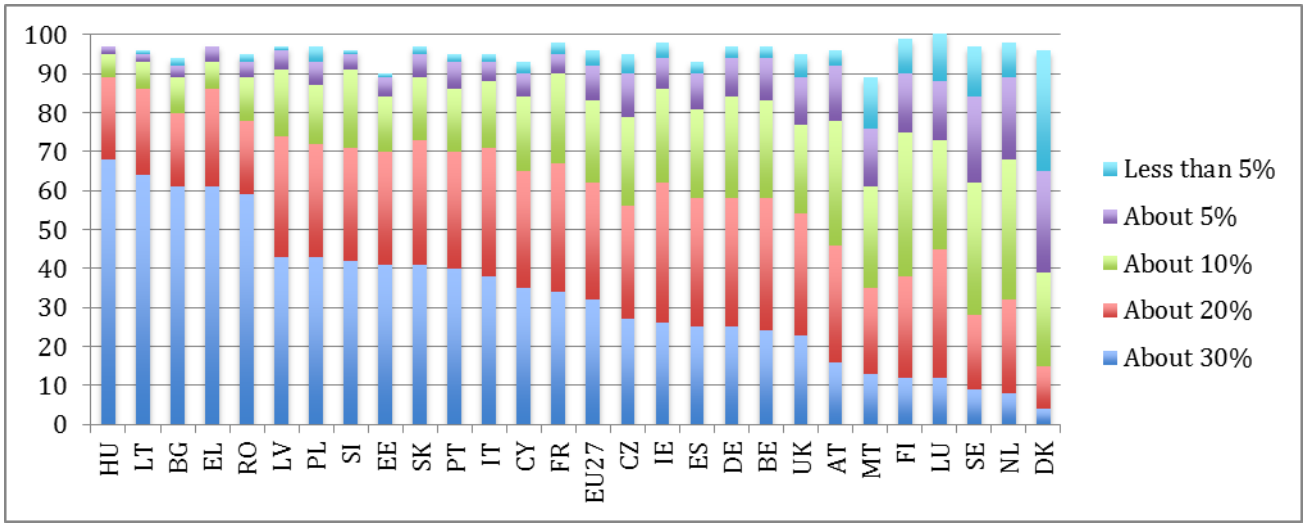


Source: Eurobarometer Flash EB no 286 (2010). Fieldwork in 2009

In 2011, the same five Member States still had the lowest proportion of respondents who felt that about 30% of local residents lived in poverty (Figure 5.32). However, there is now a clear grouping of five Member States where respondents feel that a relatively high proportion (about 30%) of local residents are living in poverty. As in

2009, this includes Hungary, Bulgaria and Romania, but now also includes Greece and Lithuania.

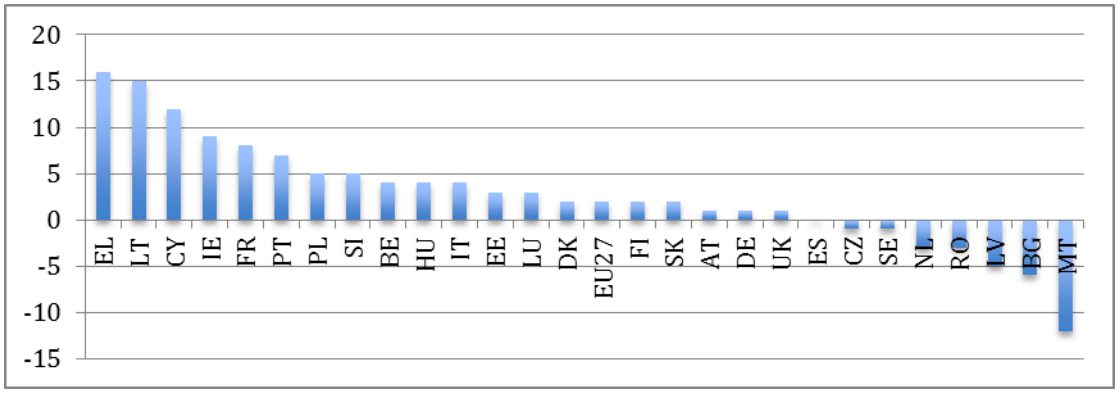
Figure 5.32 Perceived proportion of population in area living in poverty in 2011 (% respondents)



Source: Eurobarometer Flash EB no 338 (2012) Fieldwork in 2011

The economies which recorded the biggest increase in the proportion of residents living in poverty, and, by extension, can be judged as those whose residents feel were worsening in performance between 2009-2011 are Greece, Lithuania, Cyprus, Ireland and France (Figure 5.33). Those where residents appear to believe that circumstances are improving include Malta, Bulgaria, Latvia, Romania and the Netherlands.

Figure 5.33 Change in proportion of residents believing that about 30% or more of residents live in poverty (2009-2011)



Source: adapted from Eurobarometer Flash EB no 286 (2010) and Flash EB no 338 (2012) Fieldwork in 2009 and 2011 respectively

Although the perceptual data available to the study is all at a national level it does provide some highly valuable insights which can be used to complement the economic indicators previously reported. Overall there is a strong complementarity between the perceptual data and the economic datasets regarding where the effects of

the economic crisis have been most keenly felt. However, there are also some areas of dissonance which merit further exploration.

One of the features which emerges from this data appears to be the, not unexpected, lag effect visible in some of the perceptual data, however, it also appears to illustrate a degree of foresight in so far as it illustrates peoples' perceptions of the future. Equally, it also illustrates that individuals can be uncertain of the future even where employment figures are relatively positive. This may have implications for their spending/consumption decisions which in turn will have effects on levels of aggregate demand within an economy. The extent to which 'belief' in the future may be a factor in the resilience of economies remains to be explored. This may also suggest that recessions can have longer-term effects on behaviour, attitudes and expectations – an area which we will also consider in the forthcoming stages of this study.

5.2.10 Variable impacts overall

The European Commission has summarized the overall effect of the crisis on the EU as whole as moderate (European Commission, 2013). It regards the impact on the EU15 to be moderate also and on the EU12 to be low. However in seven Member States the effect is regarded as Very High and as High in a further seven Member States. Table 5.8 summarises the results for each of the Member States.

Table 5.8 Impact of Crisis on Member States (2007-11)

Very High	**High**
Latvia	Portugal
Greece	Denmark
Ireland	Bulgaria
Lithuania	Hungary
Estonia	Italy
Spain	Slovenia
Moderate	**Low**
Romania	Cyprus
UK	Belgium
Finland	Austria
France	Sweden
Netherlands	Germany
Czech Republic	Slovakia
	Luxembourg
	Malta
	Poland

Source: adapted from European Commission (2013) p.19

6 ECONOMIC RESILIENCE OF REGIONS

The approach taken to measuring the economic resilience of regions, and countries, across the ESPON space is fully set out in Section 2. To recap, a resilient region is considered to be one that has either resisted the economic crisis, in that it has not experienced a decline in economic activity, or has recovered from a downturn following the economic shock to regain pre-crisis levels of activity. Regions which have not yet proven resilient are those which have not yet recovered to their pre-crisis level of economic activity, divided between those where economic activity has passed the trough of the downturn and is now experiencing positive growth rates (not recovered but in upturn) and those which have still to reach the trough of the downturn (not recovered no upturn). We measure economic activity primarily through the indicator of number of persons employed, but also include the GDP indicator as a comparator.

6.1 National patterns

Across the ESPON territory four countries, Luxembourg, Germany, Switzerland and Poland, have resisted the economic crisis and maintained, or increased, levels of employment in the period 2005-2011 (Map 6.1). Only Poland also managed to maintain or increase its level of GDP (Map 6.2).

By 2011, eight countries had recovered to their pre-crisis peak of GDP activity (Map 6.3), namely Germany, Norway, Sweden, Switzerland, Austria, France, Malta and Slovakia. Four of these countries had also recovered to pre-crisis employment levels (Norway, Sweden, Malta and Austria), along with Belgium (Map 6.4).

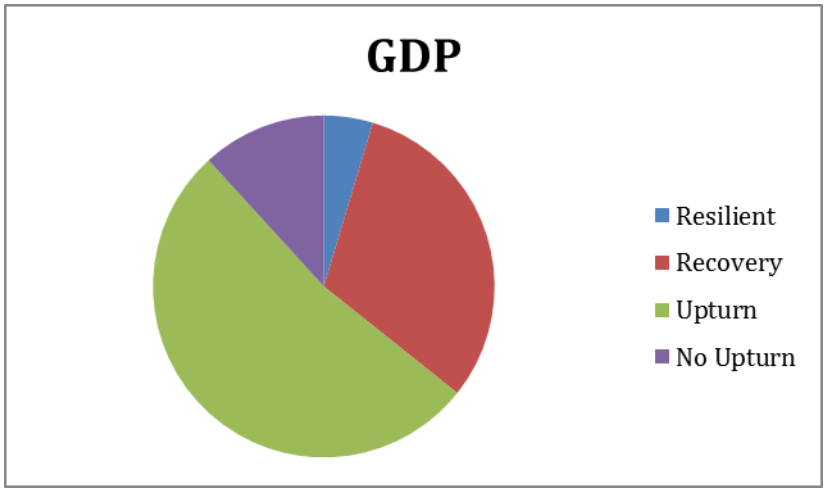
Of the countries that have not yet recovered to their pre-crisis levels of economic activity, 19 have begun to experience growth in economic output (GDP) and 12 are experiencing employment growth (Map 6.5 and 6.6). There were just two countries that, in 2011, were yet to experience any growth in economic activity since their downturn began: Greece and Croatia (Map 6.7). In contrast, there remain 10 countries, almost a third of the ESPON territory, where levels of employment remained in decline in 2011 (Map 6.8).

6.2 Regional patterns

The heterogeneous experience of regions during the crisis has already been remarked upon. This influences the observed level of resilience at a regional level. In terms of GDP, of the 280 regions considered, just 5% had resisted the crisis and not experienced any fall in economic output, whilst approaching a third (31%) had experienced a fall in economic output but, by 2011, had recovered to the pre-crisis peak (Figure 6.1). Around half of the regions (53%) had started to recover, having passed the trough of the downturn, but had not yet reached pre-crisis peak values.

Slightly more than a tenth of regions were still recording a decline in economic output in 2011.

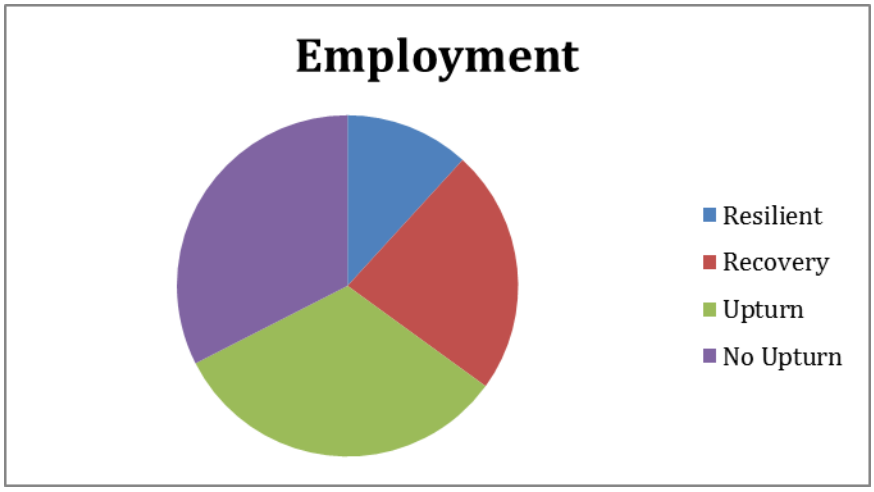
Figure 6.1 GDP Resilience of Regions (NUTS 2)



Source: adapted from study data

In terms of employment, of the 280 regions considered, more (12%) had weathered the crisis and not experienced any fall in numbers employed, whilst almost a quarter (23%) had experienced a fall in employment but, by 2011, had recovered to the pre-crisis peak (Figure 6.2). As with GDP, this leaves two-thirds of the regions still to recover in 2011, divided evenly between those that had passed the trough of the downturn, and those still to register the end of employment decline.

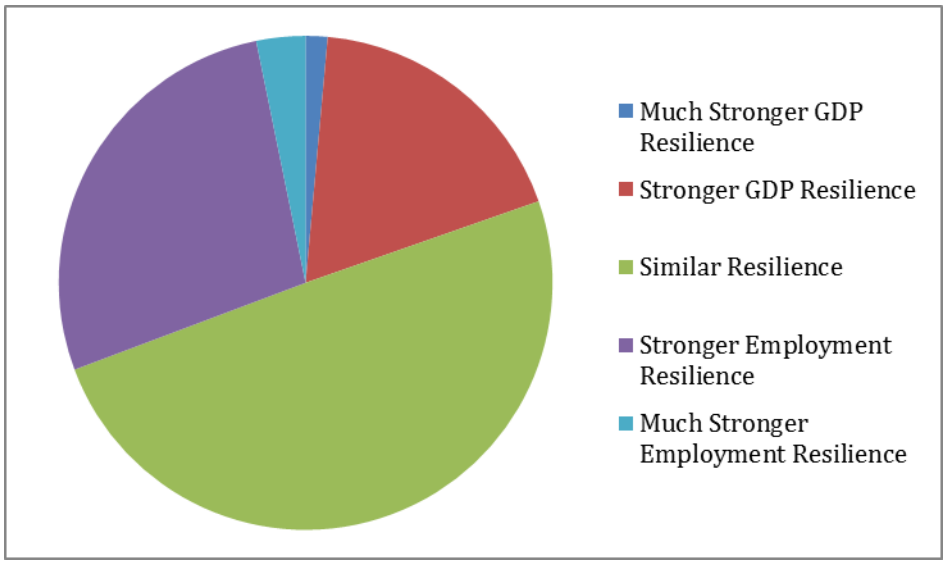
Figure 6.2 Employment Resilience of Regions (NUTS 2)



Source: adapted from study data

Comparing the observed resilience of regions in terms of GDP and employment we find that around a half of regions show no difference between the two (Figure 6.3). Of the remainder, a fifth exhibit a stronger level of GDP resilience, whilst 31% exhibit stronger levels of employment resilience (Map 6.9).

Figure 6.3 GDP vs Employment Resilience



Source: adapted from study data

6.3 Localised patterns of resilience

An assessment was also made of the resilience of NUTS 3 regions of the ESPON space. This drew on data from 1,322 territories, using employment data provided by Cambridge Econometrics. A similar pattern of resilience was found to that of the NUTS 2 regions, albeit, with a slightly greater proportion of NUTS 3 territories having resisted the crisis and a slightly lower proportion of those that had not yet recovered having begun an economic upturn (Table 6.1). The distribution of localized resilience patterns is illustrated in Map 6.10.

Table 6.1 Employment Resilience of NUTS 3 Territories

Resilience	***Number of regions***	***Proportion (%)***
Resistant (RS)	214	16.19
Recovered (RC)	314	23.75
Not recovered but in upturn	364	27.53
Not recovered and no upturn	430	32.53

Source: adapted from study data

6.4 Spatial Distribution of Resilient regions

The distribution of observed resilience across the ESPON space is illustrated in Maps 6.11-6.14 and 6.15-6.18, and summarized in Maps 6.19 and 6.20. As might be expected in the light of the national analysis the regions that did not experience a fall in GDP were concentrated in Poland. A small number of capital city regions (Berlin, Stockholm and Bratislava) also managed to maintain, or grow, levels of GDP. The picture for numbers employed is slightly more widespread. Regions in Poland and Germany both emerge as more able to resist the economic crisis, although this was

not universal. Other strengths are evident in the Benelux countries and Switzerland and, in Scandinavia, southern Norway and Aland, off the coast of Finland.

The distribution of regions that have recovered from the crisis is more widespread, both in terms of GDP performance and employment. Those regions that had experienced a downturn in Poland have broadly recovered to pre-crisis levels of GDP activity. Regions in Germany, Austria and the Czech Republic have also made a recovery, alongside regions in the Netherlands and Belgium. A strong number of regions in France have also recovered including Paris, regions in an arc bordering the Atlantic- Pyrenees-Mediterranean, and the island of Corsica. Other regions that have recovered their pre-crisis level of GDP are to be found in the UK, Norway, Sweden, Romania and Malta. Fewer regions have recovered to their pre-crisis levels of employment. Again the positive position of some regions in Germany, and the Benelux countries can be seen. France, Norway and Sweden also exhibit strengths. Isolated examples of recovered regions are also visible in Portugal, Romania and Hungary. In the latter two cases the recovered regions are both the capital cities of the Member States concerned. Malta has also made a recovery, matching its GDP performance.

Around half of the regions across the ESPON territory had experienced an upturn in GDP by 2011, but had not yet recovered their pre-crisis peak. The distribution is illustrated in Map 6.13. Fewer regions had experienced an upturn in employment levels, but not yet recovered, demonstrating a lag in recovery between GDP and employment. These included the single region territories of Iceland, Lithuania, Estonia and Cyprus, all of Finland, large parts of Sweden, Norway, France, the UK and Italy. Recovery was also underway in regions in Germany, Poland, Slovakia, Czech Republic and the Netherlands.

By 2011, very few regions were still experiencing a decline in GDP. Those that were included all of Greece and several regions in Spain. Other regions that remained in downturn included parts of the UK, Norway, Hungary and Bulgaria. In terms of employment levels, strong national effects can be observed in the continuing pattern of decline, regions across Portugal, Ireland, Greece, Spain and Denmark were all still in decline in 2011, as are the single region Member States of Latvia, Slovenia and Croatia. Large parts of the UK (particularly in England), France, Romania and Bulgaria also remain mired in employment downturn at this time, along with several regions in Italy, particularly in the south. In contrast to the prevailing resilience experience of regions in Poland and Germany, there are also examples of regions still experiencing employment downturn in both countries, as too in the Czech Republic and Slovakia.

6.5 Relative regional resilience

The distribution of regional resilience between Member States suggests that macroeconomic conditions and national policy regimes have an influence on the sensitivity of individual regions to economic crisis. Yet, there are also examples of where the experience of individual regions runs counter to national trends, or where there is strong variability within Member States.

National effects may be expected to be stronger in small and medium sized Member States[7], where the influence exerted by national policy is proportionately greater. However, even in small Member States, variation in relative levels of resilience can be observed.

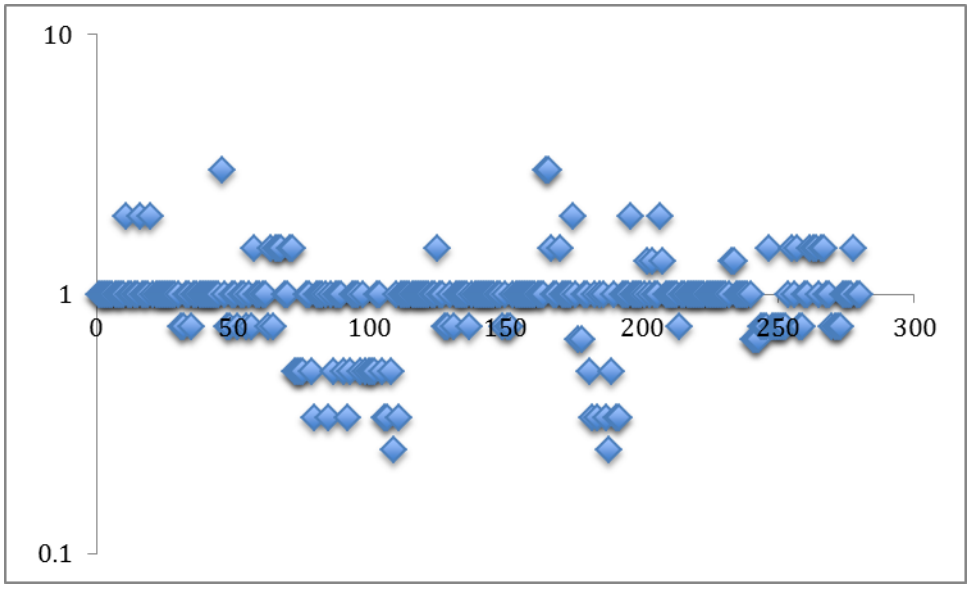
To examine levels of relative resilience we originally calculated a Beta statistic for each Member State, which compares the regional downturn experienced relative to the average for the Member State (see Section 3 for details). However, this proved to have a number of weaknesses in practice. It is only meaningful for Member States with more than three regions (owing to the averaging effect, some regions must always be less resilient than the national average and others more); can only be applied in cases where Member States as a whole have experienced an economic downturn of 1% or more, and proved able to only compare levels of relative resilience within a country and not across countries.

Despite these weaknesses, the approach provides some useful insights into the relative resilience of regions within a small number of countries. However, it also only provides a measure of the relative loss of economic activity, not comparative resilience performance. To overcome this weakness we developed an alternative measure of relative resilience based on our four resilience types. This is based on comparing the observed resilience category (employment) of each region with its national counterpart and identifying whether this is the same, or exhibits stronger or weaker resilience. This is then converted into a score, based on the number of degrees of separation between the regional and national experience, where 1 means the regional economy exhibits the same level of resilience as the regional economy, values above 1 means the region was more resilient and values below 1, less resilient.

The results of this are illustrated for our 280 regions in Figure 6.4 below. Most regions exhibit a similar level of resilience to their national average. However, there are some significant outliers, where regions either exhibit stronger resilience, compared to the national average, or weaker comparative resilience. The chart is expressed in logarithmic form, where values above the line demonstrate stronger relative resilience and values below the line demonstrate a weaker relative resilience.

[7] In small States (ie those with one NUTS2 region) the distinction between national and regional becomes rather artificial.

Figure 6.4 Relative regional resilience



Source: Calculated from CE study data

Regions can be divided into seven categories (illustrated in Map 6.21):

- Regions with significantly stronger relative resilience
- Regions with stronger relative resilience
- Regions with slightly stronger relative resilience
- Regions with the same resilience as the national economy
- Regions with slightly weaker relative resilience
- Regions with weaker relative resilience
- Regions with significantly weaker relative resilience

Those regions which exhibit a significant difference in their relative resilience compared to their national average are set out in Table 6.2. It is noticeable that those regions with significantly weaker relative resilience are located in Germany and Poland, partly reflecting the better level of national resilience recorded in those two countries. Stronger levels of relative regional resilience are, though, more dispersed, covering regions in Finland, Netherlands, Belgium, Norway, Portugal and Romania. These relatively resilient regions cover a mix of territorial cases, including an island region, capital city region and urban and rural economies with different sectoral economic strengths.

Table 6.2 Relative Regional Resilience: outlying cases

Relative Regional Resilience (R3)	***Region***
Significantly Stronger R3	Aland (FI[8]) Flevoland (NL)
Stronger R3	Antwerpen (BE) Brabant-Wallon (BE) Namur (BE) Agder og Rogaland (NO) Algarve (PT) Bucuresti-Ifov (RO)
Weaker R3	Slaskie (PL) Podkarpackie (PL) Wielkopolskie (PL) Opolskie (PL) Kujawo-Pomorskie (PL) Oberfanken (DE) Mecklenburg-Vorpommern (DE) Thuringen (DE) Brandenburg-Nordost (DE) Chemnitz (DE)
Significantly Weaker R3	Zachnodniopomorskie (PL) Sachsen-Anhalt (DE)

6.6 Regional resilience and territorial types

A key question for the study was the extent to which place-based characteristics influences the resilience of the territory (see also Sections 7 and 8). One of these key characteristics is the nature of the territory itself, whether it is mountainous, coastal, urban, rural etc. Using the territorial typologies of DG Regio and the ESPON programme, alongside our regional resilience scores (at the NUTS 3 level) we calculated the propensity for resilience of different territorial types (see Section 3 for a stronger explanation of the methodology). Some very clear patterns emerge. In each case scores above 1 signal a disproportionately greater share of that particular category and scores below 1 a disproportionately lower share. The extent to which this may be influenced by the uneven distribution of particular territorial types across

[8] Aland is an autonomous region of Finland.

the ESPON territory - and are so skewed by wider, macroeconomic, conditions of resilience - is a pertinent question that remains to be explored.

6.6.1 The resilience of urban, rural and remote areas

Overall, remote areas appear to have weaker levels of resilience (Table 6.3). They are particularly unlikely to have resisted the economic crisis. Predominantly urban areas are more likely to have recovered from the crisis, but are also more likely to have not recovered and still be experiencing an economic downturn. Intermediate areas, close to a city are more likely to have resisted the crisis, and predominantly rural areas, that are close to a city, exhibit average resilience performance. In contrast, intermediate but remote areas and remote predominantly rural areas are both more likely to have not recovered, with the latter significantly more likely still to be experiencing employment decline.

Table 6.3 Urban Rural Type and Regional Resilience

	Resistant	***Recovered***	***Not recovered: upturn***	***Not recovered: no upturn***
Predominantly urban	1.06	1.41	1.02	0.65
Intermediate region, close to a city	1.32	0.99	0.96	0.88
Remote, intermediate region	0.00	0.67	1.34	1.45
Predominantly rural region, close to a city	0.98	0.97	0.99	1.04
Remote, predominantly rural region	0.11	0.36	1.06	1.86

Source: adapted from CE study data

Examining the case of urban areas in more detail, capital cities are more likely to have both resisted the crisis and recovered from the crisis (Table 6.4). Second tier metro regions and smaller tier metro regions record an even stronger likelihood of resisting the effects of the crisis. Non-metro regions are less likely to have resisted the crisis and are more likely to have not recovered and still to be experiencing employment decline.

Table 6.4 Metro Type and Regional Resilience

	Resistant	***Recovered***	***Not recovered: upturn***	***Not recovered: no upturn***
Non-metro: other regions	0.73	0.92	1.01	1.19
Capital city region	1.15	1.51	0.84	0.68
Second tier metro regions	1.66	0.99	1.05	0.64

Smaller tier metro regions	1.42	1.10	1.00	0.72

Source: adapted from CE study data

6.6.2 Coastal regions

Regions that resisted the crisis, or have since recovered, are more likely to be found in non-coastal areas (Table 6.5). Areas with low, medium, high or very high coastal populations make up a disproportionate share of regions that had still not recovered their peak employment levels in 2011. The distribution of coastal resilience is illustrated in Map 6.22.

Table 6.5 Coastal Regions and Regional Resilience

	Resistant	***Recovered***	***Not recovered: upturn***	***Not recovered: no upturn***
Non-coastal regions	1.26	1.15	0.88	0.87
Coastal regions with low share of coastal population	0.21	0.52	1.27	1.51
Coastal regions with medium share of coastal population	0.54	0.60	1.53	1.08
Coastal regions with high share of coastal population	0.57	0.67	1.40	1.12
Coastal regions with very high share of coastal population	0.37	0.73	1.14	1.39

Source: adapted from CE study data

6.6.3 Mountainous regions

Regions that resisted the economic crisis are more likely to be non-mountainous regions, whilst mountainous regions form a higher proportion of regions that have not yet recovered from the economic crisis (Table 6.6). The distribution of resilience across mountain regions is illustrated in Map 6.23.

Table 6.6 Mountain Regions[9] and Regional Resilience

	Resistant	***Recovered***	***Not recovered: upturn***	***Not recovered: no upturn***
Non-mountainous regions	1.24	1.05	1.03	0.82
Regions with more than 50% of population living in mountain areas	4.03	1.46	0.00	0.00
Regions with more than 50% of	0.26	0.77	1.04	1.50

[9] Categories are mutually exclusive. Row 2 consists of regions with more than 50% of population living in mountains and less than 50% of surface area covered by mountains. This category includes less than 5 regions and so is not statistically significant. Row 3 has less than 50% of population living in mountains.

surface area covered by mountains				
Regions with more than 50% of population living in mountain areas and with more than 50% of surface area covered by mountains	0.25	0.92	0.83	1.57

Source: adapted from CE study data

6.6.4 Border regions

Non-border regions have the strongest propensity for resilience and are more likely to have resisted the effects of the economic crisis (Table 6.7). Territories with internal borders exhibit a stronger propensity to have recovered from the effects of the crisis. Those territories that have external borders exhibit the weakest levels of resilience. They have a much stronger representation amongst regions that have not recovered than might otherwise be expected. The distribution of resilience across mountain regions is illustrated in Map 6.24.

Table 6.7 Border Regions and Regional Resilience

	Resistant	***Recovered***	***Not recovered: upturn***	***Not recovered: no upturn***
Regions with no national borders	1.21	1.07	0.92	0.91
Regions with internal EU borders	0.81	1.12	1.05	0.97
Regions with external borders	0.30	0.20	1.33	1.66
Regions with external and internal borders	0.46	0.19	1.34	1.58

Source: adapted from CE study data

6.6.5 Industrial transition

Four types of regions are identified in the industrial transition typology: those that have industrial branches losing importance; those where industrial branches are gaining importance; those where there is internal structural change, those which are not covered by these three categories. Examination of the experience of each of these types of region during the crisis is inconclusive (Table 6.8).

Table 6.8 Industrial Restructuring and Regional Resilience

	Resistant	***Recovered***	***Not recovered: upturn***	***Not recovered: no upturn***
Regions not covered by typology	0.89	0.87	0.96	1.19
Region with industrial branches losing	1.02	1.11	1.11	0.82

importance				
Region with industrial branches gaining importance	1.41	0.71	0.68	1.28
Regions with internal industrial structural change	1.16	1.10	0.78	1.04

Source: adapted from CE study data

Similarly inconclusive are the results of a separate analysis examining whether the effects of declining or strengthening shares of industrial employment in the period preceding the crisis (1997-2007) might affect observed levels of resilience (Table 6.9).

Table 6.9 Changing Industry Share (1997-2007) and Regional Resilience

	Resistant	***Recovered***	***Not recovered: upturn***	***Not recovered: no upturn***
Decreasing industrial share	0.95	1.10	0.93	1.01
Increasing industrial share	1.27	0.40	1.41	0.94

Source: adapted from CE study data

6.6.6 Innovation

More significant results have been obtained following analysis of broad levels of innovation performance at the regional level (using Innovation Scoreboard data at the NUTS 2 level and combining this with NUTS 2 resilience scores). There is a very clear correspondence between higher levels of innovation performance (Leader) and a greater propensity for regions to have resisted the economic crisis or to have recovered from its effects (Table 6.10). Modest innovators are disproportionately under-represented in the resilient categories (resisted or recovered) and over-represented in the less resilient (non recovered) categories. Aside from a lower likelihood to have resisted the crisis, Follower regions exhibit broadly proportionate responses, whilst Moderate innovators exhibit a complex pattern of experiences that would require further disaggregation to fully explain.

Table 6.10 Regional Innovation Performance and Regional Resilience

	Resistant	***Recovered***	***Not recovered: upturn***	***Not recovered: no upturn***
Leader	2.14	2.01	0.18	0.65
Follower	0.63	1.02	1.05	1.07
Modest	0.19	0.53	1.19	1.46
Moderate	0.91	0.24	1.64	0.95

Source: adapted from CE study data

6.6.7 Convergence regions and transitional regions

Although not strictly a territorial 'type', it is also useful to consider the significance of a region's status under the EU's Cohesion Policy, as this influences the levels of external assistance provided through the EU's Structural Funds and can impact on levels of eligible aid intensity. As Table 6.11 illustrates, using eligibility under the 2007-13 programming period, regions that were eligible under the Competitiveness and Eligibility strand of the Structural Funds proved to be disproportionately likely to have resisted or recovered from the crisis. In contrast, regions eligible under the Convergence strand have proven less able to resist or recover from the crisis, with a significantly lower proportion of regions in the recovered category, and over-representation in both not recovered categories. Transition regions have also fared poorly in the crisis, with a particularly high proportion of regions still experiencing decline in 2011.

Table 6.11 Cohesion Policy Eligibility (2007-13) and Regional Resilience

	Resistant	***Recovered***	***Not recovered: upturn***	***Not recovered: no upturn***
Competitiveness and Employment	1.14	1.40	1.00	0.66
Convergence	0.84	0.30	1.12	1.47
Phasing in and Phasing out	0.62	0.73	0.69	1.64

Source: adapted from CE study data

6.7 Regional resilience and historical crises

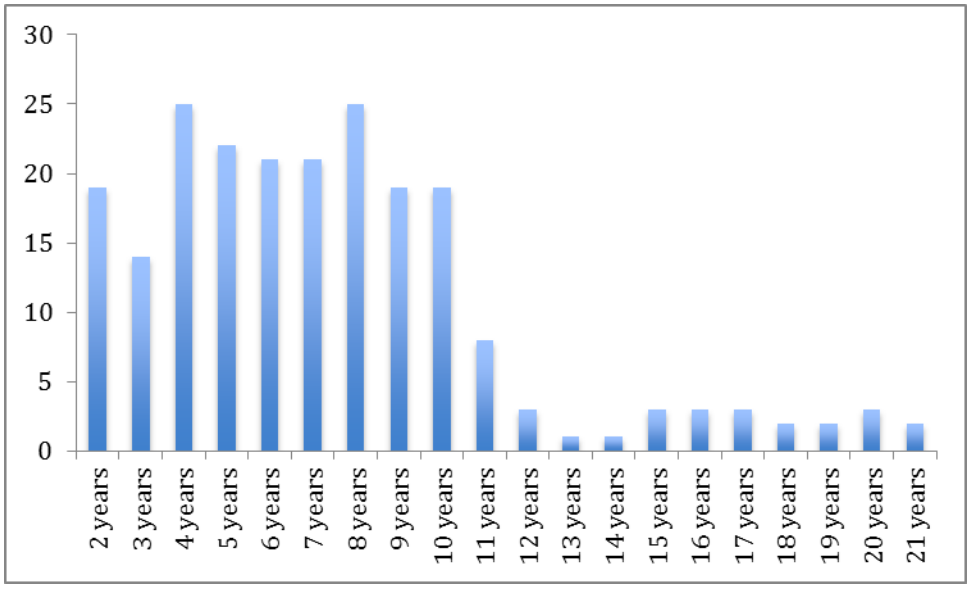
On the basis of the analysis undertaken in Section 4 we have identified two principle economic shocks, preceding the economic crisis of the late 2000s, which have had widespread repercussions across the ESPON territory. The first occurred between 1991-93 and the second, shorter and less widespread, between 2002-3. Taking these two periods as our 'crisis' reference points we are able to map out the extent to which European regions were resilient to the wider economic shocks.

Comparison with the 1990s crisis supports the contention that the effects of the current crisis has been more strongly associated with reductions in GDP, and that the effects on employment have been less immediate. In the 1990s crisis less than 5% of regions were resistant to the employment effects of the downturn, compared to 12% during the current crisis. In contrast, almost a fifth of regions (19%) demonstrated GDP resistance, compared to just 5% during the most recent crisis (see Map 4.1 for distribution of 1990s resilience). Further comparisons are difficult to make, as it is problematic to compare relative rates of recovery. Although some seven years have now passed since the first aspects of the economic crisis became apparent, experience

from the 1990s crisis suggests that this is the average time it takes for a region to recover from such a deep shock.

Data from the 1990s crisis does shed light on the relative speed of recovery, which provides a possible benchmark for comparison with current speeds of recovery. The long recovery 'tail' is clearly visible in Figure 6.5, but it is also evident that the spread of regions across different durations is relatively stable between four to ten-year recovery durations. Over a fifth of regions (22%) had recovered within four years, is slightly slower than during the current crisis, where 23% of regions have recovered within three years.

Figure 6.5 Speed of recovery to pre-crisis peak employment levels (early 1990s, NUTS 2 regions)



Source: adapted from study data

Evidence from the 1990s recession (see Section 4) also highlights how a significant proportion of regions never returned to peak levels of employment - despite the subsequent long economic boom - although most did regain their previous peak of GDP output (Map 4.1). This strong hysteretic effect cautions against any assumption that peak levels of employment should form a natural objective following an economic shock, but is also suggestive of the important interplay between the interaction of economic shocks and longer-term processes of structural transformation.

There is an argument that the 'gales of creative destruction' unleashed by an economic shock can be valuable in promoting the transformation and restructuring of an economy, leaving it stronger and more competitive for the future. However, the evidence for this from recent experience in Europe is mixed. Of the fifteen states that experienced an economic downturn around the time of the Millenium several were amongst the hardest hit by the most recent crisis (Latvia, Lithuania, Slovenia). Whilst

other, larger countries have fared better (Poland, Germany), this is not universal, with both Hungary and Denmark, both still to recover. Of those economies that were not affected by downturn in the early years of the 21st Century, some are amongst the worst affected by the current crisis (including Ireland, Portugal, Spain and Greece), but others have fared better.

7 ASSESSING THE COMPONENTS OF RESILIENCE: QUANTITATIVE APPROACHES

A feature of this study has been to measure the extent to which regions have proved resilient to the economic crisis. We turn now to consider the factors that have contributed to the degree of resilience observed. In the following section we consider existing work in this area and present the results of key aspects of our own quantitative analysis.

Two distinct schools of analysis can be identified in the literature on measuring resilience. The first seeks to create an index of the resilience of territories, be this at a national, regional or other geographic scale. This approach tends to use weighted baskets of indicators, generally in a composite form. The relationship between the constructed index and a dependent measure of resilience is not always apparent in this approach. However, the selection of indicators is worthy of consideration when assessing potential components of resilience. The second approach takes a resilience outcome as a dependent variable (typically measured in terms of change in GDP, employment or unemployment) and seeks to identify the factors that account for the observed spatial heterogeneity of the variable concerned. This provides useful material for assessing which factors appear to have significance in influencing levels of measured resilience.

We structure this section in three parts:

- A short introduction to typical resilience indexes
- A short introduction to existing measures of resilience performance
- A synthesis of the results derived from different approaches to measuring resilience employed by this study

7.1 Indexes of Resilience

In recent years there have been a small number of studies that seek to measure the economic resilience of particular territories. These provide interesting insights in terms of methodological approach and their underlying hypotheses. Some are also instructive in terms of their potential predictive power, particularly where they were developed prior to the current economic crisis. We focus here on three such studies, to illustrate the different scales and approaches being taken.

7.1.1 Measuring Resilience in the EU

At a global scale, Briguglio et al, develop an indicator of national economic resilience by extending the notion of the vulnerability of economies. In their work they have established one composite resilience value based on four categories. A number of indicators make up each category (Table 7.1)

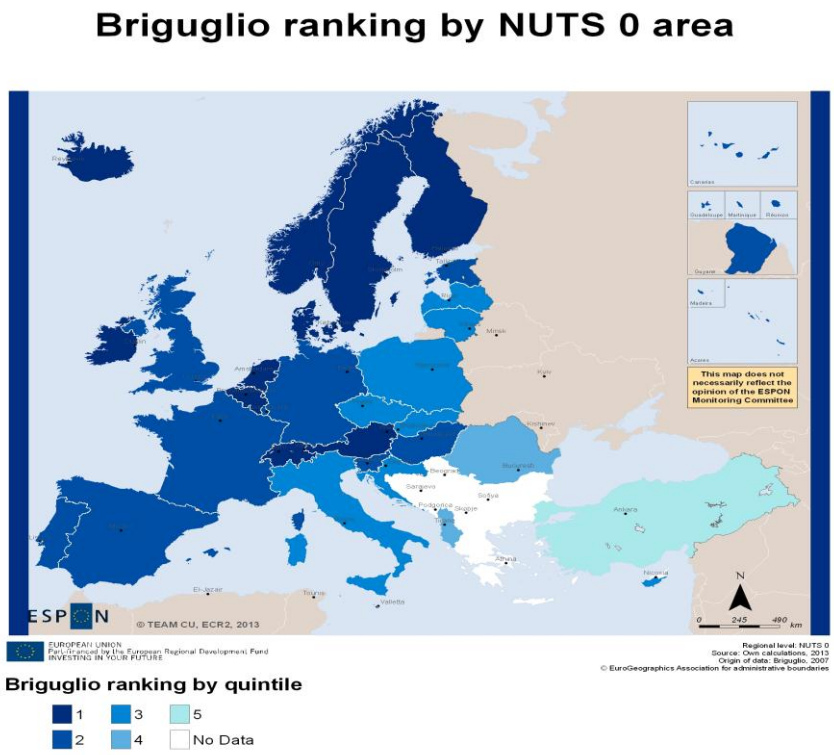
Table 7.1 Indicators of national economic resilience

Macroeconomic stability	***Microeconomic efficiency***	***Good governance***	***Social development***
Fiscal deficit to GDP ratio Sum of the unemployment and inflation rates The external debt-to-GDP ratio	Based on Economic Freedom of the World Index	Judicial independence Impartiality of courts The protection of intellectual property rights Military interference in the rule of law; Political system and the integrity of the legal system	Life expectancy at birth Adult literacy rate School enrolment rates

Source: adapted from Briguglio et al (2008)

Their work was undertaken prior to the fiscal crash and the beginning of the economic crisis, but provides a useful perspective on some potential facets of resilience. We illustrate the performance of European economies in Map 7.1, where 1 (Dark Blue) equals the most resilient quintile and 5 equals the least resilient quintile.

Map 7.1 Resilience score of European economies



Source: adapted from Briguglio et al, 2008

Comparison of the observed resilience during the 2008 crisis highlights the challenges of such ex ante assessments. Although some of the regions with strong resilience scores have indeed proved to be so during the crisis, this is not true in all cases, with Ireland, Iceland and Denmark all notable for performing less strongly in practice than their index scores might have suggested in theory, whilst Germany and Poland appear to have out-performed the index in practice.

7.1.2 Measuring Resilience in the US

The Resilience Capacity Index has been developed by the University at Buffalo Regional Institute, as part of the University of Berkeley's 'Building Resilient Regions' network. This provides a single value of resilience for US metro regions, based upon a composite index of 12 indicators, grouped into three categories (Table 7.2).

Table 7.2 Indicators of Resilience Capacity

Regional Economic Capacity	***Socio-demographic Capacity***	***Community Connectivity Capacity***
Income equality	Educational attainment	Civic infrastructure

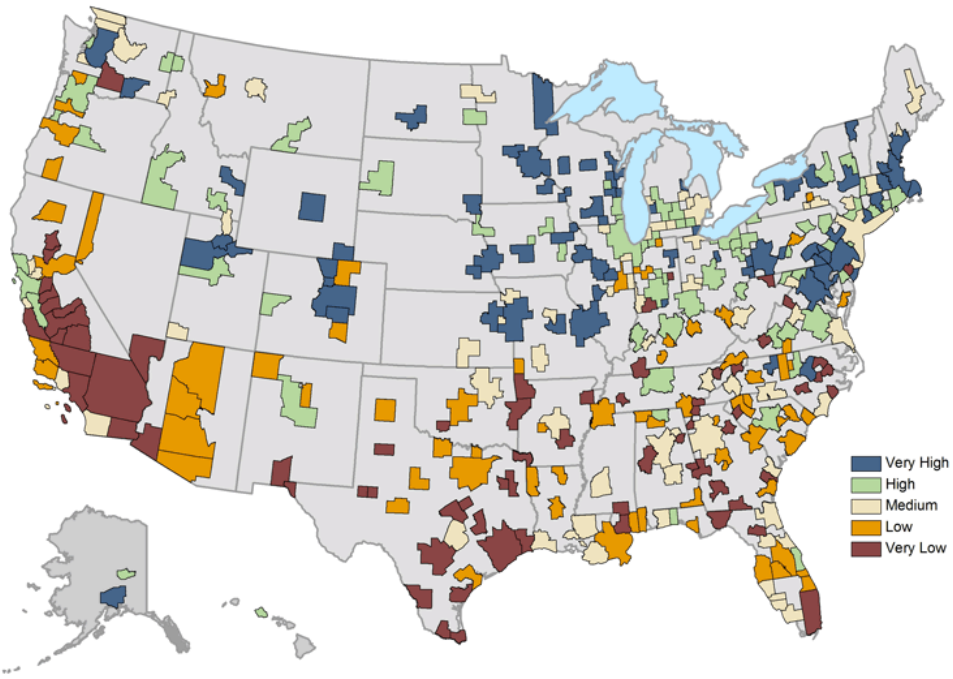
Economic diversification	Without disability	Metropolitan stability
Regional affordability	Out-of-poverty	Home ownership
Business environment	Health insured	Voter participation

Source: adapted from BRR website (http://brr.berkeley.edu/rci/)

Whilst several of these indicators are particular to the US context and do not translate well to the European space as a whole, they provide a valuable indication of the issues which are regarded as significant. The composite value of the index provides the following geography of resilience in the US (Map 7.2).

However, in subsequent work (Augustine et al, 2013), the ability of the regional economic capacity indicators to measure the propensity of regions to exhibit resilient or non-resilient outcomes is found to be limited. The authors acknowledge that they are unable to match the original work (by Foster, 2012). They test the model through univariate, bivariate and multivariate analysis techniques, but find that the capacity of a region, as measured here, is, at best, modest and point to the need for further work.

Map 7.2 Regional Resilience in the US



Source: http://brr.berkeley.edu/rci/data/map

7.1.3 Indexes of Resilience specific to Member States: UK experience

Within individual member states of the EU there have been a small number of attempts to develop regional indexes of resilience, partly as a response to the current economic crisis. These tend to relate to a particular Member State, such as the work by Experian PLC in England, UK and of EKOSGEN prepared for six urban areas in Yorkshire. In their work Experian identify four components to resilience, each represented by a number of individual indicators with weighted values (Table 7.3).

Examining the various approaches highlighted above we find that some stated indicators of resilience can only be applied at the national scale, and so, perhaps, have less validity when compiling a regional index; others are particular to individual national economies and some refer to indicators which are difficult to access on a comparable basis across the EU or the ESPON space. However, they each offer valuable pointers to the factors which might considered in developing typologies of resilience as the study progresses.

Table 7.3 Indicators of Components of Resilience

Business	***People***	***Community***	***Place***

% vulnerable sectors % resilient sectors % high-growth (knowledge) sectors Business start-up Insolvency Rates % workforce self-employed Adaptive companies Days beyond terms Foreign-owned businesses Exporters Highly exporting SICs % employment in vulnerable sector % employment in resilient sectors Business Density Experian pH group and APS	Working age population (growth) NVQ4+ APS Low qualifications % employed as corporate managers % employed in elementary occupations Earnings	% vulnerable to declines in disposable income % vulnerable to Long Term unemployment Claimant Count rate of unemployment Social cohesion/do neighbours look out for each other Life expectancy at birth female Life expectancy at birth male % wards amongst 10% most deprived	Achievement at school Crime rates House prices Previously developed land ERV commercial office space Greenspace as a % of total land

Source: Experian PLC

Examining the various approaches to date it is apparent that most of the indicators identified focus on innate characteristics of resilience, rather than measures of the adaptive capacity of a region. Many of the indicators are also composite indicators which require unpacking to appreciate their actual composition. Overall, there is a degree of consistency in what is regarded as significant in determining resilience, put broadly this relates to business characteristics, population characteristics and the nature of society (or community). Place-based considerations are less prevalent, and are only formally considered in the Experian index. The other area of variation is in the level of significance ascribed to macro-economic conditions. Whilst this latter element may have less significance in assessing relative resilience between geographical units within a national economy it might be expected to play a stronger role in cross-national comparisons. However, it is also the case that this is a factor over which sub-national policy makers can have very little influence.

Similarly, EKOSGEN (2011) identify six domains for resilience capacity, constructed around three major themes: economy, people and place. Each domain consists of a number of indicators and is weighted for significance (Figure 7.1).

Figure 7.1 Themes and domains of EKOSGEN index

ECONOMY	***PEOPLE***	***PLACE***
30%	25%	10%
Economic Structure	Skilled Workforce	Place and Population
10%	15%	10%
Enterprise	Economic Inclusion	Infrastructure and Connectivity

Source: EKOSGEN (2011)

One potential weakness of the EKOSGEN approach is that it does not appear to develop a measure of a resilient economy. Rather, the approach relies upon relative performance against the key indicators identified. This is similar to the approach adopted by another leading economic consultancy in the UK, which measures susceptibility to factors that might hold back economic recovery and resilience, based on indicators judged to make an area better positioned to adapt to economic recovery and the rebalancing of an economy (ECORYS, 2012). In each case indicators are identified a priori that are assumed to impact on the economic resilience of a regional or urban economy. The justification of these is not provided in the published documentation.

7.2 Measuring components of resilience

7.2.1 Measuring 'resilience' and reasons for spatial heterogeneity

Over recent years there have been a number of empirical analyses of macroeconomic performance during the crisis (Davies, 2011; Fingleton et al, 2012; Blake, 2012; Claessens et al, 2010; Lane and Milesi-Ferretti, 2010; Rose and Spiegel, 2010; Groot et al, 2011, Champion and Townsend, 2012). These variously consider indicators such as employment, GDP and unemployment, with some authors identifying distinctive differences between the various indicators (Champion and Townsend, 2012; Groot et al, 2011; Rogers, 2012). The work of Groot et al is perhaps the most comprehensive, covering a wider range of indicators and providing a sub-national perspective to complement the more detailed national analysis.

The cross-country differences in the timing, depth of the crisis and subsequent recovery are recognized by all authors, although some measurement approaches apply fixed start and end dates to the data series adopted. Groot et al (2011) avoids this and

uses a business cycle approach, dating the start of the recession as two subsequent quarters of GDP decline and recovery from the first quarter GDP growth is recorded. Their work then compares experience of GDP change at a national level with employment, noting the differential experience of Germany and Spain. Applying Okun's law (describing the regularity between GDP growth and change in the unemployment rate), Groot et al find that the expected empirical relationship is largely present, with the exception of Spain, where there has been a greater increase in unemployment than is to be expected from the change in GDP. The authors suggest that this is due to a significant loss in temporary jobs accounts, which quoting work by Keeley and Love (2010) account for 85% of the total change recorded in unemployment.

At a national level, factors that influence observed levels of resilience to the crisis include the degree of external trade and the openness of the economy (Lane and Milesi-Ferretti, 2010; Groot et al, 2011). Both sets of authors also identify the strength of the fiscal situation prior to the crisis as significant, with Groot stating that "a more favourable net financial position is significantly correlated to a less severe crisis both in terms of GDP and unemployment" (Groot et al, 2011, p.7). Other correlations identified by Groot involve institutional structures, with more active government institutions correlating with a smaller decline in GDP and lower increases in unemployment during the crisis. However, whilst other institutional structures such as trade union membership also strengthen unemployment performance, it tends to have a negative effect on GDP growth.

Differences in sectoral composition explains a substantial part of GDP change at a national level during the crisis (Groot et al, 2011; Blake, 2012). Using annual GDP data for regions in nine EU countries Groot et al seek to explore this further. They report that, on the basis of provisional data there, "seems to be a relationship between the (GDP) growth in 2009 and the sensitivity based on sectoral composition" (2011, p.17). On the basis of their calculations, regions with sectors that are more sensitive to the global economic crisis experience a greater fall in GDP. In this analysis, sectoral sensitivity is believed to explain about 19% of the variation in regional GDP growth rates. In the UK, Rogers (2012) reports a similar finding, with stronger recovery rates in the south of England where higher concentrations of employment in service sectors are to be found. In other areas, it has been argued that higher levels of employment in the public sector formed an 'artificial' element of labour market protection to the initial effects of the crisis (Champion and Townsend, 2012).

Looking back over a greater time period, Champion and Townsend (2012), identify the starting conditions of urban areas as a determinant of their performance during recessions, with weaker places suffering worst impacts (see also Rogers, 2012). However, Champion and Townsend also caution that each recession has its own distinctive spatial signature and that what was true in the past may not hold for the future.

7.2.2 Assessing the components of Resilience: ECR2 Results

Determining the components of resilience

The ECR2 project has defined resilience as the ability to resist or to recover from an economic shock, where recovery is determined as the point at which employment levels regain their pre-crisis peak. An alternative definition of recovery, based on the point at which GDP regains its pre-crisis peak has also been measured. Regions have been divided into four categories: Resistant to downturn, Recovered from downturn, Not Recovered from downturn but with an upturn in growth rates and Not Recovered and still experiencing negative growth rates. In this respect out work differs from many other analyses of the effects of the crisis, and the factors associated with this, which focus on the depth (or severity) of change, rather than the ability of an economy to regain pre-crisis peak levels.

Two approaches are typically taken to measuring levels of employment in an economy. One counts the total number of jobs the second the total number of people in employment. Where people have more than one job (due to a prevalence of part-time working for example) these measures may give different totals. In our work, the data derived from the Experian database counts the number of jobs, whilst the date derived from the Cambridge Econometrics database counts the number of people employed.

In the following section we have employed different approaches to test a range of factors that may have significance in facilitating the levels of resilience observed at the regional level. In the following section we report on the three approaches taken. Where results are reinforcing then we are able to offer a greater level of confidence in the reported findings. Most of the analysis is undertaken at the NUTS2 regional level. However, our analysis of relationship between territorial characteristics and observed levels of resilience is analysed at the NUTS 3 scale.

As a summary of the combined findings, those factors that appear to be significant include the following:

High levels of employment growth in the years preceding the crisis appear to be associated with regions that proved less resilient to the crisis. Lower levels of unemployment prior to the crisis also characterise regions that have proved resilient to the economic crisis. Taken together this suggests that resilience is a longer-term phenomenon based on stable growth rates over longer periods of time. Whilst higher rates of employment are associated with regions that exhibit employment resilience this is less strong regarding GDP resilience.

The economic structure of the economy is a factor. Not surprisingly, given the origins and effects of the crisis, regions with high shares of construction employment have proved to be less resilient to the crisis, as have regions with large shares of agricultural employment. Regions with high shares of employment in service industries have tended to be more likely to prove resilient. The relationship between the level of employment in manufacturing industry and observed resilience is complex in the case of employment resilience, but higher levels of manufacturing employment are associated with higher levels of GDP resilience.

There is a very strong positive relationship between higher levels of innovation performance and observed resilience outcomes. This is also present for other science and technology capacity indicators (such as Human Resources employed in science and technology). Higher levels of qualifications are also related to stronger resilience outcomes.

Lower rates of labour market participation are present in regions that have proved less resilient to the crisis. Level of household disposable income does not appear to have any relation to observed levels of regional resilience, except at the highest quartile level - which has a limited relationship to employment resilience, but lower growth rates are positively associated with regions that resisted the crisis or recovered. Again, this may suggest that stable, longer-term, growth paths provide a greater degree of resilience.

Levels of migration prior to the crisis do not appear to have a significant influence on the observed employment resilience of regions, lower levels of in-migration do appear to be associated with regions with observed GDP resilience. The relationship between demographic structure and observed resilience is not straightforward, and also varies between employment and GDP resilience outcomes.

Higher levels of capital investment and investment per head appear to have some positive relationship with stronger resilience outcomes, but the findings are not robust. Higher levels of broadband availability do appear to be related with regions with more resilient outcomes. Regions with higher levels of accessibility also tend to be associated with more resilient outcomes.

There are also important territorial dimensions to observed resilience outcomes. Regions which are remote, have external borders and/or have high levels of population living in mountainous or coastal areas all tend to have proven less resilient to the economic crisis. Regions that are closer to urban centres tend to have proven more resilient.

Whilst the univariate and bivariate techniques employed demonstrate strong, and relatively consistent, relationships between a observed resilience outcomes (of both employment and GDP) and a number of key variables the results of multivariate

techniques are more complex and offer poor levels of explanatory power. Numerous models have to be run before ones demonstrating a good fit between observed outcomes and potential independent variables can be identified, and these tend to rely heavily on the significance of dummy variables.

It is tempting to think that more data may enable more robust models to be derived but the analysis makes clear that the interactions are complex, that the direction of influence can often reversed depending upon specificities of regional contexts, and that the characteristics identified only explain a part of the resilience observed. It is likely that other factors are also at play, and that the role of policy will also be an important influence. In this context, it may be optimistic to assume that resilience at a regional level can be robustly modelled.

The following section presents the approach of the three different analyses undertaken:

- Modelling approach 1 was undertaken by Experian Plc
- Modelling approach 2 was undertaken by WISERD, Cardiff University
- Modelling approach 3 was undertaken by Manchester University
- Modelling Components of Resilience: Approach 1

MODELLING COMPONENTS OF RESILIENCE: APPROACH 1

Introduction

This stage of the project was to investigate the relationship between resilience, as defined earlier in the project, and the descriptive variables collected. The resilience categories are based at NUTS2 region and are based solely on absolute employment measures. They are:

1/ No upturn – the number of employed persons experienced a decline and no positive growth thereafter

2/ Upturn – the number of employed persons experienced a decline, then it started growing, but the pre-recession level has not been reached

3/ Recovered – the number of employed persons experienced a decline, then it started growing and exceeded the pre-recession level

4/ Resistant – no decline in the number of employed persons was present

The analysis took place in two stages. A descriptive analysis phase; where comparisons were made between each resilience type and the market as a whole. A regression analysis phase; where the resilience was assumed to take the form of an ordinal variable. The aim of this is to discover whether correlations exist between the left hand side of the equation and the right, whilst these in themselves do not point to causality they offer direction for further research on causality.

In addition the analysis is able to quantify the correlation and, through the use of dummy variables, gauge the size of exogenous influences. The initial candidate explanatory variables were based on the data collection exercise 10 and were available at differing levels of geographic area and for differing time periods. The candidate explanatory variables were:

- Total employment
- Unemployment rate
- Participation rate
- Business birth rate
- Size of business
- Number of enterprises
- Educational attainment
- Employment by sectors (agriculture, industry, construction, services)
- Investment
- Innovation
- Net migration
- Self employment
- Household disposable income
- Hours worked
- Structure of employment by sectors – share of employment in agriculture, industry, construction and services in total employment (%)

Methodology

The methodology for this analysis was conducted in three key stages.

1. Data transformation – to ensure that the data can be consistently used in the analysis
2. Descriptive analysis – initial analysis to draw out key explanatory variables to enter into further analysis
3. Discrete Ordered Choice modelling – to understand the explanatory power of variables in combination
4. Data Transformation

This first stage of the analysis was to ensure that the explanatory variables, which were available as absolute numbers, for a variety of geographies and a variety of time periods, and turn them into a consistent set of variables that could be input into the analysis.

In the first instance we conducted a series of transformations, to create relative 'change' variables alongside the absolute variables. Transformations of the candidate explanatory variables:

[10] As set out in Section 2. All data based on the Experian dataset.

Average geometric growth rate over 1 to 10 periods - prefix “cgr”
Difference over 1 to 10 periods – prefix “cd”
Moving average over 1 to 10 periods - prefix “cma”
In levels - prefix “cl”

For those variables where we did not have full time series history we performed the transformations that were possible, given the data.

The second area of data transformation work was to create NUTS2 level variables for variables that were only available at a higher geographic area. For the purposes of the analysis the assumption was to use the higher level geographic value, i.e. the country level value was used at the regional level.

Finally, a set of ‘dummy’ geographic variables were created. These variables for use in the regression stages of the analytics enabled us to control for other factors that might be at play within certain geographies that the other explanatory did not pick up. These could include existing economic development policies.

The variables created were:

EU/Eurozone membership:
EU =1 if the region belongs to a EU member state as of the crisis, 0 otherwise
EUO=1 if the region belongs to a EU member state but not to a Eurozone member state, 0 otherwise
EZ =1 if the region belongs to a Eurozone country, 0 otherwise

Geography – E/W/N/S:
E=1 if the region belongs to Eastern Europe (UN definition, see the attached file), 0 otherwise
N=1 if the region belongs to Northern Europe (UN definition, see the attached file), 0 otherwise
S=1 if the region belongs to Southern Europe (UN definition, see the attached file), 0 otherwise
W=1 if the region belongs to Western Europe (UN definition, see the attached file), 0 otherwise

Country dummies – one for each country

Descriptive Analytics

The initial analytics process was to look at the explanatory variables individually to understand the direct relationship between them and the resilience categories. A secondary output from this process was to provide a filter on the explanatory variables to be used in the regression analysis.

All explanatory variables are taken with one year lag prior to the year of the bottom of the downturn (for the countries which experience a decline in employment) and 1 year prior to 2009 (for the resistant countries). The data transformation stage allowed the growth to this period from any prior period to be used as an input into the analysis.

The tests that were conducted included:

Descriptive statistics – mean, median, minimum value, maximum value, standard deviation are taken into consideration for the whole sample, and also for each resilience group

A Welch's t-test is performed as to indicate which of the candidate explanatory variables and which of their transformations are relevant to the resilience differences. The test is applied to compare the mean of the candidate variable in any resilience subsample with the mean of the variable in the overall sample and any other resilience subsample.

The null hypothesis of the test is that the population means of the variable in two samples are equal. The following t-statistic is constructed:

$$t = \frac{\overline{X_1} - \overline{X_2}}{s}$$

where

$$s = \sqrt{\frac{{s_1}^2}{n_1} - \frac{{s_2}^2}{n_2}}$$

${s_i}^2$ is an unbiased estimator of the variance of the variable in each of the samples, n_i is the size of the sample.

Under the null hypothesis the test statistic is approximated an ordinary Student's t distribution. The p-values corresponding to the test are calculated for each candidate explanatory variable are presented (Descriptive_stat_v6.xlsx).

If we use a 5-% significance level, we can reject the null hypothesis when the p-value is below 0.05.

Discrete Ordered Choice modelling

Basic descriptive analysis showed how the explanatory variables were related to the resilience variables and between combinations of resilience variable. Discrete ordered choice modelling can be used to look at the marginal impact of multiple explanatory variables as well as to build a model to quantify this relationship to the ordered ranking of resilience variables. In particular discrete ordered choice models work for variables which are distinct outcomes rather than continuous outcome variables.

The probit regression methodology was used in the model as follows:

$$y_i = \begin{cases} 1 & 'no\ upturn' \\ 2 & 'upturn' \\ 3 & 'recovered' \\ 4 & 'resistant' \end{cases}$$

$$y_i(x_i, \epsilon_i; \beta\ , k_1, k_2, k_3) = \begin{cases} 1 & if \beta\ x_i + \epsilon_i < k_1 \\ 2 & if\ \beta\ x_i + \epsilon_i \in [k_1, k_2) \\ 3 & if\ \beta\ x_i + \epsilon_i \in [k_2, k_3) \\ 4 & if\ \beta\ x_i + \epsilon_i > k_3 \end{cases}$$

Probit:

$\epsilon_i | x_i \sim \mathcal{N}(0,1)$

Pr(y_i=1|$\beta\ , k_1, k_2, k_3$)=Φ(k_1 - $\beta\ x_i$)

Pr(y_i=2|$\beta\ , k_1, k_2, k_3$)=Φ(k_2 - $\beta\ x_i$)-Φ(k_1 - $\beta\ x_i$)

Pr(y_i=3|$\beta\ , k_1, k_2, k_3$)=Φ(k_3 - $\beta\ x_i$)-Φ(k_2 - $\beta\ x_i$)

Pr(y_i=4|β_1, k_1, k_2, k_3)=1 - Φ(k_3 - $\beta\ x_i$)

The estimation was provided using a standard maximum likelihood methodology; Properties - consistency, asymptotic normality, efficiency.

The quality of the model was measured using the standard goodness-of-fit statistic for maximum likelihood estimates is McFadden's Pseudo-R2:

$$R^2 = 1 - \frac{l(\widehat{\beta})}{l_o}$$

As a check on the results the percent of correctly/incorrectly predicted and the gain over a constant probability specification are reported and this, used in conjunction with the McFadden Psuedo R2 allowed different models to be iterated towards the final model of best fit.

The outputs from the model show us the coefficients for the explanatory variable which can be used to calculate the marginal effects. It should be noted that because the explanatory variables are not unitless the coefficients themselves have a unit (10x) component.

Marginal effects can be calculated in the following way:

$M_d(x_i;\hat{\beta})$=Φ($\hat{\beta}(x_i$+1)- Φ($\hat{\beta}(x_i$)

The sign of $\hat{\beta}_j$ shows the direction of the change in the probability of falling in the endpoint rankings (1 or 4) when x_{ij}) changes. Pr(y_i=1) changes in the opposite direction of the sign of $\hat{\beta}_j$ and Pr(y_i=4) changes in the same direction as the sign of $\hat{\beta}_j$. Importantly, the sign of the effects on the probability of falling in any of the middle rankings cannot be determined a priori.

Furthermore, the outputs of the model show the limit points and confidence in the explanatory model.

The initial inputs into the model were based on the initial descriptive analysis of key explanatory variables. The model then moved from General to specific procedure. Start from as general model as possible (limitation is the number of degrees of freedom.)

The initial model reduced through the analysis after stepwise exclusion of the variable with highest p-value of the estimated t-statistic, until all coefficients are statistically different from 0 at 5% significance level.

Several variations of the initial specification were used to understand the effect of different explanatory variables on the model and to see if they offered improvement to the outcome. These variations included using different combinations of the dummy variables for geography: EU/ Eurozone; E/S/W/N; Country level.
Over 25 models were specified but no significant improvement was noted after model 24.

Results

This section describes the results observed from the models and makes some observations of potential cause mechanisms. It should be noted that the analysis has not established the direction of causality, or indeed causality itself; the observations offer guidance for potential future research spheres.

Descriptive analysis

Introduction

The descriptive analysis section of the work investigated the individual relationship between the explanatory variables and the resilience typologies. The main discovered differences between the regions in different resilience groups relate to the following categories:

- Employment/ Unemployment growth over a long period of time
- Size and shape of industrial sectors
- Participation rate
- Disposable income
- Educational achievement

Other explanatory variables such as: Innovation, size profile of companies, investment are only available at NUTS0 level and have not been considered in this section.

The results for these key areas along with other variable with statistically different means are presented in the following tables. The tables show the resultant p – values to the Welch's test. P-Values below 0.05 indicate that we can reject the hypothesis that the sample for that explanatory variable and resilience type is the same as for the comparator resilience region type.

The direction of change of the explanatory variable across the resilience types is also noted, where relevant. This direction is not always the same as noted in the marginal regression model.

Employment growth

The presumption behind investigation this indicator is that relatively high employment growth rate might have been unsustainably high over a long period before the crisis. The latter could have brought about a necessary cooling of the labour market. If this is the case, no rebound of employment to the pre-recession levels should be expected.

Table 7.4: FTEE, average growth over 8 years (cgr_FTEE, period =8)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.182	0.306	0.384	0.050
CRI = 1		0.068	0.085	0.016
CRI = 2			0.960	0.318
CRI = 3				0.322

The presumption is supported by the data. The 'no upturn' regions have a higher long-term (3 or more years) average growth rate than the sample mean over the other resilience groups (p-values suggest that the mean growth rate of 'no upturn countries' is different from all other groups).

Moreover, the most resilient regions have a lower mean employment growth rate than the 'no upturn' countries - for growth rates over a longer than 5-year period.

Unemployment rate

The average unemployment rates are statistically different between groups, except for adjacent groups, over a short and a long-term period.

Table 7.5: Unemployment rate, level (cl_UR)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.006	0.660	0.065	0.000
CRI = 1		0.019	0.000	0.000
CRI = 2			0.278	0.003
CRI = 3				0.052

Table 7.6: Change of the unemployment rate over 7 years (cd_UR, period=7)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.004	0.251	0.000	0.000
CRI = 1		0.048	0.000	0.000
CRI = 2			0.000	0.000
CRI = 3				0.996

Table 7.7: Average unemployment rate over 7 years (cma_UR, period=7)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.005	0.592	0.005	0.002
CRI = 1		0.010	0.000	0.000
CRI = 2			0.109	0.054
CRI = 3				0.669

Whist the independent variable is largely based upon unemployment rate, it seems that more vulnerable resilient regions in general had higher unemployment rates, prior to the crisis.

Participation rate

The participation rate of the local population is statistically different between resilience groups; the smaller the participation rate, the less resistant the region.

Table 7.8: Participation rate, level (cl_PR)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.000	0.753	0.033	0.000
CRI = 1		0.001	0.000	0.000
CRI = 2			0.136	0.000
CRI = 3				0.026

There can be multiple reasons for the differences in participation rate, such as an unfavourable age structure of the population of the region, diminished human capital due to bad health, local culture.

The moving average transformation of the participation rate variable also shows statistically different average participation rates over short-term and long-term period between the ‘no upturn’ regions, the middle two groups and the ‘resistant groups’. (The ‘upturn’ and ‘recovered’ regions have similar average participation rates.); again, the lower the average participation rate, the more vulnerable the region.

Agriculture Sector

The share of the economy based around agriculture is statistically different between regions of different resilience types. The larger the agricultural share, the less resilient the region, this difference could be because the more vulnerable regions are less

developed per se, without strong industrial production and a small production of high-value-added goods. However, a decline in employment could be not because of the crisis, but due to a negative population growth in these regions (villages, with old population), or due to migration (urbanization). The reasons might be related to those seen with the participation rates.

Table 7.9: Share of employment in the agricultural sector in total employment, level (cl_STR_ESAB)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.000	0.307	0.000	0.000
CRI = 1		0.000	0.000	0.000
CRI = 2			0.035	0.002
CRI = 3				0.078

Historical changes in the share of agriculture in the economy are less statistically different between resilience types.

Construction Sector

Regions with the two more resilient indicators have smaller number of employed persons in construction compared to regions in the two more vulnerable. This variable relates solely to the absolute level and care has to be taken with interpretation. The relationship of the changing shape of the construction industry in countries with different resilience measure is described below.

Table 7.10: Employment in the construction sector, level (cl_ESF)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.0464	0.0037	0.0015	0.0002
CRI = 1		0.3098	0.1573	0.0243
CRI = 2			0.5676	0.0713
CRI = 3				0.1885

Over a long period (7-10 years) the number of employed persons in construction in the most resilient countries has fallen, while in all other countries it has stepped up. More vulnerable countries tended to have larger increases in the number of construction workers in the build up to recession.

Table 7.11: Change in the number of employed persons in construction over 7 years (cd_ESF, period=7)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.9478	0.0156	0.0043	0.0000
CRI = 1		0.0061	0.0016	0.0000
CRI = 2			0.2762	0.0000
CRI = 3				0.0022

Similar patterns are seen when using growth rates in construction as the explanatory variable. The regions with relatively higher long-term construction growths seem to be less resilient, which is in line with a hypothesis that countries with construction booms faced a severe recession in 2007-2009.

The 'no upturn' group has a higher mean growth rate (for all period from 2 to 10 years) compared to all other groups. The 'resistant' group has a lower mean long-term growth rate (over 7 years) compared to the two most vulnerable groups.
The most resistant group has a 10-year average growth of employment in construction close to 0% (0.2%), while in the most vulnerable group the 10-year-growth rate was 3.8%.

Following through from these trends we note statistically different share of the construction sector between all groups, except between the two most resilient groups. The higher the share of construction in the economy, the less resilient the group.

Table 7.12: Share of employment in the construction sector in total employment, level (cl_STR_ESF)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.000	0.257	0.011	0.000
CRI = 1		0.000	0.000	0.000
CRI = 2			0.130	0.000
CRI = 3				0.003

There is also statistically different change for a longer period (over 6 years) in the share of the construction sector between the 'no upturn' group and all the other groups. The 'no upturn group' experienced the larger increase of the share of the construction sector.

Services sector

The service sector (sectors G-S) include finance, real estate, trade, etc. which were also considered as overheating in many countries prior to the crisis. There are statistically different share of the services sector between the regions of different resilient types, except between the two most vulnerable groups. The higher the share of the services sector, the more resilient the group – whether this is a feature of the services sector or a proxy for the region's economic sophistication is unclear.

Table 7.13: Share of employment in the services sector in total employment, level (cl_STR_ESGS)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.000	0.849	0.000	0.000
CRI = 1		0.001	0.000	0.000
CRI = 2			0.014	0.006
CRI = 3				0.426

The growth rate of employment in this sector over a longer period (over 6 years) has a lower mean value in the most vulnerable regions compared to all other groups, there was no statistical difference in other areas.

However, there is also statistically different change for a longer period (over 5 years) in the share of the services sector between the 'no upturn' group and all the other groups. The 'no upturn group' experienced the larger increase of the share of the services sector.

Table 7.14: Change in the share of employment in the services sector in total employment over 7 years (cd_STR_ESGS, period=7)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.017	0.052	0.304	0.307
CRI = 1		0.001	0.005	0.008
CRI = 2			0.309	0.576
CRI = 3				0.780

Household disposable income

The average growth rate in disposable income over a 10-year-period is the lowest in the most resilient group and statistically different from the other three groups. Reinforcing the pattern seen for previous explanatory variables that indicate the most resilient areas were more stable in the years preceding a downturn.

Table 7.15: Household disposable income, average growth over 7 years (cgr_HHDI)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.317	0.196	0.395	0.008
CRI = 1		0.778	0.138	0.004
CRI = 2			0.087	0.002
CRI = 3				0.083

Interestingly there are no statistical differences in household disposable income levels between resilient types.

Educational achievement

There are statistically different educational achievement levels between regions with different resilience indicators (except for adjacent resilient groups), with higher educational achievement correlating with higher the resilience.

Table 7.16: Educational attainment, level (cl_EA)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.114	0.051	0.059	0.012
CRI = 1		0.906	0.008	0.002
CRI = 2			0.003	0.001
CRI = 3				0.513

The most resilient group has increased its educational achievement the most over the short and long period. It has a statistically different mean change for a 7-year period compared to the other three groups and looking at a 4-year period the trend for less difference between adjacent resilient groups can be seen.

Table 7.17: Educational attainment, average growth over 4 years (cgr_EA, period=4)

	CRI = 1	CRI = 2	CRI = 3	CRI = 4
ALL	0.021	0.216	0.011	0.159
CRI = 1		0.299	0.000	0.007
CRI = 2			0.003	0.044
CRI = 3				0.850

The ‘no upturn’ group is the group with second highest increase in educational attainment, for some periods the mean increase is not statistically different from the change in the most resilient group. This educational improvement in the ‘no upturn’ group was probably in line with the economic boom (in construction and services).

This would indicate that the relationship between educational attainment and resilience is likely to be complex. It is possible that the effects are indirect, and potentially operate over a far longer time period than we have observed.

Descriptive Analysis, Emerging findings

The descriptive analysis has shown that there are statistical differences in the value of some of the explanatory variables between regions of different resilience. These findings might support hypothesis that it is:

- Regions that are undergoing transition that are least resilient
- Regions that are better educated and rely more on added value services are more resilient

However, when we consider there is no statistical difference in disposable income between regions and for some explanatory variables there are similarities between the most and least resilient areas it is clear that these hypothesis are too simplistic and that interconnectedness between explanatory variables and, potentially, other factors are important in determining the resilience of an area.

The results from the discrete ordered choice modelling help define this further.

Discrete Ordered Choice modelling

Introduction

Discrete ordered choice models were built to strengthen key findings from analyzing the descriptive statistics particularly to understand potential marginal effects and, through the use of dummy data whether there might be other factors that make an impact that we are unaware of.

The model itself solves for the best set of explanatory variables that are input into it, however, with such a large range of similar potential inputs only a limited number can be input into each model. After each model run, different sets of input explanatory variables were added to the modelling process to see if improvements could be achieved. After model 24 no further improvements were seen.

Initial choices of candidate variables were shaped from the results of the descriptive analysis. In the discrete ordered choice models explanatory variables only available at NUTS0 are added to the analysis.

Model 24:

The initial general specification of model 24 includes the following candidate variables:

full time equivalent employment growth over 8 years (cgr8_FTEE)
change in the employment rate over 7 years (cd7_ER)
employment in enterprises with 1-4 employees, with 5-9 employees and more than 10 employees (cl_SB10, cl_SB59, cl_SB14), number of self-employed persons (cl_SE)
business birth rate (cl_BR), number of enterprises (cl_NE),
unemployment rate (cl_UR), average unemployment rate over 7 years (cma7_UR) and the change of the unemployment rate over 7 years (cd7_UR)
average participation rate over 8 years (cma8_PR),
shares of employment in the agriculture, construction and services sectors in total employment (cl_STR_ESAB, cl_STR_ESF, cl_STR_ESGS) (the share of employment in the industrial sector is not included as it is collinear with the other three) and the change of these shares over 7 year period (cd7_STR_ESAB, cd7_STR_ESF, cd7_STR_ESGS)
the level of innovation (cl_INN), and the nominal level of investment (cl_INV)
change in the net migration over 6 years (cd6_NM)
level of educational attainment (cl_EA) and the change of educational attainment over 4 years (cd4_EA)
country dummies

All explanatory variables are taken with one year lag prior to the year of the bottom of the downturn (for the countries which experience a decline in employment) and 1 year prior to 2009 (for the resistant countries).

The initial model reduces to the following one after stepwise exclusion of the variable with highest p-value of the estimated t-statistic, until all coefficients are statistically different from 0 at 5% significance level.

The variables which are found relevant are: employment growth rate over 8 years, the share of employment in the agricultural and the services sector, average participation rate, change in educational attainment(-ve), level of innovation, level of investment, business birth rate, number of self-employed (-ve), the size of business indicators, and several dummy country variables.

This sign of the coefficient indicates how the variable correlates to resilience, a negative sign shows that the correlation is inverse: I.e. higher levels of the explanatory variable is correlated to lower resilience areas.

These are marginal changes so do not necessarily reflect the size and/or direction of the relationship noted in the descriptive analysis. The coefficients specifically relate to the model described with the other explanatory variables.

Dependent Variable: CRI				
Method: ML - Ordered Probit (Quadratic hill climbing)				
Date: 01/31/14 Time: 15:51				
Sample (adjusted): 2 274				
Included observations: 143 after adjustments				
Number of ordered indicator values: 4				
Convergence achieved after 17 iterations				
Covariance matrix computed using second derivatives				
Variable	Coefficier	Std. Error	z-Statistic	Prob.
CGR8_FTEE	286.50	50.15	5.71	0.00
CL_STR_ESAB	18.14	8.98	2.02	0.04
CL_STR_ESGS	10.98	3.39	3.24	0.00
CMA8_PR	0.14	0.05	2.92	0.00
CD4_EA	-0.21	0.09	-2.24	0.02
CL_INN	0.00	0.00	-3.99	0.00
CL_BR	0.26	0.10	2.50	0.01
CL_SE	-1.54	0.28	-5.43	0.00
CL_SB10	0.00	0.00	5.33	0.00
CL_SB59	0.00	0.00	-5.36	0.00
CL_SB14	0.00	0.00	4.94	0.00
CL_INV	0.00	0.00	3.88	0.00
DMY_7	-50.12	10.42	-4.81	0.00
DMY_18	22.08	3.75	5.89	0.00
DMY_23	-22.83	4.66	-4.90	0.00
DMY_2	17.23	2.93	5.88	0.00
DMY_1	8.68	1.51	5.77	0.00
	Limit Points			
LIMIT_2:C(18)	10.13	4.44	2.28	0.02
LIMIT_3:C(19)	18.69	5.14	3.64	0.00
LIMIT_4:C(20)	21.63	5.30	4.08	0.00
Pseudo R-squared	0.67	Akaike info criteric		1.15
Schwarz criterion	1.57	Log likelihood		-62.31
Hannan-Quinn criter.	1.32	Restr. log likelihoc		-188.75
LR statistic	252.86	Avg. log likelihood		-0.44
Prob(LR statistic)	0			

The limit points are also statistically different from 0. Pseudo R-squared is 67%.

Prediction Evaluation for Ordered Specification					
Equation: MOD24_13					
Date: 01/31/14 Time: 15:51					
		Estimated Equation			
Dep. Valu	Obs.	Correct	Incorrect	% Correct	% Incorrec
1	30	26	4	86.7	13.3
2	54	45	9	83.3	16.7
3	40	33	7	82.5	17.5
4	19	12	7	63.2	36.8
Total	143	116	27	81.1	18.9
		Constant Probability Spec.			
Dep. Valu	Obs.	Correct	Incorrect	% Correct	% Incorrec
1	30	0	30	0.0	100.0
2	54	54	0	100.0	0.0
3	40	0	40	0.0	100.0
4	19	0	19	0.0	100.0
Total	143	54	89	37.8	62.2
		Gain over Constant Prob. Spec.			
		Equation	Constant		
Dep. Valu	Obs.	% Incorrec	% Incorrec	Total Gain	Pct. Gain*
1	30	13	100	86.7	86.7
2	54	17	0	-16.7	
3	40	18	100	82.5	82.5
4	19	37	100	63.2	63.2
Total	143	19	62	43.4	69.7
*Change in "% Correct" from default (constant probability) spe					
**Percent of incorrect (default) prediction corrected by equati					

The percent of correctly predicted observations and the percent gain over the constant probability specification are high -81.8% and 69.7% respectively.

Variations

Whilst model 24 was the most predictive model, several variations of the initial specification were considered – for instance including the EU/Eurozone indicators or the geographical indicators (models 11-16). Among them, only some of the

geographical indicators were found relevant (East and South), for instance in model 12, but the overall prediction of the model is poor.

> Model 12 – initial set of variables: cgr8_FTEE, cl_UR, cl_PR, cl_EA, cl_STR_ESAB, cl_STR_ESF, cl_STR_ESGS, cd7_STR_ESAB, cd7_STR_ESF, cd7_STR_ESGS, cma7_UR, cd7_NM, cma8_PR, cd5_PR, cd7_ER, cd7_UR, cd4_EA, cl_e, cl_n, cl_s

Mod 12, results:

Dependent Variable: CRI				
Method: ML - Ordered Probit (Quadratic hill climbing)				
Date: 01/29/14 Time: 18:19				
Sample (adjusted): 2 311				
Included observations: 194 after adjustments				
Number of ordered indicator values: 4				
Convergence achieved after 6 iterations				
Covariance matrix computed using second derivatives				
Variable	Coefficier	Std. Error	z-Statistic	Prob.
CL_UR	-0.107	0.032	-3.350	0.001
CL_PR	-0.034	0.016	-2.123	0.034
CL_STR_ESAB	-7.006	1.902	-3.683	0.000
CD7_UR	0.112	0.038	2.938	0.003
CD4_EA	-0.182	0.043	-4.241	0.000
CL_E	-1.017	0.314	-3.239	0.001
CL_S	-1.683	0.274	-6.137	0.000
	Limit Points			
LIMIT_2:C(8)	-5.703	1.359	-4.197	0.000
LIMIT_3:C(9)	-4.064	1.340	-3.033	0.002
LIMIT_4:C(10)	-2.712	1.325	-2.047	0.041
Pseudo R-squared	0.241679	Akaike info criteric		2.045964
Schwarz criterion	2.21441	Log likelihood		-188.458
Hannan-Quinn criter.	2.114172	Restr. log likelihoc		-248.521
LR statistic	120.1244	Avg. log likelihood		-0.97144
Prob(LR statistic)	0			

		Estimated Equation			
Dep. Valu	Obs.	Correct	Incorrect	% Correct	% Incorrect
1	41	27	14	65.9	34.1
2	78	54	24	69.2	30.8
3	56	34	22	60.7	39.3
4	19	0	19	0.0	100.0
Total	194	115	79	59.3	40.7

		Constant Probability Spec.			
Dep. Valu	Obs.	Correct	Incorrect	% Correct	% Incorrect
1	41	0	41	0.0	100.0
2	78	78	0	100.0	0.0
3	56	0	56	0.0	100.0
4	19	0	19	0.0	100.0
Total	194	78	116	40.2	59.8

		Gain over Constant Prob. Spec.			
		Equation	Constant		
Dep. Valu	Obs.	% Incorrect	% Incorrect	Total Gain*	Pct. Gain**
1	41	34.1	100.0	65.9	65.9
2	78	30.8	0.0	-30.8	
3	56	39.3	100.0	60.7	60.7
4	19	100.0	100.0	0.0	0.0
Total	194	40.7	59.8	19.1	31.9

*Change in "% Correct" from default (constant probability) specification

**Percent of incorrect (default) prediction corrected by equation

Several other specifications were tried, using growth or difference over a different period (for instance using cd7_NM rather than cd6_NM), but the prediction of the model did not improve further.

Significant results were found for models 9,10,12,17,18,20,21 in addition to model 24.

Discrete ordered choice modelling: Emerging findings

The findings of the discrete ordered choice model show that it is possible to build a model from the explanatory variables which provides a statistically robust prediction

of which resilience category an area is likely to be in, though it does not show causality.

Building further from the descriptive analysis the best fit model contains the variables for:

- employment growth rate over 8 years,
- business birth rate,
- number of self-employed (-ve),
- the size of business indicators,
- average participation rate,
- the share of employment in the agricultural and the services sector,
- level of innovation,
- level of investment,
- change in educational attainment(-ve),

There are two things to note in particular; firstly many of these explanatory variables appear to work in the opposite direction to that indicated in the descriptive statistics. This is primarily due to the fact that this is a marginal impact model and the coefficients are only relevant when considered with all of the other variables in the equation.

The second factor is this high reliance on country dummy variables to fit the model. This would suggest that there are other factors beyond the explanatory variables that could be important for modelling resilience; these could be policy interventions as described elsewhere in the report.

Further Analysis

The analysis work conducted in this report looked at the relationship of a set group of variables that are available across the project geography and a specifically defined set of resilience variables.

In terms of making further improvements to understanding the factors that impact on an area's resilience, variations on the resilience variables might be tried. An example might be to take into account underlying trends in population and employment. Using evidence from the case studies and other areas of research might be used to create further geographic dummy variables, perhaps based on policy interventions, to see how they relate.

Furthermore research into changes on contiguous regions in different countries – especially when allocating variables only available at NUTS0 might offer further insight.

MODELLING COMPONENTS OF RESILIENCE: APPROACH 2

Introduction

This section outlines the results of a second statistical analysis undertaken to support examination of the economic resilience of regions across the EU as part of the wider ESPON research programme. The aim of the analysis is examine observed levels of economic resilience across the EU and consider what characteristics might explain observed levels of resilience and to quantify the relative contribution of these characteristics to our overall understanding of the characteristics associated with economic resilience. The key objectives of the analysis are as follows:

- What characteristics explain the observed resilience of regions?
- How strong is the explanatory power of particular characteristics?
- How large a part of observed differences in regional resilience is not explained by the variables identified?

The analysis is undertaken predominantly at the second level of the hierarchical NUTS classification (Nomenclature of territorial units for statistics), referred to as NUTS2. However, the level of geographical detail is ultimately driven by the availability of data and for some countries data is only available for broader geographical areas (e.g. data for Belgium utilised in this analysis is only available at the NUTS 1 level). However, in a large majority of cases, the data does relate to the second level of NUTS and therefore for ease of exposition we refer to the data as representing the NUTS2 regions of the EU. Data was derived from the Cambridge Econometrics database, supplemented with Eurostat data sources, and also draws on composite data sources such as the Innovation Union Scoreboard.

To undertake the analysis regions were classified according to whether they had resisted the crisis, recovered from the crisis or, by 2011, had still not regained pre-crisis peak employment levels. To create a large population size, regions which resisted the crisis and those that recovered were then grouped together.

Table 7.18 classifies NUTS2 regions in terms of their resilience to the economic crisis. Of the 281 NUTS2 regions included in the analysis, 34 resisted the effects of the economic crisis. An important limitation of the analysis is that the timespan over which economic data is available for these regions is limited. For a majority of indicators used in our analysis (both in terms of the available measures of economic activity and the variety of measures that will be used to understand how the characteristics of these regions relate to their observed levels of resilience), data is generally available up to 2011. Our assessments of whether or not a region has recovered from the economic crisis can therefore only be made with respect to the situation as observed in 2011. Many of the 185 NUTS2 regions that are observed to have not recovered from the economic crisis by 2011 may have recovered by 2012.

Table 7.18: Timing of the Economic Crisis

	Employment	GDP
Resilience		
Resisted the crisis	40	13
Recovered by 2011	63	85
Upturn - not yet recovered	89	145
No upturn - not yet recovered	93	32
	285	275
Timing of Peak of Economic Activity		
2003	1	
2004	2	
2005	1	2
2006	14	6
2007	49	114
2008	169	140
2009	5	
2010	5	

Table 7.18 also depicts the year associated with the peak in economic activity prior to the onset of the economic crisis and demonstrates that the timing of the economic crisis varied across different regions of the European Union. Among the 247 NUTS2 regions that did experience employment decline during the period of economic crisis, approximately two thirds of these area areas (155), examination of economic data reveals that the peak economic activity prior to the crisis occurred during 2008. For a further 53 NUTS2 areas, the peak in economic activity occurred a year earlier during 2007.

In terms of identifying the characteristics associated with economic resilience, data is used that is contemporaneous with the timing of the peak in economic activity; i.e. we examine the characteristics of these economies prior to the onset of the economic crisis. For a majority of areas, we therefore utilise data related to 2008. If data related to a particular characteristic is not available for a NUTS 2 area during the year identified as representing the peak in economic activity, data from 2007 (if available) is utilised as a default. This should ensure that the characteristics of these areas are being measured prior to the onset of the economic crisis.

Labour Market Characteristics Prior to the Crisis

Table 7.19a presents descriptive statistics for the characteristics of the economic cycle among 247 NUTS 2 areas that experienced employment loss during the economic crisis. These measures are presented for different groups of NUTS2 regions, classified according to three measures of the labour market characteristics; a) labour

market participation (i.e. the rate of economic activity); b) the rate of unemployment among the economically active population and c) the rate of employment among the economically active population. In each case, NUTS2 regions are classified according to the quartile of the distribution of NUTS2 regions in which they are located. Table 7.19b presents the same analysis based on areas that experienced GDP loss during the economic crisis.

Table 7.19a: Labour Market Characteristics, employment and the Economic Crisis

	Employment Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
Labour market participation					
1st quartile	-5.7	-2.0	1.3	2.7	27.5
2nd quartile	-4.8	-1.6	1.3	2.5	25.0
3rd quartile	-2.9	-1.2	1.4	2.2	47.1
4th quartile	-2.9	-1.6	1.6	2.0	47.7
Unemployment rate					
1st quartile	-2.2	-1.2	1.3	1.8	50.0
2nd quartile	-4.7	-1.9	1.7	2.5	35.1
3rd quartile	-5.3	-1.9	1.4	2.6	29.7
4th quartile	-4.3	-1.7	1.1	2.6	25.6
Employment Rate					
1st quartile	-3.5	-1.3	1.7	2.6	30.1
2nd quartile	-4.6	-1.8	1.6	2.4	30.8
3rd quartile	-4.3	-1.6	1.1	2.3	37.3
4th quartile	-4.5	-1.9	1.1	2.1	44.1
Total	-4.2	-1.7	1.4	2.4	36.0

In terms of labour market characteristics, it can be seen that NUTS2 regions characterised by high levels of participation (3rd and 4th quartile) experienced lower levels of employment loss and were more likely to prove resilient. Regions with higher rates of unemployment (4th quartile) were less likely to prove resilient, which is an intuitive result. Regions with low rates of employment (1st quartile) tended to experience slightly lower losses of employment but were less likely to prove resilient. In terms of GDP loss (Table 2b), the patterns are broadly repeated, although here the significance of the employment rate reverses, with regions with lower employment rates experiencing lower levels of GDP loss and were more likely to prove resilient.

Table 7.19b: Labour Market Characteristics, GDP and the Economic Crisis

	GDP Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
Labour market participation					
1st quartile	-9.2	-3.7	1.2	2.2	32.3
2nd quartile	-6.5	-4.0	1.3	1.8	28.0
3rd quartile	-5.7	-4.3	1.2	1.6	43.4
4th quartile	-6.0	-3.4	1.1	1.8	37.7
Unemployment rate					
1st quartile	-5.3	-3.8	1.1	1.5	39.0
2nd quartile	-7.5	-4.2	1.3	1.9	33.8
3rd quartile	-7.3	-3.9	1.3	1.9	36.6
4th quartile	-7.0	-3.6	1.1	2.0	30.2
Employment Rate					
1st quartile	-5.4	-3.2	1.1	1.7	40.0
2nd quartile	-7.7	-4.1	1.3	2.0	35.4
3rd quartile	-7.2	-4.5	1.3	1.8	27.1
4th quartile	-6.5	-3.9	1.1	1.7	37.1
missing	-1.8	-1.8	0.7	1.0	66.7
Total	-6.7	-3.9	1.2	1.8	35.5

Demographic Characteristics and the Economic Crisis

Table 7.20a presents descriptive statistics for the characteristics of the economic cycle for different groups of NUTS2 regions, classified according to the age structure of their respective populations, focussing upon the proportion of the population that is of a) school age, b) working age and c) elderly (it is acknowledged that there will differences in terms of the age cut-offs associated with compulsory education and retirement). Table 7.20b presents the same analysis based on areas that experienced GDP loss during the economic crisis.

From Table 7.20a, the significance of a low or high proportion of school age population is difficult to determine, higher proportions of working age adults does appear to be related to higher levels of employment loss though, with the proportion of resilient regions highest in areas which had neither the highest nor lowest proportions of working age adults. The significance of higher or lower proportions of elderly residents is also uncertain from the returns in Table 7.20a. There is a clear relationship between demographic structure and the loss of GDP during the crisis. In regions with lower levels of young persons and lower levels of working age population GDP losses were greater, by corollary, regions with higher levels of elderly populations tended to experience higher losses of GDP. However, the effect of demographic structure on the likelihood of a region's resilience was mixed.

Table 7.20a: Demographic Characteristics, employment and the Economic Crisis

	Employment Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
Under 15 years					
1st quartile	-5.5	-1.9	1.1	2.5	34.2
2nd quartile	-4.7	-1.8	1.5	2.4	44.0
3rd quartile	-2.8	-1.3	1.6	2.3	34.8
4th quartile	-3.9	-1.7	1.5	2.3	34.4
missing data	-3.4	-1.5	0.9	2.2	14.3
16-59 years					
1st quartile	-3.8	-1.7	1.6	2.3	30.9
2nd quartile	-2.9	-1.2	1.6	2.2	48.5
3rd quartile	-5.3	-1.9	1.3	2.4	47.0
4th quartile	-5.3	-1.9	1.1	2.7	25.0
missing data	-3.3	-1.5	0.9	2.1	13.6
Over 60 years					
1st quartile	-4.2	-1.6	1.4	2.5	35.7
2nd quartile	-4.5	-1.7	1.5	2.5	33.0
3rd quartile	-3.0	-1.4	1.2	1.9	60.8
4th quartile	-4.9	-2.0	1.6	2.4	27.3
missing data	-3.3	-1.5	0.9	2.1	13.6
Total	-4.2	-1.7	1.4	2.4	36.0

Table 7.20b: Demographic Characteristics, GDP and the Economic Crisis

	GDP Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
Under 15 years					
1st quartile	-8.2	-4.5	1.3	1.9	40.0
2nd quartile	-6.8	-4.2	1.2	1.7	38.1
3rd quartile	-5.9	-3.2	1.1	1.9	31.0
4th quartile	-5.2	-2.7	1.3	1.9	34.4
16-59 years	-6.7	-3.9	1.2	1.8	35.5
1st quartile	-7.8	-3.8	1.3	2.1	27.9
2nd quartile	-5.9	-3.7	1.2	1.7	37.5
3rd quartile	-6.5	-3.7	1.2	1.9	41.7
4th quartile	-6.6	-4.2	1.3	1.6	39.1
Over 60 years	-6.7	-3.9	1.2	1.8	35.5
1st quartile	-5.2	-3.0	1.1	1.7	44.3
2nd quartile	-6.7	-4.0	1.3	1.8	25.9
3rd quartile	-7.1	-4.1	1.2	1.9	45.3

4th quartile	-8.3	-4.4	1.3	2.0	33.3
Total	-6.7	-3.9	1.2	1.8	35.5

Industrial Composition of Employment and the Economic Crisis

Tables 7.21a and 7.21b present descriptive statistics for the characteristics of the economic cycle for different groups of NUTS2 regions, classified according to the industrial composition of the workforce, as measured by employment within areas of economic activity based upon an aggregation of NACE Rev 2 sections. Table 7.21a examines the relationship between industrial structure and employment change, Table 7.21b examines the relationship with GDP change.

The NUTS2 regions are distinguished in terms of the proportion of those in employment who are engaged in a) agriculture, b) manufacturing, c) construction and d) services.

Higher levels of employment in agriculture are associated with higher levels of employment loss and GDP loss. Similarly, concentrations of employment in construction were associated with a high level of employment loss, but had less impact on levels of GDP change. A concentration of employment in service sectors was associated with lower levels of employment loss and lower losses in GDP. No definitive pattern is discernable in the case of manufacturing.

Table 7.21a: Industrial Composition, Employment and the Economic Crisis

	Employment Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
% in agriculture					
1st quartile	-2.8	-1.4	1.4	2.1	53.6
2nd quartile	-2.8	-1.4	1.5	2.0	36.8
3rd quartile	-3.9	-1.6	1.3	2.3	25.0
4th quartile	-7.4	-2.4	1.3	3.1	18.2
% in manufacturing	-4.2	-1.7	1.4	2.4	36.0
1st quartile	-4.1	-1.8	1.2	2.2	31.9
2nd quartile	-4.2	-1.6	1.6	2.4	34.3
3rd quartile	-4.6	-1.7	1.5	2.5	35.3
4th quartile	-4.2	-1.6	1.4	2.4	32.8
% in construction	-4.2	-1.7	1.4	2.4	36.0
1st quartile	-3.0	-1.3	1.6	2.0	58.0
2nd quartile	-3.4	-1.6	1.8	2.3	38.8
3rd quartile	-3.1	-1.3	1.3	2.3	25.0
4th quartile	-7.2	-2.4	1.0	2.9	11.9

% in services	-4.2	-1.7	1.4	2.4	36.0
1st quartile	-7.4	-2.4	1.4	3.0	14.9
2nd quartile	-4.4	-1.6	1.2	2.4	35.3
3rd quartile	-2.6	-1.3	1.6	2.1	38.2
4th quartile	-2.7	-1.4	1.4	2.0	45.6
Total	-4.2	-1.7	1.4	2.4	36.0

Regions with lower levels of agricultural employment have proved more resilient to the crisis on the whole, as have regions with higher levels of service employment (including in the public sector). There is a very strong relationship between regions with lower levels of construction employment and their propensity to have resisted the crisis or recovered from its effects. The effects of manufacturing employment are more mixed, although regions with higher levels of manufacturing employment are more likely to prove resilient in their GDP performance.

Table 7.21b: Industrial Composition, GDP and the Economic Crisis

	GDP Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
% in agriculture					
1st quartile	-5.7	-3.5	1.1	1.7	40.8
2nd quartile	-6.3	-4.5	1.2	1.5	37.7
3rd quartile	-5.8	-3.6	1.2	1.8	36.8
4th quartile	-9.6	-4.1	1.3	2.3	24.2
% in manufacturing					
1st quartile	-7.1	-3.1	1.1	2.1	32.9
2nd quartile	-5.8	-3.4	1.2	1.8	34.8
3rd quartile	-7.0	-4.5	1.4	1.7	32.8
4th quartile	-7.2	-4.7	1.2	1.7	39.7
% in construction					
1st quartile	-6.4	-4.2	1.2	1.6	50.7
2nd quartile	-6.1	-3.6	1.2	1.8	32.9
3rd quartile	-6.8	-4.0	1.1	1.8	36.8
4th quartile	-7.7	-3.8	1.4	2.1	19.4
% in services					
1st quartile	-8.5	-4.0	1.2	2.1	31.8
2nd quartile	-7.5	-4.7	1.3	1.8	30.4
3rd quartile	-6.0	-3.7	1.2	1.7	34.8
4th quartile	-5.3	-3.3	1.1	1.7	42.9
Total	-6.7	-3.9	1.2	1.8	35.5

Migration, Accessibility and the Economic Crisis

Tables 7.22a and 7.22b present data on the characteristics of the economic cycle for different groups of NUTS2 regions, classified according to two measures of accessibility. The upper panel of each Table distinguishes between regions in terms of their levels of inward migration; the panel below their accessibility.

Net migration does not appear to have a marked effect on the likelihood of regions resisting or recovering from the economic crisis, nor on the level of employment loss experienced. Regions with higher levels of migration appear to have suffered the highest loss of employment, which is commensurate with the cooling of an over-heated economy which had been attractive to migrant labour. Whilst there is no strong pattern in terms of the role of net migration and the observed resilience of regions there is a strong apparent pattern regarding accessibility. More accessible regions experience lower levels of employment loss and are far more likely to have resisted or recovered from the effects of the crisis.

Table 7.22a: Migration, Accessibility, employment and the Economic Crisis

	Employment Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
Net migration (+ inward)					
1st quartile	-4.0	-1.5	1.6	2.5	37.5
2nd quartile	-4.1	-1.5	1.5	2.5	31.8
3rd quartile	-3.5	-1.6	1.5	2.0	45.2
4th quartile	-4.8	-1.6	1.2	2.6	33.3
Espon accessibility					
1st quartile	-7.4	-2.5	1.5	2.9	16.1
2nd quartile	-3.6	-1.5	1.4	2.5	24.6
3rd quartile	-2.8	-1.2	1.7	2.2	50.9
4th quartile	-1.4	-0.9	1.4	1.5	71.9
Total	-4.2	-1.7	1.4	2.4	36.0

With respect to GDP loss the findings are more substantive. Whilst there is no strong relationship between levels of migration and subsequent GDP loss, regions with low levels of net in-migration tend to have been more resilient to the crisis and those with high levels, less resilient. There is also a strong accord with levels of accessibility and resilience. More accessible regions are more likely to have resisted or recovered from the crisis.

Table 7.22b: Migration, Accessibility, GDP and the Economic Crisis

	GDP Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
Net migration (+ inward)					
1st quartile	-6.4	-4.2	1.2	1.7	41.3
2nd quartile	-8.2	-4.4	1.3	2.0	34.8
3rd quartile	-5.9	-3.5	1.1	1.7	38.1
4th quartile	-6.4	-3.4	1.1	2.0	24.1
Espon accessibility					
1st quartile	-7.4	-3.8	1.5	2.3	19.6
2nd quartile	-5.8	-3.7	1.2	1.7	36.8
3rd quartile	-5.6	-3.8	1.1	1.6	41.5
4th quartile	-5.3	-3.9	1.1	1.4	53.7
missing data					
Total	-6.7	-3.9	1.2	1.8	35.5

Education, Capital Investment and the Economic Crisis

This section considers how levels of education, capital and investment within a region relate to that regions experience of the economic crisis and its ability to recover from the economic crisis. Capital and investment is interpreted broadly, covering levels of investment in both physical and human capital. The top panel of Tables 7.23a and 7.23b considers human capital and the economic crisis. Levels of human capital held by the population of working age is measured in terms of the proportion of persons aged 25-64 who have educated to ISCED Levels 5 or 6 (i.e. that typically associated with the completion of a University degree or equivalent).

It can be seen that those areas with the lowest levels of human capital experienced the highest levels of employment loss and the largest rate of decline in employment. These regions also fair poorly in terms of their comparative performance and also, on average, experience the effects of the economic crisis over the longest duration. The next two indicators relate to levels of investment and capital per head. For those countries outside of the Eurozone, figures provided in national currencies have been converted to Euros based upon exchange rates that are contemporaneous with the timing of the peak in economic activity.

Overall, a higher proportion of population with higher levels of qualifications relates to lower employment losses, lower falls in levels of GDP and, broadly, a greater propensity to resist or recover from the crisis. Similarly higher levels of capital investment appear to be related to a lower levels of employment loss or GDP loss, but

the effect on resilience is not clear, partly due to high levels of missing data. Finally, whilst higher levels of investment per head of population does not seem to influence levels of employment loss, it does have a positive effect on the likelihood of region proving to have been resilient, although the effect in Table 6b is less clear.

Table 7.23a: Capital, Investment, employment and the Economic Crisis

	Employment Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
% Educated to ISCED5/6					
1st quartile	-4.1	-1.4	1.3	2.7	16.9
2nd quartile	-5.3	-1.8	1.4	2.6	35.4
3rd quartile	-3.4	-1.4	1.7	2.2	47.0
4th quartile	-3.5	-1.7	1.4	1.9	45.3
Investment per head (euro)					
1st quartile	-4.1	-1.5	1.9	2.9	27.7
2nd quartile	-4.5	-1.6	1.7	2.7	28.3
3rd quartile	-3.2	-1.3	1.2	2.0	54.2
4th quartile	-4.1	-1.6	1.0	2.2	47.8
Total	-4.2	-1.7	1.4	2.4	36.0

Table 7.23b: Capital, Investment, GDP and the Economic Crisis

	GDP Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
% Educated to ISCED5/6					
1st quartile	-7.8	-4.1	1.1	1.9	20.3
2nd quartile	-7.6	-3.8	1.2	1.9	42.9
3rd quartile	-5.7	-3.9	1.3	1.7	36.5
4th quartile	-5.9	-3.8	1.1	1.8	40.0
	-6.5	-3.9	1.3	1.6	42.3
Investment per head (euro)					
1st quartile	-6.1	-3.5	1.0	1.7	38.8
2nd quartile	-7.2	-3.4	1.1	2.1	24.5
3rd quartile	-7.8	-4.6	1.2	1.8	36.7
4th quartile	-7.0	-4.6	1.3	1.7	43.8
missing data	-5.9	-3.6	1.2	1.7	34.6
Total	-6.7	-3.9	1.2	1.8	35.5

Utilisation of Information Technology

Tables 7.24a and 7.24b present data on the characteristics of the economic cycle for different groups of NUTS2 regions, classified according to two measures that represent the utilisation of Information Technology. The upper panel distinguishes between regions in terms of the proportion of households that have access to broadband. It can be seen that those areas with the lowest levels of broadband access experienced larger employment losses and larger GDP losses as a result of the economic crisis. The lower panel distinguishes between NUTS2 area in terms of the proportion of adults who have never used a computer. Again, regions with higher proportions of population who had never used a computer tended to experience greater losses in employment and GDP. Whilst there appears to be a broadly positive relationship between access to broadband and regional resilience, this is not apparent in terms of the likelihood of using a computer.

Table 7.24a: Utilisation of Information Technology, Employment and the Economic Crisis

	Employment Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
% Households with broadband					
1st quartile	-5.8	-1.8	1.2	3.1	3.3
2nd quartile	-5.7	-2.1	1.4	2.7	12.5
3rd quartile	-2.4	-1.2	1.7	1.8	56.7
4th quartile	-2.0	-1.0	1.4	1.9	50.0
% Aged 16-74 who have never used a computer					
1st quartile	-2.6	-1.4	1.5	2.0	30.0
2nd quartile	-1.9	-1.0	1.4	1.7	60.0
3rd quartile	-6.6	-2.2	1.5	2.7	18.5
4th quartile	-5.8	-1.9	1.1	3.0	7.7
Total	-4.2	-1.7	1.4	2.4	36.0

Table 7.24b: Utilisation of Information Technology, GDP and the Economic Crisis

	GDP Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
% Households with broadband					
1st quartile	-7.4	-3.9	1.2	2.0	3.4
2nd quartile	-6.1	-3.9	1.3	2.0	13.3
3rd quartile	-5.3	-3.4	1.1	1.7	34.4
4th quartile	-4.6	-3.5	1.2	1.4	38.7

% Aged 16-74 who have never used a computer					
1st quartile	-4.5	-4.0	1.2	1.3	46.4
2nd quartile	-4.5	-3.5	1.0	1.4	52.0
3rd quartile	-6.2	-3.8	1.3	2.1	4.0
4th quartile	-7.5	-3.6	1.3	2.2	0.0
Total	-6.7	-3.9	1.2	1.8	34.7

Science, Technology and the Economic Crisis

Tables 7.25a and 7.25b present data on the characteristics of the economic cycle for different groups of NUTS2 regions, classified according to two measures that relate to the utilisation of science and technology in a region. The first measure relates to the level of employment in high-tech sectors (high-tech manufacturing and high-tech knowledge-intensive services). The second measure relates to the contribution of Research and Development to GDP (i.e. levels of R&D as a proportion of GDP). The final measure is referred to as the as the level of Human Resources devoted to Science and Technology (HRST)[11].

Table 7.25a: Utilisation of Science and Technology, employment and the Economic Crisis

	Employment Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
Employment in High Tech Sectors					
1st quartile	-7.1	-2.1	1.5	3.3	9.6
2nd quartile	-3.2	-1.3	1.7	2.2	34.0
3rd quartile	-3.0	-1.2	1.5	2.4	39.2
4th quartile	-2.5	-1.2	1.2	1.9	56.0
R&D as a % of GDP					
1st quartile	-5.5	-2.0	1.5	2.8	22.9
2nd quartile	-5.1	-1.6	1.6	3.0	16.2
3rd quartile	-5.5	-1.8	1.6	2.6	28.6
4th quartile	-2.9	-1.4	1.1	2.0	41.7
Human Resources in Science and Technology					
1st quartile	-6.7	-2.1	1.4	3.2	12.3
2nd quartile	-3.2	-1.2	1.4	2.5	33.8
3rd quartile	-3.6	-1.6	1.5	2.0	29.2
4th quartile	-2.2	-1.2	1.3	1.6	69.2
Total	-4.2	-1.7	1.4	2.4	36.0

[11] http://www.oecd.org/science/inno/2096025.pdf

The derivation of this measure is broad, encompassing the percentage of the economically active population who possess a qualification at ISCED levels 5 or 6, or those who are employed in Science and Technology occupations. It must therefore be acknowledged that this definition does not place any restrictions in terms of the subject area of qualification held. There is therefore a high degree of overlap between this measure and the attainment of qualifications to ISCED levels 5 or 6 discussed above.

It can be seen that in terms of how regions responded to the economic crisis, these three measures of the utilisation of science and technology in a region yield similar findings. Those areas with the lowest levels of utilisation of science and technology experienced both larger employment losses and higher rates of employment loss as a result of the economic crisis. However, the picture is less clear with respect to GDP. There is a strong positive relationship between regions with a strong science base and their propensity to resist or recover from the economic crisis.

Table 7.25b: Utilisation of Science and Technology, employment and the Economic Crisis

	GDP Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
Employment in High Tech Sectors					
1st quartile	-7.6	-3.3	1.3	2.3	13.7
2nd quartile	-5.6	-3.7	1.1	1.7	27.5
3rd quartile	-6.2	-4.3	1.2	1.6	30.0
4th quartile	-6.4	-4.2	1.1	1.6	51.1
R&D as a % of GDP					
1st quartile	-6.8	-3.5	1.2	1.8	41.5
2nd quartile	-6.1	-3.2	1.2	2.1	16.7
3rd quartile	-6.7	-4.1	1.1	1.8	20.0
4th quartile	-6.2	-3.9	1.1	1.8	40.5
Human Resources in Science and Technology					
1st quartile	-9.9	-4.0	1.2	2.4	20.6
2nd quartile	-5.8	-3.6	1.2	1.7	30.8
3rd quartile	-6.0	-4.0	1.3	1.8	31.3
4th quartile	-5.3	-4.0	1.0	1.5	58.6
Total	-6.7	-3.9	1.2	1.8	35.5

Income, Poverty and Economic Crisis

Tables 7.26a and 7.26b present data on the characteristics of the economic cycle for different groups of NUTS2 regions, classified according to two measures that household income within an area. The first measure is an absolute measure of income and relates to the level of disposable household income. The second measure relates to levels of disposable household income. For those countries outside of the Eurozone, figures provided in national currencies have been converted to Euros based upon exchange rates that are contemporaneous with the timing of the peak in economic activity. The second measure represents a relative measure of household income and refers to the proportion of households with income less than 60% of the regional median.

The final panel of Tables 7.26a and 7.26b distinguishes the NUTS2 regions according to whether or not they fall in to the Convergence or Competiveness areas of the European Union. It can be seen that the Convergence Areas exhibited larger declines on their levels of employment, larger rates of decline in these employment levels and felt the impact of the economic crisis over a longer duration. Those regions that were Phasing In or Phasing Out of the Convergence Area largely resembled the characteristics of those regions in the Convergence Area in terms of their response to the economic crisis. Relationships between income measures and the resilience of regions to the economic crisis are not straightforward to establish.

Table 7.26a: Income, competitiveness, employment and Economic Crisis

	Employment Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
Disposable Income per head					
1st quartile	-3.7	-1.4	1.6	2.5	38.8
2nd quartile	-6.4	-2.4	1.2	2.7	10.0
3rd quartile	-3.4	-1.5	1.7	2.4	32.7
4th quartile	-2.2	-1.1	1.4	1.8	67.3
% Beneath Poverty Threshhold	-4.2	-1.7	1.4		36.0
1st quartile	-3.0	-1.4	1.3	2.0	34.8
2nd quartile	-3.5	-1.5	1.2	2.3	44.9
3rd quartile	-3.0	-1.1	1.5	2.3	53.5
4th quartile	-6.3	-2.2	1.2	2.7	24.4
ESF Area	-4.2	-1.7	1.4		36.0
Convergence	-6.5	-2.1	1.4	3.0	16.0
Phasing In/Out	-5.6	-2.1	1.0	2.6	28.0
Competitiveness	-3.0	-1.4	1.5	2.1	45.2
Total	-4.2	-1.7	1.4	2.4	36.0

Table 7.26b: Income, competitiveness, GDP and Economic Crisis

	GDP Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
Disposable Income per head					
1st quartile	-6.3	-3.8	1.1	1.6	54.9
2nd quartile	-9.0	-4.2	1.3	2.3	15.7
3rd quartile	-5.7	-3.5	1.2	1.7	38.0
4th quartile	-5.7	-3.5	1.2	1.9	40.0
missing data	-6.8	-4.2	1.2	1.6	31.1
% Beneath Poverty Threshhold					
1st quartile	-5.4	-4.3	1.1	1.4	45.7
2nd quartile	-5.3	-3.4	1.3	1.8	43.2
3rd quartile	-5.7	-4.4	1.1	1.4	55.8
4th quartile	-7.1	-4.0	1.3	1.9	25.6
missing data	-8.1	-3.7	1.2	2.1	23.0
ESF Area					
Convergence	-8.9	-4.2	1.3	2.1	32.0
Phasing In/Out	-8.4	-4.4	1.2	2.0	20.0
Competitiveness	-5.6	-3.7	1.2	1.7	39.2
Total	-6.7	-3.9	1.2	1.8	35.5

Regional Innovation and Economic Crisis

Finally, Tables 7.27a and 7.27b consider how levels of regional innovation contribute to different responses to the economic crisis. The measure of innovation utilised is derived from the EU's Regional Innovation Monitor and distinguishes NUTS2 areas in terms of whether they are Leaders, Followers, Moderate or Modest. The analysis confirms that innovation can be regarded as a core component of how regions experienced the effects of the crisis. Those regions that are classified as leaders experienced the lowest levels of employment loss, the lowest rates of decline in employment levels, exhibited the highest levels of relative regional performance and experienced the effects of the economic crisis for the shortest duration. Unlike many of the measures discussed in the previous sections, these findings also translate in to intuitive findings with respect to regional resilience. Those regions classified as Leaders were also most likely to both resist the economic crisis (23%) and to recover from the crisis (72%). However, it is interesting to note the relatively superior performance of those regions in the 'Modest' category compared to those in the 'Moderate' group.

Table 7.27a: Regional Innovation, employment and Economic Crisis

Innovation Category	Employment Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
Leader	-1.5	-1.0	1.4	1.5	76.0
Follower	-3.3	-1.4	1.5	2.3	30.2
Moderator	-4.3	-1.6	1.3	2.7	13.3
Modest	-7.1	-2.4	1.3	3.1	14.3
Total	-4.0	-1.6	1.4	2.4	36.1

Table 7.27b: Regional Innovation, GDP and Economic Crisis

Innovation Category	GDP Loss	Rate of Decline	Comparative Performance	Duration of Impact	Resisted or Recovered from the Crisis
Leader	-5.6	-4.5	1.1	1.4	63.8
Follower	-5.6	-3.5	1.1	1.7	31.9
Moderator	-5.8	-3.5	1.3	2.0	13.3
Modest	-10.1	-3.9	1.2	2.5	27.9
Total	-6.6	-3.8	1.2	1.8	34.7

Identifying the Characteristics Associated with Resilience

The preceding analysis has illustrated some of the variations that exist between regions in terms of how they responded to the economic crisis (i.e. their decline in employment or the rate of this decline) and their levels of resilience to the economic crisis (i.e. did they resist the economic crisis and, if not, did they subsequently recover from the crisis) and how different characteristics of these regions contribute to the these responses. Such descriptive analysis is however not possible to determine the relative strength of these relationships.

To develop a better understanding of these issues, we employ multivariate statistical techniques that allow us to estimate the overall strength of any correlations. Results of multivariate analysis are summarised in Tables 7.28 and 7.29. The tables present the estimated explanatory power of the regression models. The analysis is based upon the data derived for the 281 NUTS2 areas as described above.

A common problem in undertaking multivariate based upon aggregate data (i.e. where explanatory variables in the model relate to the aggregate characteristics of an area) is that the results derived from such models can be sensitive to the choice of explanatory variables included. These issues arise due to problems of multi-colinearity (correlation between explanatory variables) combined with statistical models being

based upon a relatively limited number of data points (in the case, 281). The analysis is therefore undertaken in stages.

Separate statistical models are estimated in respect of the different groups of variables identified in the tables in the preceding section. So for example, under the Accessibility theme, 2 statistical models are estimated to examine how a) the rate of net migration and b) the index of accessibility contribute to our understanding of how regions responded to the economic crisis. Separate models are also estimated for a) each of the 4 measures of how regions were affected by the economic crisis (presented in Table 7.28) and for b) each of the 3 measures associated with measuring regional resilience (presented in Table 7.29).

The explanatory variables used in these models as groups of variables that account for the position of that area in the overall distribution of all NUTS2 areas in relation to a particular measure, as utilised by the preceding statistical analysis. So, for example, the model which examines how variations in the level of poverty contribute to observed levels of resilience includes 4 variables that identify which quartile of the poverty distribution that area appears in. The benefit of such an approach is that non-parametric relationships can be estimated; i.e. no particular functional form between poverty and resilience (e.g. linear, log linear, quadratic) is assumed at the outset.

The results presented in Table 7.28 are all derived from standard 'Ordinary Least Squares' regressions. The results presented in Table 7.29 are all derived from logistic regressions, a statistical technique used where the dependent variable being modelled is dichotomous (0/1). For example, the analysis models an area's likelihood of being classified as 'resilient' (=1) as opposed to 'not being resilient' (=0). The overall explanatory power of the regression is measured by its pseudo r-squared. It is not possible to make direct comparisons of the measures of explanatory power derived from the models presented in Table 7.28 and 7.29 due to the different techniques used. The purpose of the analyses is to make within Table comparisons of explanatory power to provide an indication as to which variables are most strongly correlated with the outcome variable being examined.

The results of the regression analysis are summarised in Tables 7.28 and 7.29 below. For each table, the regressions with the highest explanatory power are highlighted. It is noted that this selection is made to provide a broad picture of what regional characteristics are important to our understanding of response to the economic crisis. In terms of understanding response to the economic crisis, the characteristics deemed to be of most significance are: industrial composition, accessibility, computer use, human resources deployed in science and technology, employment in SET and regional innovation. In terms of understanding resilience to the economic crisis, the characteristics estimated to be of most significance are industrial composition, accessibility, access to broadband, research and development, disposable income per

head and regional innovation. The index for regional innovation has the highest explanatory power across nearly all regression models.

Table 7.28: Accounting for Response to Economic Crisis

	R-SQUARED				PSEUDO R-SQUARED
Title	**Employment Loss**	**Rate of Decline**	**Comparative Performance**	**Duration of Impact**	**Resisted or Recovered from the Crisis**
Age demographic	0.072	0.041	0.110	0.051	0.066
Industrial composition	0.413	0.246	0.167	0.181	0.169
Migration	0.017	0.053	0.025	0.049	0.010
Accessibility	0.235	0.174	0.065	0.140	0.162
Education	0.038	0.046	0.036	0.076	0.046
Capital	0.087	0.014	0.192	0.417	0.062
Investment	0.013	0.032	0.123	0.069	0.037
Broadband	0.087	0.052	0.026	0.097	0.100
Computer Use	0.096	0.051	0.020	0.083	0.062
Human Resources in Technology	0.154	0.104	0.055	0.163	0.076
R&D	0.056	0.015	0.037	0.093	0.043
SET Employment	0.162	0.100	0.014	0.214	0.133
Income per Hd	0.109	0.095	0.040	0.060	0.102
Risk of Poverty	0.071	0.051	0.031	0.036	0.031
Convergance Area	0.149	0.064	0.023	0.120	0.059
Innovation Category	0.291	0.251	0.007	0.209	0.213

Table 7.29: Accounting for the Resilience to Economic Crisis

	R-SQUARED				PSEUDO R-SQUARED
Title	**Employment Loss**	**Rate of Decline**	**Comparative Performance**	**Duration of Impact**	**Resisted or Recovered from the Crisis**
Age demographic	0.067	0.086	0.035	0.037	0.034
Industrial composition	0.136	0.104	0.060	0.170	0.051
Migration	0.034	0.026	0.014	0.022	0.014
Accessibility	0.113	0.008	0.069	0.117	0.047
Education	0.040	0.002	0.011	0.017	0.027
Capital	0.098	0.033	0.025	0.262	0.107
Investment	0.027	0.045	0.014	0.030	0.012
Broadband	0.057	0.010	0.008	0.042	0.089
Computer Use	0.064	0.005	0.013	0.086	0.059
Human Resources in Technology	0.030	0.020	0.008	0.078	0.071
R&D	0.007	0.019	0.003	0.017	0.046
SET Employment	0.147	0.003	0.017	0.120	0.059
Income per Hd	0.069	0.016	0.011	0.072	0.053
Risk of Poverty	0.072	0.018	0.012	0.103	0.055

Convergance Area	0.109	0.012	0.003	0.042	0.012
Innovation Category	0.171	0.035	0.023	0.174	0.103

MODELLING COMPONENTS OF RESILIENCE: APPROACH 3

The following approach examines the typological characteristics of areas associated with resilient outcomes. It also considers other key potential components of resilience, particularly the significance of economic structure and propensity for innovation. The analysis of territorial typologies is based on the observed resilience of regions at the NUTS 3 territorial scale, and uses the territorial classifications of DG Regio and the ESPON programme.

The analysis of economic structure and innovation is undertaken at the NUTS 2 territorial scale. Data for sectoral employment taken from the Cambridge Econometrics database is used to assess the significance of economic structure. Data is divided into 10 sectors. Propensity for innovation is based on the regional typology contained in the Regional Innovation Scoreboard (2012) produced by the European Commission.

NUTS 2 regions were categorised for resilience as follows:

Resilience	***Freq.***	***Percent***
Resistant (RS)	32	11.51
Recovered (RC)	68	24.46
Not Recovered1 (NR1)	87	31.29
Not Recovered2 (NR2)	91	32.73
Total	278	100

Note: Resistant means no recession was experienced (positive value is recorded); recovered means that the pre-recession employment level has been reached; not recovered 1 means that the trough of the recession has been reached but the level of employment is yet to return to pre-recession levels; not recovered 2 means that the trough of the recession is yet to be reached (up to year 2011 in our dataset).

NUTS 3 regions were categorised for resilience as follows:

Resilience	***Freq.***	***Percent***
Resistant (RS)	214	16.19
Recovered (RC)	314	23.75
Not Recovered1 (NR1)	364	27.53
Not Recovered2 (NR2)	430	32.53
Total	1322	100

Cross-tabulations of Resilience by territorial type

A cross-tabulation was undertaken to examine the frequency with which different territorial categories were represented within each Resilience category. The eight regional 'types' are set out below, with associated coding.

Urban/Rural Typology. 'Urbrur'. Codes:

1: predominantly urban;
21: intermediate region, close to a city;
22: remote intermediate region;
31: predominantly rural region, close to a city;
32: remote predominantly rural region.

Metropolitan Typology. 'Metro'. Codes

0: nonmetro: other regions;
1: capital city region;
2: second tier metro region;
3: smaller tier metro region.

Border_B Typology. 'Border_B'. Codes

0: other regions;
1: internal borders programmes (regions located on borders between EU member states/ European Free Trade Area (EFTA) countries);
10: external borders programmes (regions participate in programmes involving countries outside of EU member states or EFTA);
11: internal and external borders programmes.

Mountain Typology. 'Mountains'. Codes

0: other regions;
1: regions with >50% of their population living in mountain areas.
2: regions with > 50% surface area covered by mountain areas;
3: regions with > 50% surface area covered by mountain areas and > 50% of their population living in mountain areas.

Coastal Typology. 'coastal'. Codes

0: other regions;
1: coastal region with low share of coastal population;
2: coastal region with medium share of coastal population;
3: coastal region with high share of coastal population;
4: coastal region with very high share of coastal population.

Industry Transition Typology. 'indtrans' Codes

0: area not covered by typology
1: region with industrial branches losing importance;

2: region with industrial branches gaining importance;
3: region with internal industrial structural change.

Innovation Typology. Codes

1: leader;
2: follower;
3: moderator;
4: modest innovation.

Convergence Typology. Codes

0: competitiveness and employment;
1: convergence;
2: phasing in/ out.

Results

The table below show the frequency of the typologies noting the number of NUTS regions classified by type.

NUTS 3 analysis

urbrur	RS	RC	NR1	NR2	Total
1	4.01	7.87	6.58	4.99	23.45
21	7.79	8.55	9.68	10.44	36.46
22	0	0.23	0.53	0.68	1.44
31	4.16	6.05	7.11	8.85	26.17
32	0.23	1.06	3.63	7.56	12.48
metro					
0	7.34	13.54	17.25	24.05	62.18
1	1.21	2.34	1.51	1.44	6.51
2	3.03	2.65	3.25	2.34	11.27
3	4.61	5.22	5.52	4.69	20.05
border_B					
0	11.27	14.6	14.45	17.02	57.34
1	4.31	8.7	9.46	10.29	32.75
10	0.23	0.23	1.74	2.57	4.77
11	0.38	0.23	1.89	2.65	5.14
mountains					
0	14.98	18.61	21.03	19.89	74.51
1	0.15	0.08	0	0	0.23
2	0.53	2.27	3.56	6.05	12.41
3	0.53	2.8	2.95	6.58	12.86

coastal					
0	14.15	18.91	16.79	19.52	69.36
1	0.15	0.53	1.51	2.12	4.31
2	0.38	0.61	1.82	1.51	4.31
3	0.61	1.06	2.57	2.42	6.66
4	0.91	2.65	4.84	6.96	15.36
indtrans					
0	5.37	7.72	9.91	14.45	37.44
1	7.79	12.41	14.45	12.63	47.28
2	0.83	0.61	0.68	1.51	3.63
3	2.19	3.03	2.5	3.93	11.65
Total	*16.19*	*23.75*	*27.53*	*32.53*	*100*

Key: % amounts from 1322 regions. Total at end refers to each block.

NUTS 2 analysis

	RS	RC	NR1	NR2	Total
innovation					
1	6.12	12.23	5.04	1.44	24.82
2	2.52	8.63	11.51	11.87	34.53
3	0.36	2.16	7.55	6.47	16.55
4	2.52	1.44	7.19	12.95	24.1
convergence					
0	7.91	20.5	18.71	12.95	60.07
1	2.88	2.16	10.43	14.39	29.86
2	0.72	1.8	2.16	5.4	10.07
Total	*11.51*	*24.46*	*31.29*	*32.73*	*100*

Key: % amounts from 278 regions. Total at end refers to each block.

Economic structure

The project has also examined the significance of economic structure on resilience outcomes using 10-sector employment data. The table below demonstrates the wide range in concentrations of employment in the individual sectors, plus changes in sectoral share in the lead up to the economic crisis (taking the period 1997-2007 for reference purposes).

Sectoral Shares for 278 NUTS 2 regions in 2007 (10 year change: 2007-1997)

Sector Shares 2007	***Mean***	***Std.Dev.***	***Min***	***Max***
Agriculture	0.0620864	.0752818	.0005426	.4806828
Industry	0.1686988	.0717564	.0198423	.3770956
Construction	0.0794728	.0246523	.0293192	.1664889
Retail & Wholesale	0.2415546	.0431654	.1193434	.4865288

Info &Communication	0.021665	.0112914	.0015355	.0767185
Financial Services	0.0742523	.033597	.0096208	.2303391
Real Estate Activities	0.0077093	.0050016	.0002513	.0487447
Professional, Scientific	0.0479293	.0225873	.0048552	.1358333
Public Administration	0.2480488	.0609496	.1028554	.4893439
Arts & Leisure	0.0485831	.0152148	.0156427	.0982095
10 year change in sector shares:				
Agriculture	-0.2901825	.1700789	-.7770587	.653951
Industry	-0.1388581	.1599237	-.4571385	.5937891
Construction	0.1439415	.2965677	-.5369374	1.299896
Retail&Wholesale	0.0469629	.1225264	-.2558008	.6119453
Info&Communication	0.0557463	.1325206	-.2554713	.7011037
Financial Services	0.2773026	.209958	-.2130206	1.124667
Real Estate Activities	0.2645458	.2263891	-.2390272	1.149813
Professional, Scientific	0.2845808	.2105324	-.2130205	1.124777
Public Administration	0.0826629	.1337659	-.2418894	.6670163
Arts & Leisure	0.0862966	.1366296	-.24189	.667018
2006 Population	900.007	876.3588	14.457	8999.129

Cross-tabulation of changing shares of sectoral employment does not demonstrate any significant relationship with observed resilience to the economic crisis. The results are swamped by the structural transformations in the economy at this time as employment shares shift from industry (and agriculture) towards service based employment sectors.

Cross-tabulations by resilience for Changing Share of Industry over last 10 years:

	Resilience					Pearson chi2(3)
Agriculture:	**RS**	**RC**	**NR1**	**NR2**	**Total**	
Decreasing	11.51	23.74	30.22	31.65	97.12	1.1076
Increasing	0	0.72	1.08	1.08	2.88	0.775
Industry:						
Decreasing	9.35	23.02	26.98	25.9	85.25	7.4424
Increasing	2.16	1.44	4.32	6.83	14.75	0.059
Construction:						
Decreasing	7.19	11.51	8.27	4.32	31.29	37.1843
Increasing	4.32	12.95	23.02	28.42	68.71	0
Retail & Wholesale:						
Decreasing	2.88	11.51	12.95	8.27	35.61	10.9603
Increasing	8.63	12.95	18.35	24.46	64.39	0.012
Info&Communication:						
Decreasing	2.52	11.15	11.87	8.63	34.17	9.0975
Increasing	8.99	13.31	19.42	24.1	65.83	0.028
Financial Services:						
Decreasing	0.72	1.8	0.72	1.8	5.04	2.2649
Increasing	10.79	22.66	30.58	30.94	94.96	0.519
Real Estate Activities:						

Decreasing	1.8	3.24	1.44	1.8	8.27	6.9599
Increasing	9.71	21.22	29.86	30.94	91.73	0.073
Professional, Scientific:						
Decreasing	0.72	1.8	0.72	1.44	4.68	2.39
Increasing	10.79	22.66	30.58	31.29	95.32	0.496
Public Administration:						
Decreasing	1.08	4.68	9.71	7.91	23.38	7.0708
Increasing	10.43	19.78	21.58	24.82	76.62	0.07
Arts & Leisure:						
Decreasing	1.44	4.68	7.91	8.27	22.3	3.0837
Increasing	10.07	19.78	23.38	24.46	77.7	0.379
Total	11.51	24.46	31.29	32.73	100	

Cell Key: cell percentage; Pearson chi2 statistic in right hand column with 3 degrees of freedom.

Analysis of the significance of sectoral employment demonstrates some notable dimensions, which merit further detailed analysis. Overall, the sectoral effects are clearer where the sectors are better defined (such as Construction, Financial Services and Information and Communications). The following analysis takes the original cross-tabulations and then manipulates them to take into account the greater number of non-recovered regions, and the different number of regions across the respective employment bands. Employment bands reflect total employment share within individual regions. Each sector is independent of each other, so comparisons cannot be made across sectors. Table 1 contains the initial cross-tabulation results. Relative importance is set out in Table 2, where scores greater than 1 indicate a greater than expected number of regions in that category, scores of less than one indicate a lower than expected incidence.

Table 1

		Resilience			
Agriculture:	**RS**	**RC**	**NR1**	**NR2**	**Total**
x1<0.02	4.32	10.79	6.12	6.83	28.06
0.02<x2<0.05	3.96	8.63	14.75	7.91	35.25
0.05<x3< 0.1	1.08	4.68	6.47	7.55	19.78
x4>0.1	2.16	0.36	3.96	10.43	16.91
Industry:					
x1<0.1	1.08	6.12	5.4	6.47	19.06
0.1<x2<0.15	3.24	4.32	9.35	7.19	24.1
0.15<x3< 0.2	3.96	7.91	5.4	10.79	28.06
x4>0.2	3.24	6.12	11.15	8.27	28.78
Construction:					
x1<0.06	5.76	7.19	2.88	1.8	17.63
0.06<x2<0.08	3.6	11.87	16.55	15.11	47.12
0.08<x3< 0.1	1.8	4.32	9.71	5.4	21.22
x4>0.1	0.36	1.08	2.16	10.43	14.03
Retail & Wholesale:					
x1<0.21	2.52	3.24	7.55	6.12	19.42

0.21<x2<0.24	3.6	7.91	11.15	7.91	30.58
0.24<x3< 0.27	2.88	8.63	9.71	10.07	31.29
x4>0.27	2.52	4.68	2.88	8.63	18.71
Info&Communication:					
x1<0.01	1.44	2.16	3.6	10.43	17.63
0.01<x2<0.02	1.8	6.12	8.63	7.91	24.46
0.02<x3< 0.03	6.47	9.71	13.67	10.07	39.93
x4>0.03	1.8	6.47	5.4	4.32	17.99
Financial Services:					
x1<0.05	1.44	1.8	6.47	12.59	22.3
0.05<x2<0.07	2.52	5.4	9.35	9.35	26.62
0.07<x3< 0.1	3.6	11.51	9.35	7.55	32.01
x4>0.1	3.96	5.76	6.12	3.24	19.06
Real Estate Activities:					
x1<0.005	2.52	3.6	9.71	11.87	27.7
0.005<x2<0.0075	2.52	3.6	8.99	7.91	23.02
0.0075<x3< 0.01	3.24	6.83	4.68	6.47	21.22
x4>0.01	3.24	10.43	7.91	6.47	28.06
Professional, Scientific:					
x1<0.02	1.44	0.36	2.52	5.04	9.35
0.02<x2<0.04	2.16	4.32	8.27	14.03	28.78
0.04<x3< 0.06	3.24	11.51	13.31	10.43	38.49
x4>0.06	4.68	8.27	7.19	3.24	23.38
Public Administration:					
x1<0.2	1.8	2.16	8.63	8.27	20.86
0.2<x2<0.25	5.4	10.43	5.76	12.95	34.53
0.25<x3< 0.3	3.24	5.4	10.79	6.12	25.54
x4>0.3	1.08	6.47	6.12	5.4	19.06
Arts & Leisure:					
x1<0.04	3.96	3.24	8.99	9.71	25.9
0.04<x2<0.05	3.6	7.55	7.19	12.95	31.29
0.05<x3< 0.06	2.88	8.27	5.76	4.68	21.58
x4>0.06	1.08	5.4	9.35	5.4	21.22
Total	**11.51**	**24.46**	**31.29**	**32.73**	**100**

Key: x1, x2, x3 and x4 are 4 groups of shares of employment.

Table 2

Agriculture:	RS	RC	NR1	NR2
x1<0.02	1.34	1.57	0.70	0.74
0.02<x2<0.05	0.98	1.00	1.34	0.69
0.05<x3< 0.1	0.47	0.97	1.05	1.17
x4>0.1	1.11	0.09	0.75	1.88
Industry:				
x1<0.1	0.49	1.31	0.91	1.04
0.1<x2<0.15	1.17	0.73	1.24	0.91
0.15<x3< 0.2	1.23	1.15	0.62	1.17
x4>0.2	0.98	0.87	1.24	0.88

Construction:				
x1<0.06	2.84	1.67	0.52	0.31
0.06<x2<0.08	0.66	1.03	1.12	0.98
0.08<x3< 0.1	0.74	0.83	1.46	0.78
x4>0.1	0.22	0.31	0.49	2.27
Retail & Wholesale:				
x1<0.21	1.13	0.68	1.24	0.96
0.21<x2<0.24	1.02	1.06	1.17	0.79
0.24<x3< 0.27	0.80	1.13	0.99	0.98
x4>0.27	1.17	1.02	0.49	1.41
Info&Communication:				
x1<0.01	0.71	0.50	0.65	1.81
0.01<x2<0.02	0.64	1.02	1.13	0.99
0.02<x3< 0.03	1.41	0.99	1.09	0.77
x4>0.03	0.87	1.47	0.96	0.73
Financial Services:				
x1<0.05	0.56	0.33	0.93	1.72
0.05<x2<0.07	0.82	0.83	1.12	1.07
0.07<x3< 0.1	0.98	1.47	0.93	0.72
x4>0.1	1.81	1.24	1.03	0.52
Real Estate Activities:				
x1<0.005	0.79	0.53	1.12	1.31
0.005<x2<0.0075	0.95	0.64	1.25	1.05
0.0075<x3< 0.01	1.33	1.32	0.70	0.93
x4>0.01	1.00	1.52	0.90	0.70
Professional, Scientific:				
x1<0.02	1.34	0.16	0.86	1.65
0.02<x2<0.04	0.65	0.61	0.92	1.49
0.04<x3< 0.06	0.73	1.22	1.11	0.83
x4>0.06	1.74	1.45	0.98	0.42
Public Administration:				
x1<0.2	0.75	0.42	1.32	1.21
0.2<x2<0.25	1.36	1.23	0.53	1.15
0.25<x3< 0.3	1.10	0.86	1.35	0.73
x4>0.3	0.49	1.39	1.03	0.87
Arts & Leisure:				
x1<0.04	1.33	0.51	1.11	1.15
0.04<x2<0.05	1.00	0.99	0.73	1.26
0.05<x3< 0.06	1.16	1.57	0.85	0.66
x4>0.06	0.44	1.04	1.41	0.78
Total	**11.51**	**24.46**	**31.29**	**32.73**

Regions with lower levels of agricultural activity tend to be more resilient, perhaps echoing the stronger level of resilience observed for urban areas. However, regions with the strongest proportion of agricultural employment were both more likely to be found in category NR2 and RS, suggesting that in some cases deep rural attributes

may have provided a degree of resistance to the crisis. However, where the crisis has affected agricultural regions they are far less likely to have recovered.

The picture for industry is mixed and requires further exploration. In contrast there is a clear relationship between the share of construction employment and resilience outcomes. Regions with very low shares were more likely to resist or recover from the crisis, whilst those with very high shares were more likely to have not recovered and still be experiencing downturn.

The relationship between retail and wholesale employment shares and observed levels of resilience are unclear. One suggestion is that local domestic market conditions are the determining factor here, with performance reflecting this rather than wider sectoral trends.

There is a strong relationship visible between employment shares in Information and Communications, Financial Services and Real Estate and the resilience of the economy. High employment shares are associated with Resistant and Recovered regions. Low shares with Non-recovered regions. There is a similar picture also for Professional and Scientific shares, although here an important exception is found where very low shares of employment are also associated with Resistant economies. There may be a link here with the results for agricultural shares, which merits further exploration.

The results in the case of Public Administration and Arts and Leisure are both quite varied. In the former case this may be due to both the nature of the crisis and the breadth of the category. In the case of the latter it is more likely that performance is due to a dependence on domestic market conditions, rather than sector specific trends.

8 ASSESSING THE COMPONENTS OF RESILIENCE: QUALITATIVE ANALYSIS

In our conception of the potential features that influence resilience to economic shocks we highlighted the possible role of four main components:

- Businesses and the business environment
- People and the population
- Place-based characteristics, and
- Community, or societal, characteristics

In the following section we draw on our qualitative research to identify what features under each of these headings have influenced levels of observed resilience across the ESPON territory. The evidence based is provided by the eight case studies undertaken for the study, plus a selected wider literature.

We conclude this section with a consideration of two specific themes. The first is a separate analysis of the role green development pathways have played in economic resilience, and how the crisis has affected the significance attached to such economic transformation activities. The Terms of Reference for the study specifically requested that one or more of the case studies should inform an understanding of this theme.

8.1 Business Components

Our case studies have provided a rich source of qualitative data on the components which have influenced their resilience to the crisis. Here we summarise the key business components that have been seen as important.

8.1.1 Sectoral Structure and Diversity

The sectoral composition of our case study economies appears to have had an important influence on the resilience of particular regions. The decline in the construction sector is particularly marked, with considerable implications for regions where this was a significant component of economic activity (e.g. Puglia, Italy, which was badly affected by the collapse of the residential market and delays in the implementation of infrastructure projects). The impact of the crisis in Puglia was also exacerbated by its high dependence upon other sectors which were deeply impacted by the economic crisis, notably steel production and agriculture. Regions which had a greater dependence on the public sector were initially shielded from the worst effects of the crisis. However, since 2011 and the widespread development of austerity measures, such regions have also been much less resilient.

There is evidence that those regions with stronger exposure to high-tech, knowledge intensive industries, as well as niche production sectors and those less exposed to cyclical economic cycles (such as health and education), have experienced greater

resilience. Thus, for example, places such as Freiburg in Baden-Württemberg enjoyed greater resilience due to the strong role of the service sector with its focus on local demand. Niche production sectors such as furniture and clothing proved particularly robust in Salento, Puglia owing to their strong markets less vulnerable to changes in demand and their strong, differentiated product brands. Health and education have provided an importance source of stability in Pomorskie, Poland.

It is those regions which have mono-functional economies, or a reliance on a limited number of key employers, which have appear to have been more adversely affected by the economic crisis. In Western Macedonia, Greece, for example, the severe shrinkage experienced in the investment and employment provided by the region's powerful public energy corporation (DEI), has had a severe impact on the region. DEI responded to the crisis with a drastic reduction of salaries and wages and due to the fact that DEI is the major employer in the region, there was an immediate negative multiplier effect upon many SMEs servicing local consumption. Similar vulnerability is evident in Uusimaa, Finland owing to the significance and size of the Nokia cluster, whilst mono-functional towns in parts of Estonia have also fared less well than other parts of the region. Where regions are dependent upon sectors which are currently strong (such as Stuttgart's dependence upon the car industry), there is recognition that this may provide for future vulnerability without accelerated adaptation towards electric engine technologies. Wales continues to suffer from an earlier prior dependence upon a limited set of heavy and extractive industries notably coal, steel and iron, and a more recent dependence upon the public sector.

It follows that case study regions with more diversity in their economic structures have generally exhibited greater resilience. Diversity has a number of features and benefits. Diversity of economic activities across a range of sectors and markets reduces vulnerability to crisis in one of these sectors. Both Estonia and Pomorskie appear to have benefited from the lack of dominance of sectors such as construction which were badly hit by the recent crisis, and by having a relative balance across export-oriented and domestically-oriented activities.

There is also evidence in our case studies that diversity can create positive opportunities for synergy. In other words, where there is variety, each business sector or type is more like to be able to offer something distinctive which, when dovetailed with the offerings of others, adds up to a better overall product / business offer. This is evident in Puglia where those areas that have managed to forge related diversity through strong inter-sectoral linkages appear to have performed economically better than where they have not. One example of this phenomenon is in the Lecce province which enjoys relatively high concentrations of activity in agricultural production, niche industries and tourism, where economic activities have a mutually reinforcing effect (e.g. the tourism sector benefits the agri-food sector and vice versa). Similarly, regions which have a diversity of types of specialised cluster also appear to have demonstrated greater resilience. For example, the Pomorskie region has benefited

from having a range of clusters in construction, food, maritime, IT, tourism and others. The strong interconnectivity of firms in these clusters helps them to keep functioning through a crisis. Moreover, the geographical spread of these clusters across both the metropolitan area of the region and its more peripheral areas, increases the modularity of the region's spatial structure. There is also evidence from this case study that firm size diversity also promotes resilience, with the region reportedly benefiting from a lack of dependence on a few large employers.

There is also evidence from our case studies that where sectoral diversity is accompanied by (or perhaps leads to) export diversity, resilience is also strengthened. The Pomorksie region of Poland, for example, has enjoyed relative economic stability in recent years owing to its relatively high level of international openness and export diversity with 30% of its exports being to non-EU countries. A similar story is evident in Uusimaa where export diversity has increased since the late 1990s both in terms of the nature of goods exported and the diversity of markets, with reduced dependence on Russian markets regarded as provided for greater resilience. Other case studies, notably South West Ireland, Estonia and Baden-Württemberg, also demonstrate the value of greater diversity within sectors towards internationally traded services. In contrast, other case studies such as Wales demonstrate the drawbacks of more limited sectoral and export diversity.

It is also worth noting that there is some evidence that diversification can be actively supported by policy-makers. In Baden-Württemberg, for example, policy-makers worked with key industrial sectors through the 1990s to encourage the search for diversified business opportunities and markets, and the development of related knowledge-based and internationally traded services. In this regard, it has learnt the lessons from previous crises and recognised the importance of internationalising supply chains, diversifying export markets and increasing their service activities.

8.1.2 Innovation and Entrepreneurship

A number of case study regions provide evidence supporting the importance of strong investment in R&D and innovation during crisis. This was particularly evident in Baden-Württemberg where the crisis was regarded by many businesses as an opportunity to improve efficiency and build for recovery. For the majority of industrial firms here, investments in R&D and product and process innovations were an important tool to reach more strength after the crisis. Rationalisation and cost cutting strategies were particularly focused on procurement and process organisation, while R&D was only rarely focused on cost reduction. Therefore, many firms were able to use the crisis as a process to increase efficiency and to become more competitive during the recovery period.

In contrast to previous crises in the 1990s, industrial firms tried to prevent dis-investments in R&D and innovation capacities or even strengthened these segments to

keep their global competitiveness. These activities became an important source of the region's fast recovery. Moreover, the already excellent public research infrastructure with a strong focus on applied research was extended during the crisis. There is also evidence that in Estonia, the crisis acted as a positive spur to organisational and process innovation. In weaker performing regions such as Wales and Western Macedonia, the lack of indigenous R&D facilities and large-scale knowledge-based sectors has been regarded as problematic.

Our case studies found much less evidence regarding the role of entrepreneurial attitudes in resilience although it was reported as being important in Pomorskie. In some regions such as South West Ireland it was also seen as a possible response mechanism to the crisis providing small-scale employment opportunities.

8.1.3 Export orientation and foreign investment

As already indicated, our cases study evidence suggests that regional with a stronger export orientation and greater international openness have tended to exhibit greater resilience through the crisis, although export exposure can also have some negative effects. In Baden-Württemberg, for example, the strong focus on export-oriented industries made the firms, in particular the bigger firms, and region initially more vulnerable when the crisis hit, but these firms were also the first ones to profit from the recovery and increasing demand from China and other emerging markets. Export growth also helped fuel Puglia's recovery from the crisis and tourism seemed to provide a source of resilience to parts of the region such as Salento.

Key to the relatively strong performance of manufacturing industries in the South West of Ireland, particularly around the Cork metropolitan region, has been a high level of foreign investment over the past two decades or so. The South West region is the European base for numerous global pharmaceutical, technological and service based industries, demonstrating the importance of the international trade within the manufacturing industry within this region. These industries experienced higher rates of employment creation and lower levels of employment losses than experienced elsewhere owing to the availability of a skilled and well-educated labour force, plus access to good infrastructure, facilities and services. The strong share of foreign investment in the region is also reported to have encouraged stronger performance within the wider economy as a whole, including spinouts from major employers. Similar evidence is found in Harju County, Estonia where foreign-owned companies performed better through the crisis owing to their capacity to access other sources of finance and their ability to draw on broader resources to renegotiate contracts and adapt more flexibly to changed economic circumstances. The Wales case study, in contrast, illustrates the long-standing weaknesses that may ensure where historical dependence upon foreign investment and capital weakens the ecology of indigenous business supply chains and export capacity.

8.1.4 Business Strategies

Finally, our case studies also shed some light on the importance of particular business strategies in coping with and responding to the crisis. In certain case studies, there is strong evidence of the importance of learning from the effects of previous crisis in the development of effective strategic responses to this crisis. In Stuttgart in particular, the reactions by many firms in the region to the 2008 crisis were shaped by their previous experiences and helped create the strong imperative to keep human capital inside firms to avoid skill shortages in the recovery period. Firms here and in the wider Baden-Württemberg region also appear to have learnt from previous crisis experiences and developed a strong focus on self-financial strategies and innovation through the crisis as a means of preparing for the future. Firms here also have accepted the existence of vulnerabilities due to the volatility of markets and developed adjustment strategies which accordingly build this in. This is particularly demonstrated by the tendency for firms in the region to innovate in the search for new sources of credit and finance.

The financial crisis with its impact on banks – in Germany in particular on some regional public banks and specialised private banks – had negative effects on credit supply. Many SMEs, however, were better prepared than in former crises, as they were able to increase their private equity ratios during boom periods before this crisis hit. In this regard they have learnt from previous crises and increased their private equity ratios to meet the standards of the banking sector, but also to cope with the volatility of markets. For firms in severe danger of insolvency, bigger customers or family firm owners of other regional industrial firms offered short-term guarantees and loans. Besides motivations to keep important parts in the value chain, the relatively low interest level during the financial crisis created incentives for this engagement as an alternative to other financial investments.

Overall, self-financing based on cash flows became even more important during the financial crisis for German industrial firms. This is also evident in Pomorskie where experience from previous crises also taught Polish entrepreneurs to build up their own financial resources to provide buffer for crises. Here firms also benefited from business strategies based upon high rates of private sector investment which seemed to help productivity grow faster than wages, thus helping keep costs down. Firms in Uusimaa in Finland also appear to have learnt from the 1990s crisis and developed stronger levels of capitalisation in the boom period which provided greater financial buffers to help them through the recent crisis. The risks of reliance on overseas sources of credit as a potential source of contagion was highlighted in the case of Estonia, where firms were adversely affected by the withdrawal of credit lines by nordic banks.

Other case studies indicate the very different business strategies and crisis responses that often exist by different firms according to their overall objectives. Thus, whilst in

many of the regions referred to above strategies of labour retention and wage cuts have been utilised as a mechanism to provide a platform for future recovery and growth, in some businesses in certain areas which are oriented to local markets, such as many service providers in market towns or rural areas in parts of Wales, strategies for sustaining employment through a crisis have been deployed to provide stability and service the local population and workforce rather than as a strategy for future growth.

8.2 People Components

8.2.1 Labour market changes

Across the case study regions, the economic crisis has brought about a change in the labour market, evidenced anecdotally and through Labour Force Survey data. Interestingly, across many of the case study regions the recession has brought about a gender rebalancing of those that are unemployed. This has been attributed to the fact that many of the sectors that are traditionally male-dominated such as construction and manufacturing were more severely affected by the downturn.

In the Baden-Württemberg region, alongside a redressing of the proportion of women in the workforce, the recession saw a polarisation between those employees with low and high qualifications. The proportion of low-qualified workforce in total employment decreased between 2000 and 2008 from 34% to 24%, while the share of academic workforce in total employment increased between 2003 and 2008 from 10% to 15% (Bohachova; Sporkmann, 2009). Wide-spread job losses for low-skilled workers were witnessed throughout the case study regions. However, some regions such as North-Estonia considered that the pre-recessionary period had witnessed a disproportionately-high level of employment, meaning that there was existing pressure for labour cuts, which were seen predominantly in manufacturing, construction and wholesale.

Whilst much of the labour force change evidence can be considered anecdotal due to the availability of data, the Irish case study was able to utilise Labour Force Survey data that spanned 2006-2011, effectively encapsulating the pre-recession peak and a proportion of recovery. This data observed a general decrease in the numbers reporting that they were looking after the home or family; interestingly, across Ireland the number of males looking after the home has increased by 8% and the number of females looking after the home has declined by 13%. The reduction in household incomes may have pushed people back into the labour force in order to provide supplementary incomes; this however, has to be set in the context of falling participation rates. Significantly, the number of males joining the labour force has increased by 1% and the number of females has increased by 12%; however, across Ireland those who are unemployed and looking for their first regular job has increased

by 16%. At the country-level the Labour Force Survey shows interesting trends, however, there are marked differences at a regional level.

Kerry County that has a higher-than-average number of employers, account holders and retired persons has witnessed an increase in females in the Labour Force that is comparable with the Irish average. There was a significant 20% decrease in the number looking after the home, with above Irish average decline in women doing so. In contrast to the Irish average, men looking after the home decreased by 3%. Cork County that also has a high level of employers and account holders witnessed a sharp 58% increase in females assisting relatives (for which they are not remunerated) and a higher than Irish average joining of the labour force by both men and women. However, those looking after the home reflected the Irish average. Cork City, with a higher than average number of students, retirees and those unable to work due to a disability or illness has witnessed the most counter-trend effects of the crisis. There has been a decline of men in the labour force and the number of females joining the labour force was 4%, compared to the Irish Average of 12%. Female unemployment has decreased as has those looking for their first job, yet the proportion of the labour force which continues to be unemployed is above average.

These regional variations can perhaps suggest an area of future analysis, considering the regional characteristics that may lead to observable differences in the labour force.

8.2.2 Occupational structure

The crisis was observed by many as an 'ideal opportunity' to focus on deeply addressing staffing issues. In Estonia significant changes were witnessed where key workers were kept in place, some were transferred to part time working and others were dismissed. Firms regarded the crisis as an opportunity to discharge the less capable employees and replace them with more skilled workers. Those that remained in employment witnessed a negotiated decrease in wages that averaged 10 – 30%. Therefore, some of the interviewed CEOs believed that today's team is more competent and unitary than before the crisis. The labour cuts were rather diverse across the companies and no clear pattern can be distinguished. In general, a more extensive reduction of labour was witnessed in the service industry as opposed to the manufacturing industry. The clear exception was IT-related enterprises, which mostly did not reduce the number of employees.

Poland witnessed a rise in the number of temporary and casual contracts due to the structural difficulties in introducing flexibility for those that are permanently employed. This lead to a strong polarization of the market, with mainly young people being offered these contracts and many social costs were involved. However, these contracts were still viewed as a better solution than the shadow economy. Amidst concerns of the consequences of the crisis, some employers did not register all of their employees in order to lower the labour costs. The employees agree to work illegally

because they can earn more money this way, do not have to pay taxes and are afraid of losing their jobs. This situation is observed mainly in the construction industry, sales and in vehicle repairs. Conversely, private company employees have worked additional hours for which they were not remunerated. This inevitably impacted employee morale.

Baden-Württemberg witnessed structural adjustment from industry to service sectors, where between 2007 and 2010 more than 10,000 jobs in the regional industry were lost. While employment levels in the key industries of automotive and machinery witnessed a marginal drop of 1%, major losses were observed in already struggling industries such as wood, paper and textile. It was concluded that the job losses in the industrial sectors during the crisis could not be completely compensated by new jobs in the service sectors, as regional employment growth was restricted to public, social and human resource services, while for example logistics and retail were also severely negatively affected.

As a region, Wales continues to have a heavy dependence on manufacturing, which accounts for 10% of all jobs, but has a predominantly service-based employment and output structure. As such, Wales has in recent years become structurally 'more similar' to the UK economy as a whole, this is highlighted in Table 8.1[12]. It is questionable whether in becoming less structurally distinct and more service-oriented that it has necessarily become more diversified however.

Table 8.1 Structural composition of Wales vs UK

	GVA		Workforce Jobs	
	Wales % of Total	UK % of Total	Wales % of Total	UK % of Total
Agriculture	0.2	0.6	2.6	1.3
Mining & Quarrying / Elec, Gas, Water	4.4	3.5	1.8	1.2
Manufacturing	15.2	10.3	10.5	8.0
Construction	7.7	7.1	6.8	6.4
Wholesale, Retail Trade & Repairs	11.0	11.1	14.5	15.4
Hotels & Restaurants	3.3	2.9	7.4	6.5
Transport, Storage & Communication	7.3	11.2	5.7	8.7
Financial & Professional Services	20.3	29.6	13.9	20.6
Public & Other Social Services	30.6	23.7	36.6	31.9
Total (%)	100	100	100	100
Total	**£44bn**	**£1,236bn**	**1.398m**	**31,886m**

[12] Interview with Welsh Government Business and Economy Department (BETS) representative, April 3 2013.

Alongside this service-based employment, Wales also has some developing strengths in key areas of advanced manufacturing. North Wales accounts for over 30% of the manufacturing output of Wales (Mersey Dee Alliance, 2012). Flintshire hosts a major Airbus wing-making facility which employs around 6600 people, making Flintshire one of the few areas of the UK where manufacturing employment outweighs the public sector as a major employer.

With 9 per cent of Britain's land mass and only 5 per cent of its population, farming continues to be influential in sustaining rural areas. As in other parts of Britain and the rest of the EU, farming has been under severe pressure, leading to a decline in employment, farm amalgamations, and an increase in part-time farming. Farmers in Wales have had to respond by seeking to add value and to move upmarket into more speciality food products such as salt marsh lamb, and Welsh Black beef, as well as to diversify into farm tourism and wine production.

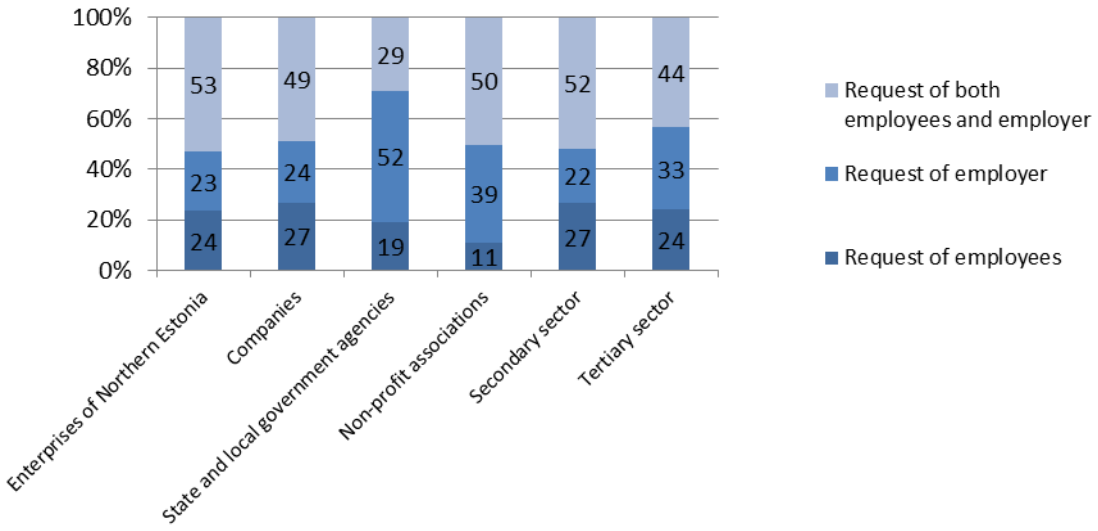
There are sharp contrasts in the importance of different industries between the sub-regions of Wales. The public sector is more important in certain parts of Wales, accounting for over 40% of all jobs in North West Wales, Mid Wales and South West Wales, and in the cities of Cardiff and Swansea, more than 35% of the workforce are employed in government support jobs (WLGA, 2009).

8.2.3 Hours worked

The crisis not only affected the levels of employment but also influenced the number of hours that were worked, this impact was seen throughout the case study regions. The reduction of working hours in order to retain skilled labour and human capital was a common strategy adopted by firms.

In the Uusimaa case study, hour reductions were viewed as a strategy to reduce labour costs, in the early stages of the crisis this was achieved through sending workers on temporary vacations. However, this strategy has been seen to undermine the productivity of the companies and ultimately affected firms' profitability. In Estonia, the reactions of the public and private organisations differed. The public sector saw wide-spread use of unpaid vacations and part time employment in order to avoid labour cuts. The private sector, however, did not implement staffing decisions quickly, beginning in 2008 with a reduction of working time and slight decrease in wages and progressing to more radical measures such as the reduction of workforce in 2009.

Figure 8.1 Reason for part-time working for employees (Estonia, 2009)



The most extensive and organised adjustment to working hours was witnessed in Baden-Württemberg. Modifying a longstanding and familiar policy instrument Germany has legislated the utilisation of an enhanced short-time working allowances for a period of up to two-years. This meant that during the most recent crisis, firms were able to react by adjusting their working hours without losing their human capital (Bohachova; Krumm, 2011; Lichtblau et al., 2010). Typical measures include utilisation of working time accounts and short-time allowances or reducing the number of new staff hired. These measures were used more often than in former crises (Lichtblau et al., 2010) and firms in Baden-Württemberg made greater use of the allowances than firms in other regions. These firms viewed the retention of human capital as a support mechanism for fast recovery as firms can quickly adjust their production capacities and rely on an experienced and loyal workforce.

As a consequence of these activities, labour productivity was reduced during the crisis, and the gross wages per working hour increased sharply, despite a reduction of gross wages (Fed. and State Stat. Offices, 2012). These changes were generally considered to be accepted by the trade unions with the promise of increased job security.

8.2.4 Wages and disposable income

Alongside a reduction in working hours, wages were also reduced, as with the reduction of working hours, the anecdotal evidence suggests that these changes were accepted in favour of employment and job security. Interestingly, in regions such as Pormorskie, the period before the crisis had witnessed significant increases in wages and disposable income that fuelled consumption, which did not begin to decrease until 2012. This reduction in consumption was considered to be caused by psychological rather than economic factors.

Estonia also witnessed the introduction of wage flexibility with workers being paid on an individual job performance or firm-level economic performance. Furthermore, interviewed Estonian enterprises highlighted that one of the major responses to the crisis was to cut training costs and costs related to 'entertainment'. Estonian commentators believed that the crisis had served to re-adjust worker's wage expectations and increase productivity levels. It was considered surprising that these radical changes did not cause unrest, however, in Estonia this was attributed to the unilaterally reduced employment options and the weakness of the trade unions, with instances of companies introducing wage cuts without prior agreements from the unions and contrary to Estonian legislation.

In Wales the relative lack of highly-paid jobs is reflected in the overall prosperity of the region. Total annual pay fell by 8.1% in Wales between 2007 and 2012, compared with a 7.5% fall across the UK as a whole (TUC, 2013). Moreover, underemployment is now at an unprecedented scale – a measure of the number of people who want more work than is available to them - perhaps as a reflection of a fall in real wages. Underemployment as a percentage of the workforce is higher in Wales where in 2012 an estimated 134,000 people desired longer working hours (Bell and Blanchflower, 2013).

8.2.5 Educational attainment

The case studies have highlighted that education and skill-levels within a region are highly influential at a time of crisis. In particular, regions with a dominant employer were more vulnerable to the need to retrain and re-orient the skills of employees. In Western Macedonia, it was found that the dominance of the Public Power Corporation (DEI) dictated the development path of the region, with citizens directing their skills development towards the attainment of a job in the company in the belief of a permanent, well-paid job. This culture of job expectation undermined the continuation of agricultural activities and the expansion of entrepreneurial initiatives. However, DEI highlighted a disconnect between the HEIs and local enterprises with a need to instil students with practical knowledge that can meet the region's needs; the region was negatively influenced by the DEI's decision to close the vocational training schools that had previously been operated by the company. Further to this, in the pre-recessionary period, higher levels of income had allowed many families to support the expense of educating their children outside of the region in Greece or even abroad. It was considered that the qualifications acquired did not meet the needs of the local economy and many of these graduates felt that the region did not provide satisfactory employment opportunities.

Much like Western Macedonia, the Uusimaa region in Finland was impacted by the role of a dominant regional organisation, where Nokia has contributed to the development of an innovation system, demanded highly skilled employees and has

positively influenced changes in the education system . However, the domination of Nokia in the national and regional economy has been attributed as one of the reasons that there is a scarcity of high-growth entrepreneurs (see Autio, 2009). This said, an educated and trained population is considered one of the key assets of Finland, with workers readily able to adapt to new industries and a large number of R&D workers and specialists with technical/engineering education. This focus came in reaction to the crisis experienced in 1990 and restructuring of the economy at large. Even in the egalitarian Finnish context, the better availability of highly skilled labour force makes Uusimaa region more competitive compared to other regions of Finland for foreign companies and investments, and can be considered more resilient in terms of recovery and renewal.

In contrast, Puglia's major plant has been closed down due to environmental concerns, ending 12,000 direct jobs and 8,000 ancillary jobs. This will have a larger regional effect on employment, however, the main regional concern is that many of these 20,000 jobs were of low-skill and low educational attainment, presenting a problem for regional employment and training policy.

There is much debate on the relationship between education/skills attainment and resilience; however, the case study regions bear-out that those workers with low qualifications and low levels of formal education encounter the most difficulty in adapting to a changed market situation and skills requirement. In Baden-Württemberg, with a 2.1% (2009) share of the total staff in R&D employment, this strong innovation performance is supported by an education system that shows a low share of school leavers without formal qualification. The regional dynamics have witnessed a polarisation between low and high-qualified workforce.

Interestingly, a component of the short-term allowances was to increase incentives for firms to provide time for staff to gain further qualifications, through linking allowanced to training provision through the Structural Funds, however, only a small fraction of short-term workers actually received a qualification. Significantly, a study for Baden-Württemberg firms at least did not observe any reduction of further qualification measures by firms between 2007 and 2010 (Behringer; Klee, 2011). Estonian commentators highlighted a need to improve managerial skills. The officials of governmental institutions, representatives of national support institutions and recognized researchers came up with the idea that to increase the resistance of the case study area to the future economic downturns, one of the major goals is to improve executive quality of enterprises. Many of the interviewees claim that the lack of managerial capabilities and skills was an important restraint at the time of the recent crisis. Previous management studies conducted in Estonia have also drawn a conclusion that average managerial level is rather low in Estonia. During the recent crisis, managers often lacked the flexibility and competence to implement strategic restructuring and change the direction in the rough economic situation. The general purpose should be that the entrepreneurs are able to focus and find market niches,

implement innovative business models, improve product and service design and become competitive on export markets.

This was supported by the Welsh case study where 28% of Welsh employers report a skills gap within their workforce and 35% of managers and professionals in Wales lack an "appropriate" formal qualification.[13] One danger is that this will put off future businesses from setting up operations in Wales and create a downward spiral of further business decline.[14] Clearly, however, this is also a long-standing problem that cannot be resolved quickly.

8.2.6 Demographic profile

The demographic profile of a region could also be considered to influence resilience, with the case studies considering that whilst the young could be considered the most adaptable, they are also the most vulnerable in times of crisis. The Uusimaa case study suggests that inexperience in the labour market and inflexibility of competencies makes getting new job more complicated during a time of crisis. The empirical evidence suggests that age and type of occupation are vital as older people and those working in factory jobs are less resilient in terms of recovery after crisis (Näätänen, 2011). The problems encountered by the Nokia cluster during the current crisis have had a very different impact on factory workers and R&D specialists, with specialists seemingly encountering no significant problems in finding a new job.
In Finland, the ageing population is considered a serious issue for economic development. Whilst not directly related to impact of the most recent crisis, it is feared that declining labour input will affect future renewal (Lassila and Valkonen, 2010; Lassila et al., 2011; Dahlman et al., 2006). In the Uusimaa capital city region, there is a younger population and positive migration, so it is not considered as significant a problem for the case study region. However, the effect that this ageing population will have on future growth and resilience is highly dependent on policy responses, which has recently included a commitment to raise the average age of retirement (see OECD, 2012).

In the Pormorskie region, the young and unskilled were most affected by unemployment, as a result of experiences in the early 2000s, employers did not wish to dismiss well-qualified and experienced employees due to the problems presented with the slowdown ends. Retention of human capital is a predominant theme in 'people's' role in regional resilience. The Pormorskie case study identified potential in the region due to the young working age population, in recent years the population aged 15 – 64 has grown to 71% and 17% are aged 0-14. The population growth rate in the region is approx. 2.5% and it is the highest in the country (Polish average is

13 NIACE Cymru - http://www.niacedc.org.uk/facts

14 http://www.bbc.co.uk/news/uk-wales-25208226

0.3%) and high in relation to other regions of the Central Europe. The region is in the group of five Polish regions with the positive migration rate (Eurostat 2012, Demographic Yearbook of Poland, 2012). The role of migration was touched upon in many of the case studies, with Uusimaa identifying that nearly half of the Finnish Swedish-speaking population lives in the region and makes up 8% of the regional population.

Wales entered the crisis as one of the poorest regions of the UK in GVA per capita terms. One interviewee from Welsh Government indicated that the relatively low level of GVA per capita in Wales is not surprising given the lack of large cities or substantial economic agglomerations in the region, its demographic profile which is characterised by a high dependent population (particularly elderly) and the relatively low skills base of the workforce.[15] Indeed, various reports and studies during the period leading up the crisis highlighted the persistent problem of low economic activity rates, and lower skills and productivity levels in Wales (e.g. Welsh Assembly Government Economic Research Advisory Panel, 2006; Hudson, 2008). Thus, and as indicated above, the crisis hit a region already facing the considerable challenges associated with the legacy of industrial decay and decline and the need to re-skill and revitalise many of its communities.

8.2.7 Individual responses

The responses of individuals throughout the case study regions have shown many similarities, and often came in response to the situation of the labour market. In Western Macedonia a general passivity was observed as many believed there was no straightforward alternative. However, those that were young and with high skills left the region in search of employment. This trend was reflected in the Puglian concerns that due to the poor regional employment prospects and legacy of environmental pollution, the young and mobile will migrate to regions in Italy and throughout Europe that can offer the employment opportunities that they need. In Baden-Württemberg the skills and loyalty of the resident workforce played an important role in adaptability at a State and local level. Workers accepted flexible working-time arrangements, stayed in short-term allowance or used the periods for qualification to keep their jobs. Therefore firms reduced working hours, were able to cut at least parts of the wages and accepted a reduced labour productivity during the crisis in 2008/2009.

In Finland, commuting became more common place, even for those living within Uusimaa. However, those that were skilled and educated living within Helsinki were more able to find new employment. Whilst there was a threat that the unemployed would migrate to other countries, it was considered an unlikely alternative. The hope was that skilled workers would become entrepreneurs, but there were some cultural

[15] Interview with Welsh Government (BETS), January 24 2013.

and motivational obstacles. Conversely, North Estonia's entrepreneurial spirit was recognised through the fact that a common response by laid-off workers was to establish a business in the field within which they had been working. There were several cases where those made redundant were able to launch successful businesses and took over some of the customers of the enterprises they were initially working for.

In the pre-recessionary period, outward migration was witnessed extensively in Poland with the unskilled looking for jobs in Germany, United Kingdom and Ireland. However, during the first wave of the crisis (2008-2009) the migration rate decreased and economic growth was observed in Poland during this period. This said, the number of outward migrants has once again increased since 2011. In Finland, the inward migrating populated were found to be contributing to the resilience of low productivity activities and businesses. These workers were considered to provide little contribution to socio-economic resilience. The case study identified that there is insufficient migration of high skill workers to Finland and Uusimaa (Johansson 2008), these workers would provide support for renewal and reorientation.

In West Macedonia, alongside the changed employment patterns there were also changes in consumer behaviour where "luxury expenses" were purchased more sparingly and subsequently budgets were tightened for everyday expenses. This is in sharp contrast to the pre-recessionary period where the ease of funding construction and cultural propensity for investing in property led to parents buying apartments for their children (regardless of their age) and renting it until their children needed it. This led to the disproportional growth of the construction sector.

In Estonia, the behaviour of local enterprises was considered to be 'panicky' and erratic. The behaviour of these firms influenced others and some SMEs released workers because the main competitor had done the same, where in some cases there continued to be enough orders and work for the employees to complete. The representative of the Unemployment Insurance Fund believed that there were many rush decisions and overreactions in terms of labour cuts.

As such, this crisis perhaps had a less devastating impact on the psyche of many of those living and working in Wales than might have been the case for other parts of the UK or indeed other European regions. This is indeed supported by evidence gathered for a Joseph Rowntree study which examined the impact of the recession on the former coalfield community of Gellideg in Merthyr Tydfil, as part of a wider study of the effects of the crisis on different UK neighbourhoods. One resident when asked about the impact of the current recession replied 'Recession, what recession? Economic and social depression is a constant state of life here' (Day, 2009; p. 10), reflecting the community's ongoing struggle with generational unemployment. There is, however, also evidence that Wales has exhibited the highest rate of increase of any UK region in the perceived costs associated with job loss, leading many

workers to report that it would be difficult to find alternative employment. As a consequence, staying in 'any' job is preferable to no job at all. Notably however, workers in Wales reported significantly higher levels of confidence about their prospects of job security with only one in five expressing a belief that there was some chance of them losing their jobs in the foreseeable future, compared with one in three workers in London and the South East.

Finally, the crisis has also encouraged activity outside the formal economy, with an increase in volunteering and participation in citizens' groups. An interviewee stated that there is a sense of solidarity and an urge to offer, as "people are realizing that we are all exposed to the economic crisis". The persons involved in such actions have experienced the effects of the crisis themselves.

8.3 Place-based components of resilience

The role of place-based characteristics in shaping resilience has been suggested by the quantitative analysis. In the following section we assess the evidence from the qualitative case studies for the significance of different characteristics of place. We consider a range of different components.

8.3.1 An urban centre assists resilience, but not in all places

A strong feature of several of the case studies is the significant role played by a major urban centre in promoting the resilience of the surrounding economy. This was identified in the case of Cork, Ireland; the tri-city of Gdansk-Gdinya-Sopot in Pomorskie, Poland; Tallinn, Estonia and Helsinki, Uusimaa. In the latter case, the fact of being the capital city created additional benefits, as it attracted a greater share of investment and other economic activity, in both the private and public sectors. The productivity advantages of urban centres are now firmly established (Combes et al, 2012) and the significance of this for the resilience of places is illustrated in our work. However, it is not ubiquitous. In the case of Stuttgart it was felt that sub-urbanisation and out-of-city investment pressures were weakening the significance of the urban area, although in this case it is likely that the benefitsof the wider conurbation continue to positively influence levels of resilience.

In contrast, in both the Puglia and Western Macedonia cases it was felt that the resilience observed in the region was not associated with urban centres located in these regions. In both cases, it was felt that the rural areas were out-performing their urban counterparts, and any resilience to the crisis experienced in these regions was more strongly based on rural characteristics. However, in both cases, one interpretation of the experience reported is that the urban areas concerned are under-performing on many socio-economic characteristics and so fail to make the contribution to regional resilience that might otherwise be the case.

In the case of South West Ireland, a slightly more nuanced perspective was offered, suggesting that areas that had proven more resilient were divided between the metropolitan area of Cork and more rural areas. The argument put forward was that it was the smaller urban centres and peri-urban areas that were proving to be less resilient. A similar situation was described in Uusimaa, Finland, where some suburban districts, with limited local accessibility were regarded as finding it more difficult to adapt to the effects of the economic crisis.

8.3.2 Accessibility to markets is an advantage for resilience

The accessibility of an area appears to have some bearing on the observed resilience in all of our case study regions. In the case of South West Ireland, the port facilities were regarded as an important dimension of the ability of the region to engage with global markets. The significance of port facilities was also reported in Uusimaa, Pomorskie and Estonia. In Puglia, the port facilities were seen as a positive element for the economy, together with the connections promoted by the local airport. Air links were also important for the City of Cork and for Helsinki. In each case the links helped to underpin economic activity, and overcome peripheral geographic locations.

In Western Macedonia, the more limited accessibility was regarded as a reason for a more inward looking economy. Arguably, this has left it less able to respond to the decline in domestic demand. Indeed, recent investments in new motorway connections was reported as having highlighted the vulnerability of the local economy to external competition, whilst also assisting the development of some sectors of the economy such as tourism. Similarly in Wales, relatively poor levels of accessibility (both by land and air) are argued to have constrained levels of economic development and so affected the ability of the economy to respond to the economic crisis.

8.3.3 Stocks of natural capital can underpin resilience, but may also undermine it

In both Puglia, Italy and South West Ireland the importance of strong endowment of natural capital were reported as significant features of observed levels of resilience. In both cases the quality, and form, of the local environment underpinned a resilient agricultural sector and a tourism sector, helping to offset the effects of the economic crisis elsewhere. In Puglia, this was grounded in the prevalence of small family-based farms trading artisanal provenance-based products. In South West Ireland the foundation was the grass-based dairy industry, allowing farmers to reduce their input costs and trade on quality criterion. A similar effect was reported in Wales, but of a much lesser magnitude.

Western Macedonia, Greece highlights how the availability of natural resources can both act to underpin the resilience of a region, and also weaken it. The availability of Lignite deposits across the region has shaped both the place and the economy of

Western Macedonia. In the past, the national energy provider (DEI) has been able, and required, to absorb spare capacity in the economy leaving the economy increasingly dependent on a mono-functional activity. This is a significant cause of the region's poor state of resilience, but, as the case study reports, there remains a strong belief that DEI will, once again, be able to absorb spare capacity in the region, and so act as a solution to the region's economic problems.

A high quality natural environment can also contribute a higher standard of living in an area, with potential positive implications for the resilience of a region. This was the case in Pomorskie, Poland, where the quality of the natural environment was remarked upon as a positive element in the area's ability to attract inward investment and skilled labour. To a certain extent it was felt that this could act as a counterweight to the higher salaries on offer in the capital Warsaw.

8.3.4 Knowledge based infrastructure support resilience

In half of the cases studied, the presence of well-regarded Universities and research institutes were reported to have supported the observed resilience of their surrounding areas. This was the case in Uusimaa, Stuttgart, Cork and Pomorskie. Importantly, these institutions complemented local innovation systems, which, in the cases of Cork, Stuttgart and Uusimaa, were identified as being key components of the resilience exhibited by these areas in the face of the economic crisis.

In the case of Puglia, Western Macedonia, Estonia and Wales, the role of the Higher Education, research and innovation infrastructures was not reported to have been a significant factor in the observed resilience of these regions. In the case of Western Macedonia, the limited presence of research and innovation institutions, coupled with weak levels of innovation, is regarded as one of the difficulties facing the region. Efforts to stimulate innovation cultures have recently been enacted in Puglia in an effort to overcome the perceived weaknesses in this area.

8.3.5 Planning regimes and the property market can influence resilience

The collapse of inflated property markets in both Ireland and Estonia were major factors underpinning the economic crisis in each country. In the other cases studied for this work, volatile property markets were a less significant feature of the experienced crisis, although there may be a link to the levels of household borrowings and observed levels of resilience that merits further study. The impact of the dramatic downturn in the construction sector in several of the cases studied is considered under the 'business' section above.

Planning regimes are reported to have had some impact on observed levels of resilience in a small number of our case study regions. Whilst the overall impact in South West Ireland was negative, owing to the readiness of the system to grant

permission for residential and commercial development, some positive attributes are also identified. The Cork Area Strategic Plan (CASP) developed for the wider metropolitan area of Cork is widely regarded in the region as a model for strategic development planning, and is regarded as having moderated the excesses of the property boom, leaving Cork better-placed during the economic crisis. In Stuttgart, also, a strong strategic planning approach, that is able to combine plan-making with infrastructure investments alongside transport and economic policies, is argued to underpin the longer-term development of the economy and so contribute to their observed resilience. In both cases the strategic planning activity involves a partnership bringing together more than one public authority.

8.3.6 Open, export-orientated economies underpin resilience

There is a very strong connection between the reported level of external trade and the resilience of the region in the face of economic crisis. In the case of South West Ireland, economic growth has been predominantly export-led. In Stuttgart also, it was the ability of leading manufacturing companies to adapt to new global markets that has underpinned the strong economic performance of this region through the crisis. In both Puglia, Italy, and Western Macedonia in Greece, the more resilient economic sectors have tended to be export-orientated. This is the case of agriculture in the case of Puglia, and the fur industry in Western Macedonia. In Wales, the case study reports that weak levels of exports have undermined the ability of the region to respond to the effects of the economic crisis.

The propensity to export is not the only support provided by an open economy to regional resilience. In Estonia and Pomorskie, as in South West Ireland, the role of foreign firms is reported to have assisted each of these regions to weather the economic crisis. These firms had the resources and the expertise to draw on during the economic downturn that was often lacking in domestic firms, many of which had no prior experience of dealing with economic circumstances of this magnitude. Foreign firms also introduced new production technologies, strengthening the competitiveness of the local economy.

In turn, the inter-connectivity of places, through value-chains and supply-chains, may also impact on levels of resilience. This is remarked upon in the case of Estonia, whose firms benefited from efforts to stimulate the Finnish economy. Arguably, it also serves to underpin observed resilience in Pomorskie and Baden-Württemberg where German competitiveness is supported by a pool of low-wage, well-educated and highly productive workers in Poland, whose firms benefit from German market access (Cienski and Buckly, 2013).

There can be adverse effects of open economies. In Western Macedonia, the opening of the economy to external competition was reported to have exposed the weaknesses of previously protected local businesses, and so contributed to a lessening of the

ability of the region to respond to economic crisis. In the case of Uusimaa, the local economy was exposed to the declining fortunes of Nokia as it found itself out-competed in international markets by new entrants.

8.3.7 A complex relationship between resilience and migration

Patterns of economic migration tend to follow the economic cycle. Areas that are experiencing economic decline tend to witness the out-migration of working-age population, particularly those in younger age groups, in search of alternative employment opportunities. This is reported in the case of South West Ireland. Conversely, South West Ireland is also experiencing patterns of in-migration of young workers from elsewhere in Europe, attracted by the opportunities offered in international firms located in the Cork and its surrounds. Stuttgart is also benefitting from its ability to attract skilled labour, which is helping to maintain its economic growth.

Despite the resilience of the Polish economy, and that of Pomorskie, the economy is still experiencing a net out-migration of working age population, as people seek better-paid opportunities in Warsaw or abroad. In Puglia, there is also a reported out-migration of more highly qualified residents in search of better-paid opportunities elsewhere. Net-migration rates may demonstrate a positive inflow though, with the in-migration of less skilled workers, often from outside of the EU.

In the short-term, migration patterns are not reported to have played a significant role in the observed resilience of any of the regions studied. However, the implications of changing labour force characteristics may have a more substantial effect over the longer-term.

8.3.8 Local patterns of resilience within regions may differ substantially

One of the key findings of the case study reports is the heterogeneity characteristic of observed resilience within the regions concerned. In South West Ireland, there is a strong contrast between the experience of metropolitan Cork and the western, more rural, areas of the region, particularly County Kerry. In Puglia, however, it is the rural parts which appear to have a stronger degree of resilience to the economic crisis than the urban centres. In Western Macedonia, the contrast is again apparent, with rural areas offering strong resilience characteristics, but also a contrast between areas dependent on the fur sector and those on the energy sector. The former has proven more resilient in the face of the crisis than the latter.

Similarly, in Baden-Württemberg, three neighbouring cities provide contrasting experiences of resilience to the crisis. Freiburg, with its concentration of employment in service sectors, university and research institutes has demonstrated stable long-term economic growth rates; Stuttgart, with its focus on technology-based industrial

manufacturing, recovered from a short-dip in activity during the crisis to maintain high employment levels (albeit with slightly increased unemployment) and high income levels; Pforzheim, in contrast, struggles with the economic restructuring of a more traditional metals-based industry, higher levels of debt and company insolvencies.

8.4 Community-based components of regional economic resilience

The resilience of communities to economic change and crisis is a subject in its own right (see for example, Hall and Lamont, 2013). That is not the subject considered by the case studies undertaken for this project. In this case, the studies sought to explore the role that community-based features could play in the economic resilience of the region as a whole. What emerges are a number of features that appear to have some impact on observed levels of resilience. Whilst rarely strong enough to impact directly on the ability of an economy to withstand the effects of an economic crisis they are able to play an important role in shaping the way in which it responds and the opportunities available to communities.

8.4.1 Social capital is an important dimension of resilience

Several of our studies report on the significance of business networks, and interfirm social capital, in shaping responses to the economic crisis. In Baden-Württemberg, it is reported that larger firms or owners of family owned firms often offered short-term guarantees and loans to help out firms that were facing insolvency. This corresponds with wider research reporting on how larger firms offered payment holidays, or made credit available to their supply chains (Wrobel, 2013). In South West Ireland, strong informal ties between businesses have been shaped into more formal networks in order to strengthen the potential impact. In Puglia and Western Macedonia it was also reported that sectors in which business ties were stronger had coped better through the crisis. In Uusimaa, one of the reasons given for the lower levels of resilience observed was that inter-firm linkages were particularly weak.

Amongst residential communities there is also some evidence that the strength of social capital networks have affected the ability of places to respond to the effects of the crisis. In both Uusimaa and Estonia it is reported that a tradition of self-reliance has resulted in communities taking responsibility for their own well-being during the crisis. Similarly in South West Ireland and Wales, strong levels of social capital have contributed to the response of communities to the crisis, although in the case of South West Ireland, the effect have been unevenly distributed and, in many ways, is being stimulated by the effects of the crisis and a senses of fending for themselves.

This sense of increasing civic engagement is also reported in Western Macedonia and Puglia, particularly through an increase in the level of volunteering. However, in both these cases the responses are reported to be fragmented, reducing the potential power

of the response. In both cases, the response is an ameliorative one, focused on the dispersal of charity in the case of Puglia, and suffers from short-term objectives with no development of longer-term community capacity. In Wales, an increase in charitable giving and volunteering can also be seen, the rise of Foodbanks providing a particular case in point, but here there is also a stronger sense of organisations trying to influence longer-term policy considerations.

As part of the consideration of social capital, (inter-generational) family support mechanisms has also played a part in helping communities to respond to the effects of the economic crisis. This was particularly reported in the case of Estonia.

8.4.2 Community-based initiatives have a role to play in facilitating resilience

The role of community-based initiatives in countering the consequences of the economic downturn featured in all the cases studied. In no case were significant initiatives identified that had made a strong impact on the observed level of resilience within the regions concerned. There is evidence from other locations of the role that a variety of initiatives, some of which are very long-standing, can play in tempering the effects of economic downturns. Zolli and Healy (2012), for example, report on the work of James Stodder in Switzerland, who has found that during a recession volumes of business undertaken using a complementary currency known as the WIR (Wirtschafstring) have increased, with volumes of activity subsequently declining in periods of economic growth. It appears that communities are able to use such alternative currencies as a form of 'safety valve'. Other examples include Timebanks, Local Exchange Trading Schemes and various forms of alternative currency units (Seyfang and Longhurst, 2013).

In South West Ireland, there was some evidence that the crisis had led to an increasing interest in exploring alternative approaches to traditional economic activity, with a strong emphasis on grassroots perspectives. However, this was very much a case of such actions complementing rather than supplanting traditional economic activity. The potential for such actions to supplement mainstream economic actions to promote a more resilient economy remains to be explored.

One area where community-based initiatives were seen to have some influence on levels of resilience, albeit at the very local scale, was the development of stronger localist agendas, epitomized by 'buy-local' campaigns. These were reported in Ireland and in Wales. In Waterford, Ireland, the campaign emphasizes the value that shopping locally can provide (Figure 8.2). In Crickhowell, Wales, local businesses have developed a brand "Totally Locally" (http://www.youtube.com/watch?v=nK5oHfIix64) and a campaign aimed at encouraging resident to spend at least a 'fiver' (£5.00) in the town each fortnight. Offers are made by participating businesses linked to this value and the value of the potential cumulative spend to the local economy is emphasized.

Figure 8.2 Examples of local promotion: Ireland and Wales

8.4.3 Societal regimes impact on the resilience of places

There is some evidence from the case studies that the nature of welfare regimes can influence the resilience of regions. This was reported in the case of Uusimaa, where the social compact provides for strong redistribution effects. Similarly in economies where there is an emphasis on collective bargaining the social compact between firms, states and workers can also impact on observed levels of resilience. This was remarked upon in the case of South West Ireland, in Uusimaa, in Stuttgart and in Western Macedonia. The effects of this were not uniform though.

The tolerance of societies for activities outside of the formal economy may also have an impact on levels of resilience. At one level this can assist communities to continue to earn a living. In Spain for example, Prof. Robert Tornaball, former Dean of the ESADE Business School in Barcelona, argues that "a lot of people are now staying afloat thanks to the underground economy", which is reported to account for up to 20% of GDP (quoted in Minder, 2012). However, the loss of tax revenues can undermine the ability of an economy to respond to the economic shock, and the grey market activities can impede the resumption of formal economic activity owing to substitution and displacement effects. No substantive examples of informal economic activity emerged from our respective studies, but this was not a focus of the research.

8.4.4 The crisis is changing attitudes to entrepreneurship

Across the cases studied the economic crisis has led to a renewed interest in the potential offered by entrepreneurship. There is, though, limited evidence from the cases studied of a more entrepreneurial culture making an observable difference to resilience experiences. Evidence from South West Ireland, suggests that higher levels of entrepreneurship have not led to stronger resilience outcomes, for example. Several of the regions already have strong entrepreneurial cultures and some report that this provides a greater diversity of activity and enables local communities to maintain economic activity. In areas where there has been less importance attached to entrepreneurship, such as Western Macedonia, the economic crisis has exposed the

inability of existing structures to adapt and has led to an increasing interest in the potential alternatives offered by starting new businesses.

The challenges of starting businesses are well-documented and, in some countries this is more difficult than others. Amongst our cases, it easiest to start a business in Ireland and the UK, and most difficult in Greece, followed by Poland, Germany and Italy (World Bank, 2014). In terms of ease of doing business, the UK, Finland and Ireland lead the way, with Greece again being the worst performer, albeit with a marked improvement between 2012 and 2013 (ibid). Unfortunately, the challenges are leading some residents to choose to set up their companies overseas, to "escape… not just the economic crisis that has engulfed Greece, but also the psychological crisis and collapse in morale that has flowed from it" (Tarnanas, 2012 p.8). Equally significantly, residents often preferred to take secure employment rather than uncertain, and less well-remunerated, positions in small start-up firms, depriving them of talent. This was reported to be the case in Western Macedonia. Observers argue that this requires a change in mindsets and, perhaps, prevailing models of education that encourage the selection of seemingly secure jobs.

8.4.5 Demographic structure of communities may shape resilience

The role of demographic structure in shaping resilience takes a long-term trajectory. Across our case studies, the ageing of population in more rural areas was reported, constraining their ability to adapt to new economic pathways. This occurs both due to emerging population structures and to selective migration patterns fueling the urbanization of our society.

Overall, it appears that those locations with younger workforces have been the more resilient, as reported in South West Ireland and Uusimaa, for example. However, this may simply be a factor that younger workforces are, generally, attracted to more active, resilient, economies. A similar effect was reported in Estonia, with the associated observation that the attractiveness of the urban centre (Tallinn), was adversely affecting the demographic structure (and by extension observed resilience) of the surrounding areas.

A second finding, that merits further exploration, is that older populations may also promote a greater level of resilience in an economy. This was the situation in South West Ireland, for example, where there was a greater proportion of residents aged 40-64. As several of the cases identify, the strength of this effect may depend on the adaptability of this cohort to new economic circumstances. It also reflects a more general trend whereby younger adults have been more adversely affected than those aged over 50 (Stehrer and Ward, 2012)

In some, local, cases there is a suggestion that a greater proportion of elderly residents may provide a foundation for local businesses owing to the greater stability of their

income streams (from pensions and other savings). Whilst the effect of this is not fully demonstrated in the data (owing to the significance attached to numbers employed and economic output produced) it may have strong effects in particular localities.

In both South West Ireland and Western Macedonia the crisis is reported to have led to a return of some residents from urban centres to rural localities, in search of employment opportunities (often in agriculture) or as a means of reducing living costs, but this is the exception to more general trends.

8.4.6 Weak and fragmented local governance hinders resilience

Across the cases studied it is reported that where local government is weak this has hindered the resilience of the areas concerned, leaving them ill-prepared to deal with the consequences of economic shocks. In South West Ireland, Puglia and Western Macedonia, local and regional government has been described as weak, often with limited powers and limited capacity. There has been a reliance on national agencies to provide solutions, which at a time of fiscal austerity and retrenchment to national priorities, can lead these areas exposed and vulnerable. In Puglia, the election of the Vendola government, is credited with strengthening the response of the region to the crisis, although prior history in the region has been less positive.

For Stuttgart, the stronger powers and authorities of the Länder and the 'Regional Association' have been associated with the ability of local government to shape the observed resilience of the economy. Strong importance is attached to the role of the Regional Association in both planning and implementing policies and acting in a coordinated manner. In metropolitan Cork, South West Ireland, strong coordination between neighbouring authorities, particularly around strategic planning issues is highlighted as an important foundation of the resilience observed. In contrast, elsewhere in South West Ireland, reported in-fighting between government agencies initially impeded the ability of the area to respond to the crisis.

National governments are significant players across all of the cases, as might be anticipated given the scale of the economic crisis. Both Uusimaa and Estonia are reported to have benefited from their identification as part of the national growth priority. This has been less so in other regions, as the example of South West Ireland illustrates. In Wales, the mix of devolved and retained powers presents a complex mix of competences at the UK, Wales and local levels. National governments have also imposed reforms of government structures, as a direct consequence of the economic crisis, in Greece and in Ireland. The longer-term effects of these remain to be seen, but are reported to have had short-term implications for the ability of local structures to respond to the crisis.

8.4.7 Greater fiscal autonomy may help, or hinder, resilience

At first sight, levels of fiscal autonomy also appear to have some bearing on the observed level of resilience. However, this requires further exploration as it has not featured strongly in any of the reporting. Whilst, some degree of fiscal autonomy for Baden-Württemberg does seem to have been important in the observed resilience of Stuttgart, it is hard to draw conclusions from just one example. In the case of the autonomous regions of Spain, greater levels of fiscal autonomy have not prevented their weaker performance during the economic crisis and, in some circumstances, appear to have worsened the situation rather than ameliorated it; as pro-cyclical policies enacted during the economic boom have affected their ability to act during the slump. Similarly, in Estonia, it is reported that local authorities that were more active investors during the crisis have also been more adversely affected in their ability to respond to the crisis than those that were less active. It appears that the manner in which fiscal autonomy is used may be more significant than simply the presence of such powers.

For local and regional government, it may not just be the possession of powers and authority that is important. There also has to be the willingness to use those that are available. In Western Macedonia it is reported that available resources from the Compensatory Fund, available from the DEI operations, were not fully utilized, whilst in South West Ireland, it is also reported that County Kerry did not make use of the opportunity to levy an economic development fund, unlike the neighbouring County and City of Cork.

8.5 Green transitions and regional economic resilience

One of the elements we have been asked to consider is the extent to which the crisis has led to the adoption of new development paths in regions, particularly green growth strategies. We explicitly examined this in our eight case studies. We have found a mixed picture with an initial green stimulus proving to be difficult to embed and indeed sustain. In this regard, our findings appear to support and enhance those of other research.

8.5.1 Europe-wide evidence

Green growth is a new strategic narrative that promises to solve both environmental and economic problems. It frames environmental protection in terms of opportunity and reward rather than additional costs. There are different perspectives on green growth with different degrees of ambition (Bowen and Fankhauser, 2011): a) green growth can be economic growth that is slightly greener; associated policy measures are green taxes that address negative externalities (and thus improve well-being), b) green growth can be the creation of new jobs in green sectors; associated policy measures are public spending on green investments (Keynesian ‘green stimulus’) that

stimulates aggregate demand; c) green growth can arise from a green Industrial Revolution this requires investments in new technologies, markets, skills, infrastructures, and broad socio-institutional change. Thus all forms of green growth require substantial policy change (Geels, 2013).

The green economy is defined as 'one in which environmental, economic and social policies and innovations enable society to use resources efficiently…while maintaining the natural systems that sustain us' (EEA, 2013; p. 5). As such, progress towards the greening of the economy can be expected to embrace both efforts to boost resource efficiency and initiatives to develop economic activities which do not compromise the limits of natural systems. At the time of the economic crisis, it was widely acknowledged that whilst greening of the economy had moved up the policy agenda across Europe, progress had been somewhat mixed and generally slow although progress in improving resource efficiency had generally exceeded that of preserving ecosystem resilience (UNEP, 2008; Pelletier, 2010; EEA, 2012).

Geels (2013) has analysed analyses the various effects of the financial and economic crisis on the probability of the implementation of ecological reforms in Europe. His empirical research shows that immediately after the start of the crisis, the economic stimulus plans initiated in many countries caused a significant rise of green investments in the deployment of renewable energy, energy efficiency, public transport and rail, and improving electrical grid transmission. For example, Germany and the UK spent respectively 13.2% and 6.9% of stimulus packages on green investment, amounting to 0.4% and 0.1% of GDP. In terms of specific technologies, growth in asset finance (and small distributed capacity) was mostly driven by the expansion of solar power. Most other technologies (wind, biomass, biofuels, geothermal, marine) experienced shrinking investment. Most solar investments went to small distributed capacity (rooftop PV-installations), and the remainder to utility-scale projects (solar thermal plants, large-scale PV).

Germany and Italy dominated small-scale project investment (rooftop solar) in 2011, while the UK saw the fastest percentage growth. In all cases, this growth was helped by generous subsidy schemes (feed-in tariffs), which were set to expire in 2012 and thus generated a rush of projects in 2011.

However, with the implementation of austerity programmes since 2010, environmental and climate policy goals have been afforded much less of a priority. Indeed, in its report in 2012 (p. 11) the Frankfurt School observed a 'weakening in policy support of renewable energy in many developed countries' which in Europe, it stated, reflected austerity pressures. This is supported by Geels (2013) who concludes that 'it is hard to avoid the impression that climate and energy policies are actually moving in the wrong direction in response to financial-economic pressures (austerity) and declining public attention' (p. 26). Green stimulus packages largely came to end by 2012 and at the same time, many European governments (Germany, UK, Spain

and Italy) substantially reduced feed-in tariff subsidies, partly in response to falling technology costs (e.g. for photovoltaics) and partly to reduce overall government spending. Coupled with this, at the European level, the Emission Trading System (ETS) is not yet delivering, because the carbon price is relatively low, decreasing and volatile.

Geels (2013) also demonstrates that with regard to public discourse, the financial-economic crisis significantly changed people's priorities. In the UK, a national opinion poll in 2012 showed that people were most concerned about the economy and unemployment, whilst the environment and pollution had dropped off the main list of people's concerns. Indeed, public attention to the environment peaked in 2007 and has declined since whilst the concern with the economy has risen, suggesting that these issues compete for attention and the recent crisis has given economic issues the upper hand. Moreover, as well as a decline in public attention, there appears to have been a shift in the nature of public discourse with greater emphasis on the costs of the low carbon transition. In the UK there are particular concerns that low-carbon options such as offshore wind and required upgrades in the electricity grid, cause electricity prices to rise. This is not entirely fair since increasing energy bills are mainly driven by rising global fossil fuel prices, but this public perception nevertheless has a powerful influence on policy-makers.

Geels (2013) does note, however, that more positive developments are identifiable at regional and urban level, highlighting in particular the number of cities working on green configurations of local systems, particularly in relation to transport (e.g. Copenhagen's Plan to be carbon-neutral by 2025 and the development of eco-cities in Freiburg and Graz). He notes that these initiatives are encouraging not least because they are often mobilised by city actors who are less constrained by existing regimes and associated dependencies and who have the capabilities and will to drive transitions on the ground. However, he also raises a number of questions surrounding whether all cities and regions have the constitutional powers to drive such initiatives through (noting that UK cities, for example, appear more constrained than German cities). He also observes the positive evidence of a decentralised groundswell of local, grassroots sustainability initiatives led by activists, social movements (such as Transition Towns) and local communities (such as in the development community energy projects). The number of UK projects has increased in recent years, for example, in the context of the government's rhetoric on the 'Big Society' and some central funding for local projects. Geels (2013) questions whether the momentum of these grassroots projects is sufficient to drive a transition however. Most projects appear to be small, dependent on the drive of a few people, vulnerable to withdrawal of grants, and difficult to replicate on a broader scale (because they are tailored to local conditions and because the embedded normativity faces a mis-match with mainstream public orientations). However, he suggests that they have potential for a positive indirect effect through revitalising the public discourse on sustainability and providing experiments which may lay the foundations for future commercial ventures.

8.5.2 Evidence from our case studies

We have examined the effect of the crisis on the greening of economies in all of our eight case studies. However, we specifically chose two of our case studies – Puglia in Italy and Wales in the UK – on the grounds that they offered potential for particular examination of this question. This is because Wales has a regional government with a unique statutory obligation to deliver sustainable development, and similarly Puglia has had a significant political commitment to investment in the renewable energy sector since 2005.

The evidence from the case studies broadly supports the findings reported above. First and foremost, for most of our case study regions, the crisis has had no clearly discernible or obviously transformative effect upon their development path. For some regions, such as Pomorskie in Poland and Baden-Württemberg in Germany this is because progress towards renewable energy is seen as a both an existing pathway and a long-term commitment, and is somthing largely unaffected by the crisis. In Baden-Württemberg, political decisions at federal and state level in support of renewables such as on-shore wind energy were regarded as more significant in influencing this pathway than the economic crisis. In most of our other regional case studies, it is either simply too early to discern what, if any, transformative effects the crisis has had, or the efforts of dealing with the crisis has been all-consuming and has limited the potential for anything more than rhetorical statements from regional actors to emerge as yet.

There is some evidence that the crisis initially accelerated green economy ambitions and practices in some case study regions, particularly those where greening strategies were already in place. Thus, for example, the regional government in Puglia successfully built on its commitment to progressing renewables in the region by taking a distinctive approach to the exploitation of national feed-in tariffs by providing generous financial support for PV installations. As a consequence Puglia has become the regional leader for PV installed power, accounting for 17% of Italian national production. Similarly in Wales, where the regional government has progressively developed an agenda for greening in line with its sustainable development obligations, a Green Jobs strategy was launched in the midst of the crisis. This signalled a heightened ambition on the part of the Welsh Government to create jobs in the region through the more efficient use of resources, the development of skills, innovation and new technologies, and strengthening the low carbon energy sector. A tangible initiative as part of this was the Arbed scheme, established in 2009 to retro fit energy efficiency on the existing housing stock. Phase one of the project invested £36.6 million in retro-fitting social housing in deprived communities in Wales with measures including solid wall insulation, solar panels and heat pumps. Phase two is now being rolled out in a £45 million programme that has EU funding support. Community renewables energy projects are also in evidence across Wales

although, like the Arbed scheme, these remain small-scale and highly localised. Indeed, green jobs still account for only around 2% of all jobs in the region.

However, we also found some evidence that the crisis and the tighter fiscal conditions it ultimately promoted, significantly affected the priority afforded to greening strategies. This was most strongly evident in Wales where spending cuts to the Welsh Government from 2009 coupled with long-standing concerns regarding the importance of protecting and creating jobs in a region struggling after decades of relative economic decline, resulted in a much less emphasis being placed upon renewable energy and rather more upon securing any investment or development likely to generate economic activity and jobs, particularly after 2011. This is illustrated by the Welsh Government's changed and more accommodating stance towards nuclear energy as revealed by its support in 2012 for the building of a new nuclear power station on the Isle of Anglesey. This further supports the assertion that environment and economy typically tend to compete with each other for attention and that at times of economic crisis and/or in contexts where economic priorities are seen as more immediate and pressing, economy tends to win. The Welsh Government's rather pragmatic approach to energy developments must therefore be seen within its long-standing concern to protect jobs and manage the effects of environmental regulation and energy costs for its energy-intensive industries.

Our case studies also highlight the importance of understanding greening strategies and transitions in their contexts. They clearly reveal the importance of national and federal government agendas and strategies in shaping regional government agendas. Thus, the strong strategic federal government emphasis upon renewables in Germany is clearly significant in shaping what happens at regional level. In contrast, the post-crisis strategy of the UK national government has been one of focusing upon national strategic priorities including energy supply and the retention of economic activity and jobs, which in line with tighter fiscal conditions has undoubtedly encouraged the regional government in Wales to pursue similar priorities. Similarly, the powers and resources available to regional actors to develop green strategies are also highly circumscribed, particularly in certain contexts. This is particularly the case in Wales where the ambition and aspirations of the Welsh Government typically exceeds its economic resources and political and regulatory powers. The Welsh Government's main powers in respect of renewable energy lie in setting planning policy and overseeing planning for smaller energy developments. Whilst it has developed a distinctive approach to planning for renewables with the development of preferred zones for large scale on-shore wind which has increased developer interest, the devolution settlement has fragmented responsibilities for consenting these projects, hindering and politicising their delivery.

8.5.3 The role of green transitions in economic resilience

For some, the economic crisis raised fundamental questions about the basis of a market-led economy driven by financial institutions, leading to a groundswell of popular counter-movements and an exploration of alternative possibilities. Much of this focused on community-based 'green' movements. Whilst our case studies, and wider research, has cast doubt on the extent to which the development of more sustainable, and greener, development pathways affected the resilience of particular places, there are some tantalizing glimpses of alternative possibilities.

In particular, this focuses on the role of green, sustainability-based activities not as a driver of economic growth and development but as insulation from the perturbations of market cycles. Renewable energy projects that are focused on individuals and communities provide an opportunity to develop independent sources of energy that can not only reduce the exposure of households to rising energy prices but may also provide an economic return. Similarly, community food projects can assist in reducing the costs of rising global food prices, and for those that are time rich but income poor assist in 'smoothing out' the costs of underemployment. Other community-based examples include the development of alternative currency schemes as part of local 'Transition' movements.

Such activities are not an alternative to mainstream economic activities. However, they might act to complement such activities, providing societal outcomes which could include the potential to act as a buffering influence on the possible risks associated with future economic shocks.

9 PUBLIC POLICY RESPONSES TO THE ECONOMIC CRISIS

The scale of the economic crisis precipitated a substantial level of intervention by public authorities. These interventions occurred at an international, national and subnational scale, as authorities sought to stem the effects of the economic shock rippling across global and European economies. Our case studies have primarily focused on the role that sub-national policies have played in responding to the effects of the economic crisis, as stipulated in the Terms of Reference for the study. However, in the following section we also consider the role played by international and national policies in promoting economic recovery and the economic resilience of regions. It is the interplay of these multiple government levels that, in many ways, stands out as the key consideration for resilient regional economies.

The section first considers the role that public policy can play in promoting resilience, before undertaking a short review of the wider policy context surrounding this theme.

9.1 Public policy roles and resilience agendas

9.1.1 The role of public policy

In many ways, the economic crisis has reinforced the policy focus on jobs, growth and competitiveness that was visible prior to the crisis. However, it has also led to a renewed attention being directed to the potential role of public policy in enhancing the capacity of national and regional economies to absorb the effects of an economic shock, to adapt to the consequences of this and to use it as a stimulus for transformation, with a strong emphasis on the importance of adaptive capacities (OECD, 2011b).

The role of public policies in the face of economic shocks can, perhaps, be seen in two parts. Firstly, there is the need to stabilize the situation, to react to the immediate effects caused by the shock. Secondly, there is then a response to the crisis, centered on efforts to overcome the negative effects of the shock and to seek to restore economic growth. To this can be added a third dimension, to facilitate the adaptation of the economy in preparation for future economic shocks. In doing so, we should not lose sight of the agency perspective (Mitchell, 2013). Public policies can, and perhaps should, seek to enhance the choices made by firms, households and individuals.

Public policy interventions can be regarded as mechanisms for the sharing of the risks (and associated costs) accompanying an economic shock (Ahrend, 2011). Where private markets will not, or cannot, insure the market then the state may take on this role. Where the state is unable, or cannot, do so, then other actors may be forced to act. In this imaging, one role for public policies may also be to seek to reduce the potential consequences of an economic shock. It can do so directly, or by

encouraging and facilitating the involvement of other actors, business or civic. The OECD counsels against assuming that public policy can remove all risks, and that to try to do so is, in fact, undesirable (Mitchell, 2013; OECD, 2011a). Rather, one role for public policy may be helping agents to be more informed in the choices that they make as to the risks they face and take.

9.1.2 An evolving policy context

The economic crisis has reinforced the pre-crisis emphasis at a European level of stimulating economic growth and employment. However, there are also signs that it is regarded as an opportunity for change rather than being seen as a one-off hit that then allows the resumption of business as usual. Thus the emphasis is upon encouraging *sustainable recovery* with the Europe 2020 strategy document explicitly stating 'our exit from the crisis must be the point of entry into a new economy' (p. 10). More specifically, the Territorial Agenda 2020 states that the crisis 'provides an opportunity for a transition towards a more sustainable and resource efficient economic structure if appropriate actions are taken' (p. 5). Whilst there is less explicit evidence of similar thinking occurring within the cases studies for this work it is certainly the case that the crisis has led public authorities to review the circumstances leading up to the current position. In the Stuttgart reigon for example it has led to a consideration of the potential vulnerability incurred through their reliance on a highly successful automotive sector.

At the same time, European policy-makers are also aware that crisis induced austerity measures are likely to present significant difficulties for some regions in terms of finding resources to invest in appropriate innovation and regional development policies. This creates an imperative for stronger inclusion of private sector actors and resources in such policies and governance. The EU also recognises that regions may well "need external support to help find (and realise) their own paths of sustainable development" (EC, 2011 p.3), as, in many cases, the crisis has exposed the limitations of internal capacity and resources. These limitations have also been recognised at a national level, with the reorganisation of local and regional government structures reported in both our South West Ireland, and Western Macedonian cases.

The Barca report (2009; p. 22) observes that 'an exogenous intervention might be needed to trigger change'. It goes on to acknowledge, however, that such intervention must work with the grain of territorial assets and capacities – 'the purpose is obviously not to import institutions from outside, but to provide the pre-requisites for them to develop, to tilt the balance of costs and benefits for local actors to start building up agency, trust and social capital, to change beliefs and to experiment with institutions and democratic participation. As Amartya Sen (1999) puts it, what is called for is a contribution to enhancing and guaranteeing the substantive freedom of individuals seen as active agents of change, rather than passive recipients of dispensed benefits'.

The EU's Cohesion Policy is acknowledged to be 'uniquely placed' to contribute to the EU's sustainable growth objectives' (Commission, 2011; p. 12). As well as promoting its delivery through multi-level governance and public-private partnerships, the external intervention it provides for territories may prove critical in facilitating appropriate adaptation, changing development trajectories and thus in building resilience. In Section 9.3, we explore how this has played out in practice.

More broadly, it is now widely acknowledged that different regions are affected differently by crises. As the Territorial Agenda 2020, 'local endowments and territorial characteristics have growing importance for regions in order to cope with and recover from external shocks' (p. 5). Across EU policy strategies, increasing emphasis is being placed on encouraging the development of integrated, place-based policy action. This is policy which is tailored to contexts; where intervention elicits and utilises local knowledge; where linkages and interdependencies between placed are taken into account; and which is part of a territorialised social agenda which aims at guaranteeing socially agreed standards for particular aspects of well-being (Barca, 2009; Territorial Agenda, 2020). The powerful logic behind this is that cities and regions are faced with different combinations of development problems and growth potential. However, countervailing tendencies are also visible in the cases studied for this work. In more than half these examples it was reported that the crisis had led to a reduction in the emphasis attached to spatially-informed policies, with attention instead focusing on national economic priorities with little consideration of the spatial consequences of this.

Territorial Agenda 2020 places particular emphasis upon the development of strong local economies through effective use of territorial assets and the integration of local endowments, characteristics and traditions into the global economy. This is seen as critical 'in strengthening local responses and reducing vulnerability to external factors' (p.8) – in other words for the development of economic resilience. Cohesion policy, in particular, has the capability to unleash territorial potential through integrated development strategies based on local and regional knowledge of needs, and through building on the specific assets and factors, which contribute to the economic development of places. It thus requires the encouragement and active involvement of local actors.

This thinking clearly aligns with and has informed the conceptualisation of resilience developed for purposes of this study. Regions are understood to be highly diverse and evolutionary entities. Furthermore, their resilience is here conceived as a place-based capacity shaped both by a territory's inherited resources and structures, as well as its people and the agency of its individuals, businesses and institutions.

At a sub-national level there are also signs that there is a stronger emphasis on the notion of 'economic resilience' emerging, although, as our case studies report, it is

less often expressed in these terms. This can readily be seen in the UK, which we use as an exploratory lens for reporting here. Evidence for the increasing attention being paid to economic resilience can be seen most vividly in the extent to which the term now occurs within policy documents and strategies. This is illustrated by the inclusion of a section in "Creating Successful Local Economies" - the national publication of the LEP Network (England's new structure of Local Enterprise Partnerships (LEP) responsible for local economic development) – entitled "Economic Resilience and the Long-Term Growth Challenge" (The LEP Network, 2012). This highlights both the emergence of this theme and also the longer-term perspective being associated with it. In other examples we have the New Economy Manchester (the LEP for Greater Manchester) speaking of Building Economic Resilience across Greater Manchester, and, in its submission to Government the proposed LEP for Cornwall and Isles of Scilly identifying the "ingenuity, resilience and aspirations of our area" (www.cornwall.gov.uk). Whilst there is evidence that some authorities, such as Sheffield City Region, were beginning to consider notions of economic resilience prior to the economic crisis in the UK, it is apparent that the crisis has provided an impetus to sub-national policy considerations in this field.

9.1.3 Sub-national policy roles

Examining the available documentation it is apparent that, in broad terms, sub-national policy-makers seek to influence resilience adaptive capacities in three main ways.

First and foremost, they seek to provide leadership of the region's resilience agenda and through identification of resilience challenges, goals and preferred outcomes or measures of success, can provide strategic leadership of the agendas of individual and collective actors in the region. This is evident across the strategy documentation, as well as the development of a new language of discourse. They also play a critical role in mobilising knowledge of the economic environment and how it is changing, and disseminating this knowledge and learning to other actors in the region. This depends upon highly networked information and management systems. A number of sub-national governments have already devised resilience action plans or strategies which make an assessment of their risks and vulnerabilities to economic downturns and set out ways and means by which they may take pertinent action (e.g. City of Edinburgh, 2008). In the case of Aberdeen resilience is also promoted but is conceived as an individual trait rather than a systemic strength (Aberdeen – the smarter city, Aberdeen City Council, 2012). The development of indexes of Resilience, or tools for identifying levels of resilience are a strong part of this process (Yorkshire Cities, 2009 and 2011), a demand for which many consultancies respond (see for example, ECORYS, EKOSGEN and City of Sheffield, Experian).

Secondly, and directly following on from the above, sub-national governments can take action to influence the adaptive capacities of other individual and collective

actors in the region. A range of specific interventions can be identified for each different actor or actors in the region. Thus in terms of business, for example, they may seek to prioritise investment in growth business sectors or facilitate sectoral diversity. In terms of people, they may invest in rapid redeployment initiatives to support workers adaptability to changing labour market conditions (e.g. PROACT, Wales), or provide 'life-changing' funds to support individual re-training or skill enhancement. In the North East of England, Gateshead Council have introduced an 'Economic Resilience Package' to "alleviate the worst effects of the recession" (Gateshead Council, 2012). In terms of community, they may invest in the development of key multi-functional community hubs to build stronger social networks and relationships.

Thirdly, sub-national governments also have the capacity to act on and help enhance key structural features of the region's economy or its unique, place-based assets or 'capitals'. These include a place's economic and financial capital, its social and cultural capital, as well as its political, natural and built capital assets. For example, in terms of social capital, sub-national governments act as unique connectors, facilitating complex communication and co-operation between multiple agents including a region's firms, labour force, consumers, advocacy groups and so on, that otherwise might not be made.

In summary therefore, sub-national governments have a unique and important capacity to provide 'institutional' or 'policy entrepreneurship' that can co-ordinate, provide strategic direction and leadership, enhance place assets and improve the functioning of key networks in the regional economy.

But as well as understanding *what* sub-national policy-makers can do, it is also important to understand *when* they can do it. Resilience thinking emphasises the dynamic nature of regional economic development trajectories and policy responses. As such, governance and policy actions in relation to resilience can be categorised into four broad types or horizons, distinguished according to when they occur relative to the shock or stimulus.

- Anticipatory actions - that seek to build a stronger understanding of the components of the regional economy, its existing strengths and vulnerabilities to shocks
- Reactive policies - that address the immediate effects of an economic downturn to mitigate the effects in a region
- Responsive policies – that respond to the particularities of the economic shock experienced
- Transformative actions – that seek to bolster the resilience of an economy over the medium to long-term

9.2 Policy responses to the crisis

9.2.1 The surrounding policy environment

Sub-national responses to the economic crisis can only be understood in the context of the wider policy response undertaken by national governments and international bodies. This is particularly so given the significance of national policy initiatives in most of the cases studied for this work. Whilst the specific policy environment differs by country it is useful to highlight a number of common themes underpinning the collective response to the economic crisis (OECD, 2009; Stehrer and Ward, 2012). We summarise some key themes below. It is also worth highlighting the significance of automatic fiscal stabilisers and social welfare regimes, such as access to unemployment benefits and other welfare payments. Generally operating at a national level, these are a significant mechanism through which the costs of economic shocks are distributed across society more broadly.

Securing international liquidity and credit markets

International mechanisms for sharing the risks associated with economic shocks are not well-developed (Ahrend, 2011). Despite this, concerted coordinated action occurred across the world's major economies in response to the unfolding crisis, most significantly in 2008 through major equity injections into banks in the US and the EU - a process that effectively turned the financial crisis into a sovereign debt crisis – and, later, through the practice of Quantitative Easing.

Within the EU, Member States had to develop mechanisms to respond collectively to the crisis. Measures to promote financial stability and support Member States that required financial assistance included the creation of the European Financial Stabilisation Mechanism (EFSM) and, later, the European Financial Stability Facility (EFSF) - to provide a collective investment vehicle and replace the reliance of EU members on the provision of bilateral loans.

The path to these measures was by no means straightforward, as Member States debated the form that each should take and tensions arose as to the distributional burden of the adjustments required (Begg, 2012). The impact of these measures has also set a context within which national and sub-national actions are set, particularly the move to austerity-based policies as Government's seek to reduce historically high levels of public debt.

Austerity measures

A key aspect of the policy response to the current economic crisis has been the imposition of substantial austerity measures. For some countries this has been a

condition of financial support from international institutions such as the International Monetary Fund or the EU; for others an internal objective owing to fears that inflated public debt liabilities would raise borrowing costs and constrain growth[16]; whilst for prospective Eurozone applicants such as Estonia it was a prerequisite for membership.

This has resulted in public sector pay freezes and job losses, reductions in public expenditure and investment and an increase in indirect and direct taxation and other charges for the provision of public services. Austerity measures have been particularly marked in our case study areas of Ireland, Greece and Estonia, but are also reported in the UK and Italy. In Ireland for example a series of emergency budgets from 2008-2010:

- Imposed public sector pay cuts of 5-10%
- A progressive income tax levy in addition to the existing income tax rates
- An increase in VAT charges
- A reduction in the value of Jobseekers Allowance for those unemployed and aged under 20.
- The introduction of a household charge and a local property tax

Economic stimulus packages

In an effort to boost economic activity, governments across the EU have introduced a range of economic stimulus packages, even whilst implementing austerity measures. These range from bringing forward, or increasing, investment in infrastructure projects through to more specific schemes, such as the 'car scrappage' incentives enacted in many economies at the start of the crisis. In practice, many infrastructure investments suffer from implementation delays, limiting their short-term impact. There is also a risk that the economic benefits of stimulus packages are felt in localities other than those initially intended. Stimulus measures enacted in Finland for example have reportedly played a positive role in supporting economic recovery in Estonia as many of their firms benefit from trade links with Finland and Finnish firms.

Labour market interventions

A host of policy initiatives have been aimed at maintaining employment levels; assisting redundant workers, and supporting those unable to gain jobs. Measures include short-term working allowances, which compensate workers who are affected by reductions in their working hours; temporary wage subsidies; retraining initiatives and advice and support schemes. These can prove an effective mechanism for protecting firms and workers from short-term reductions in demand, but their cost can

[16] See for example the contested findings of Reinhart and Rogoff (2010)

be high, particularly if kept in place for extended periods. The positive benefits of the value of short-time working allowances are widely acknowledged in Germany, but in Finland, the benefits (compared to the costs) are currently subject to some debate.

Governments have also intervened in labour market institutions, imposing pay freezes for public sector workers in some cases, as part of national austerity measures, but also encouraging pay restraint in centralized bargaining procedures. In other cases, national governments have moved to increase flexibility, through introducing legislation or, as in the case of Finland, encouraging a move to decentralized pay bargaining to enable appropriate factory-level responses to the crisis.

Promoting competitiveness and innovation

The crisis has strengthened national policy efforts directed at creating more competitive economies. This ranges from policies to encourage business start-ups, through to increasing support available for innovation and research. Where overall budgets are under pressure, levels of activity relative to other policy areas have often increased. There is a sense that the crisis has not changed the underlying fundamentals of economic growth and that investments in these areas will assist the longer-term transformation of the economy. If anything, as Yuill et al recognize, there is some evidence that the crisis has caused "countries to think more in terms of longer-term growth and international competitiveness" (2010, p.28).

Easing eligibility rules and providing access to credit

In an effort to stimulate economic activity, and to limit constraints, national and European authorities sought to ease eligibility rules of existing aid schemes and to raise award ceilings where possible. At a European level measures included the relaxation of rules on the use of existing financial support mechanisms, such as State Aid rules and the European Globalisation Adjustment Fund[17]. Similarly, governments have also sought to overcome the difficulties experienced by firms in raising external credit facilities, including the provision of risk capital, access to loan guarantees and other financial support instruments. Other examples of policy initiatives in this area include the easing of regulatory costs and burdens as well as the reform of administrative procedures.

Government reform and institutional change

A final policy response that merits inclusion is where the economic crisis has acted as a catalyst for the reform of Government structures. The reasons for this vary from the potential efficiency savings that can be realized to anticipated improvements in the effectiveness of government. Two clear cases of reform were reported in our cases,

[17] This was amended to include eligibility for effects emanating from the crisis as well as globalization.

firstly the reorganization of the public sector in Greece under the Kallikratis law of 2010 and, secondly, the planned rationalization of government structures in Ireland. Both are a clear consequence of the economic crisis. At a European scale though, significant institutional changes have also been enacted owing to the crisis, notably in the development of the EMSF (Begg, 2012).

9.2.2 Sub-national policy responses

Overall, local and regional policy responses to the economic crisis have been relatively modest. As reported in our case studies, there is a strong reliance on national measures to counteract the effects of the crisis. Yuill et al argue that in certain cases this is because "regional policy is a medium-term response to structural issues, not a short-term cyclical or crisis measure" (2011, p.v). Where policy responses have been identified they argue that these tend to be associated with significant local events, such as the closure of a major employer. The very scale of the crisis itself may also have acted to limit the ability of local or regional authorities to intervene.

It is certainly the case that in many countries the scope for local and regional action is also modest. This is particularly, but not only, so in our Irish and Estonian cases. Indeed it is only in our Baden-Württemberg and Welsh cases where stronger structures (and resources) for regional policy actions have been identified. In both these cases there has been a commensurately stronger response. It is important to recall that these are also both NUTS 1 territorial units, equivalent to Estonia, Ireland and all of mainland Finland.

Where the scope for local and regional action is limited, then national level actions take on a greater significance. The composition of the local area may influence the extent to which it benefits, or does not, from such policies. By example, the Baden-Württemberg case reported that the region was well-placed to benefit from national policies stimulating investments in research and innovation, as well as the car-scrappage scheme. Regional participation in the Federal short-term working allowance scheme was also reportedly disproportionately high. In these circumstances a key role for local and regional authorities can be to ensure that their area reaps maximum benefits from the opportunities available. However, there are also occasions when national polices limit the ability of a region to develop their own solutions to experienced problems, as reported in the Puglia case.

The crisis has also witnessed a reduction in the emphasis attached to the spatial dimension of policies, as well as a certain level of policy centralization, further limiting the potential opportunities for local and regional authorities. Whilst this has been reported as a limiting factor for Western Macedonia, South West Ireland and Estonia, it is also the case that individual areas can reap benefits from this, including Helsinki in Uusimaa; Cork in South West Ireland and Tallinn in Estonia.

Responses to the crisis vary, depending upon economic and institutional context. Several case studies reported that there was an increasing interest in policies to promote entrepreneurship (Western Macedonia, Pomorskie, Estonia), particularly through offering advice and supporting access to credit and credit guarantees. Local and regional agencies were also involved in trying to promote innovation in Puglia and in South West Ireland. Not only was this seen as investment in the future but, on a more mundane scale, was regarded as a means to help companies identify potential new markets to help them survive the downturn.

A range of labour market measures were also reported. The Federal short-time working allowance scheme in Germany has previously been referred to, but it is reported that firms in Baden-Württemberg benefitted from this more strongly than in other parts of Germany. In Wales, the Welsh Government introduced schemes such as React, aimed at assisting redundant workers, and Proact, aimed at helping firms retain workers. Similarly, in South West Ireland, County Kerry developed a programme to support those made redundant, mainly in the form of advisory assistance. In Estonia, a number of local authorities invested resources in supporting 'social jobs' for the unemployed. Whilst these were often criticized at the time, our case study reports that some social value is now accorded to these schemes.

Typically, traditional counter-cyclical policy roles were not available to authorities in the cases studied, owing to the effect of public austerity measures. Many authorities found themselves unable to make capital investments, even where this was being encouraged by higher authorities. This was exacerbated in situations where debt had been incurred from previous investment decisions taken during the growth years. However, in a small number of cases, the crisis was seen by authorities as an opportunity to instigate new strategic development plans. The discussions on the future development of the old port areas in Cork, Ireland being a case in point here.

The designation of certain areas as having a special status is a potential tool for focusing support measures. This was reported in Wales, with the designation of a number of spatially-bounded 'Enterprise Zones', which confer incentives on firms that locate there. In Uusimaa, a neighbourhood that had suffered particularly during the crisis was designated as a special development zone. In Baden-Württemberg, authorities made use of powers originally designed to support areas affected by floods to provide support and assistance.

In our conception of policy responses we differentiate between the immediate reaction and the later response. Consideration of the examples reported in our case studies suggests that this might be regarded as something of an artificial divide. That there is little distinction between the two in practice. However, one of the key findings of the cases is the extent to which policy-makers (at all levels) were ill-prepared for the crisis, perhaps summed up by the authority in South West Ireland who admitted that it

was only when the first major employer closed that they realized that they had no policy as to how to approach this. In these circumstances most active policy actions have been responses to the crisis, many introduced in a rapid manner in an attempt to tackle the emerging situation. As Section XX on experience with the Structural Funds shows, the immediate reaction of policy to the crisis tended to be reactive, following events rather than actively trying to shape them.

The significance of anticipatory actions is clearly demonstrated across our case studies, which highlights the links between past policy decisions and the effects of the crisis. This includes the role of planning policies and of longer-term economic development strategies. As with policies responding to the effects of the crisis it is, again, the interplay of national and sub-national policies that are the key. In Cork, concerted efforts to promote inward investment, coupled with collaborative planning structures are highlighted as key components of the relative resilience experienced since the crisis. Similarly, respondents in Pomorskie highlighted how policies that had supported the diversification of the economy in earlier decades had paid dividends during the recent crisis. In contrast, policy decisions taken in Western Macedonia are reported to have increased the dependency of the economy on the public employer DEI, as DEI was encouraged to employ workers made redundant following the closure of other major employers in the area. Local and regional authorities reportedly continue to regard DEI as the potential solution to the economic crisis in the area, suggesting that the area remains shackled to conservative policy ideas. In Uusimaa, a dependency on Nokia and associated industries has also resulted in a certain vulnerability to the local economy, particularly given the economic challenges faced by Nokia, although not to the same extent as in Western Macedonia.

Western Macedonia has also been adversely affected by the legacy of other historical policies, particularly the reconstruction efforts following a major earthquake in the 1990s. The subsidies available successfully supported the reconstruction effort but contributed to an increased dependency on the construction sector, which was badly affected was the subsidies were withdrawn at the same time as the crisis hit. An unexpected consequence of the subsidies was that households invested substantially in property, with ownership of multiple properties being common. This left households exposed to the economic downturn with higher levels of debt and falling asset values.

A further feature highlighted by our case studies is how the decisions taken following a past crisis are able to shape the ability of an economy to respond to future shocks. In Uusimaa, it was reported that the area was better placed in the current crisis owing to reforms to the national banking system that resulted from the difficulties faced by the Finnish economy following a financial crisis in the early 1990s. Similarly, the Pomorskie and Baden-Württemberg cases both reported that policy decisions taken following national economic shocks in the early years of the 20th century had laid the foundations for the higher level of resilience observed during the current crisis. In Cork, respondents emphasized that it was decisions taken as a consequence of the

wholesale closure of key industries in the early1980s that laid the ground for the relative resilience that was being experienced by the city.

A critical feature that was referenced across several of the cases, was the ability to learn from past experiences. This was explicitly stated in both the South West Ireland and the Baden-Württemberg cases. The fact that authorities, and individuals, had no previous experience of dealing with similar circumstances was also referred to in some case studies. Given that this was the worst economic downturn in more than half a century and the first substantial downturn in twenty years for some areas this is not surprising, but reinforces the importance of anticipating potential risk-scenarios.

9.3 Economic crisis and the Structural Funds

9.3.1 The role of the Structural Funds in combatting crisis

At a time of fiscal austerity across much of the EU, it is little wonder that the budget of the European Union itself has come in for much scrutiny. Whilst accounting for around only 1% of the combined Gross National Income of Member States, debates on the future scale of the budget have taken on a much larger significance in many countries. Some of the strongest debates have taken place over the scale, and future shape, of those parts of the budget devoted to regional expenditure – most notably the ERDF, ESF and, to a lesser extent, the EARDF.

Whilst much of the political debate focuses on questions of scale and efficiency – who gets how much, who gives how much, whether the money is well spent - and whether the budgets would be more effective if 'repatriated' to Member States (see for example, and Bureau of Investigative Journalism, 2010), more academic work focuses on the effectiveness of the EU's only – explicit - transfer policy (Becker, 2012). Here the evidence is mixed. Some authors take a pessimistic review of the effect of EU expenditures on regional growth rates (Boldrin and Canova, 2001; Sala-i-Martin, 1996;), whilst others find more cause for optimism, suggesting that EU Structural Funds provide a positive boost to regional growth rates (Ederveen et al 2002; Cappelen et al, 2003). In a similar vein, Becker et al (2010), focusing on Objective 1 programmes across the EU, found positive effects beyond a simple consumption stimulus, arguing that every €1 of investment through Structural Fund programmes resulted in an additional boost to regional GDP of €1.20, although in later work Becker suggests that there exists a maximum threshold of support intensity beyond which inefficiency sets in (2012).

One area that has featured less strongly in the debate, however, is the role that the Structural Fund programmes have played in supporting regional economies through the economic crisis. The current budgetary period began in 2007 and ends in 2013. Thus, it neatly spans the period from the start of the economic crisis. This paper seeks to examine how Structural Fund programmes have been affected by the economic

crisis in a small number of regions and how they have, in turn, responded to the changing economic circumstances in the regions concerned.

9.3.2 A European level enabling response

At a European level, the European Commission, European Council and European Parliament reacted relatively rapidly to the emerging economic crisis. Between 2008 and 2011 a number of Amending Regulations were passed which have enabled changes to the rules governing the use of the EU's Structural Funds. The aim has been to enhance the flow of funds through simplifying procedures, accelerating payments and protecting major projects (Smail, 2010).

One of the first initiatives was to extend the life of the 2000-06 Operational Programmes from the end of December 2008 to the end of June 2009. This would ensure that budgets could be fully spent, and that key projects did not come to an end just as the crisis began to bite. The Commission then initiated a further financial injection by enabling an increase in the value of advance payments made to the new Operational Programmes (2007-13). By 2009 around 8% of programme value was made available in the form of advance payments, with further resources made available to those Member States[18] which have seen GDP fall by more than 10% or which have significant cash flow problems (Smail, 2010).

The Commission has also relaxed the regulations in a number of ways in order to promote full use of the funds, and recognizing the fiscal difficulties of a number of Member States. It removed, for example, the n+2/n+3 rule for 2007 to limit the risk of decommitment of funds in 2009/2010. In a bid to speed up project expenditure, Member States can also now incur expenditure on major projects prior to receiving Commission approval, although this will be at risk if approval is not forthcoming, whilst the definition of major projects was harmonized at €50m. In a further bid to maintain construction-based expenditure, the Commission has also widened the eligibility criteria for the use of ERDF investments in the housing stock, so that this now applies across the EU as a whole and at an enhanced value.

Similarly, the Commission also recognized the financial challenges being faced by across Europe, particularly in accessing finance for future investment. To encourage ongoing investment State Aid rules were eased to raise the *de minimis* limit for aid to SMEs from €200,000 to €500,000 between 2009 and 2011[19] and threshold values for revenue-generating projects were raised from €200,000 to €1,000,000 in order to ease reporting requirements.

[18] Estonia. Latvia, Lithuania, Hungary, Romania

[19] Temporary Union framework for State Aid measures to support access to finance in the current financial and economic crisis *Official Journal of the European Union* 11.1.2011 C6/5

Significantly, in 2011, a change was made to the maximum intervention rate, allowing a temporary increase in the level of European co-financing by up to 10% in countries receiving special macro-economic assistance (Ireland, Latvia, Greece, Portugal and Romania). This enables co-financing rates of up to 95% to be applied in each of these countries, except Ireland where the rate is 60%. Actions have also been taken to provide greater flexibility in programme management to make it easier for reprogramming to occur in response to changing needs as a consequence of the economic crisis in particular places.

More latterly (2012/13), the Commission has amended the Structural Fund regulations so that Member States in crisis (those in receipt of rescue funds), could use EU funds in cooperation with the EIB to mobilise increased loan financing for private promoters of projects. The aim being to boost private co-financing rates of structural fund projects. In another major initiative the Commission also initiated its Youth Opportunities Initiative, in response to the endemic levels of youth unemployment being experienced across many Member States. Our research occurred too soon after these initiatives to witness any effects.

These, and other, actions set the framework for responses at a national and regional levels across the EU.

9.3.3 Programme level effects and responses

Overall, the effects of the economic crisis on the present programmes is quite mixed. For half of our sample the economic crisis has not had any significant effect on programme activities, although in all cases programmes have responded to the crisis to a greater or lesser extent.

Effect of the crisis

The most visible affect of the crisis on Structural Fund programmes in the EU has been a reduction in the level of resources available to co-finance programme activities. In around half of the regions considered in this study this has proved to be a modest or significant issue. This has led to the withdrawal of some partners from projects, as well as to past applicants no longer applying for funds through the Structural Fund programmes. Programme authorities also report delays in their ability to drawdown EU funds as partners are forced to reduce the level of their planned activities or incur lower levels of expenditure than forecast, owing to static or falling salary costs and reductions in the costs of tendered activities.

Many respondents reported that activity levels under the current programmes were reduced owing to the sense of uncertainty felt by potential applicants. This related particularly to uncertainty over future budget settlements and so led organisations to

take a risk-averse attitude and not commit to longer-term project activity, such as those financed by the Structural Fund programmes.

An unanticipated side-effect of the crisis has been felt by third sector organisations that traditionally made use of credit and overdraft facilities to pre-finance their activities. The offer of grant by programme authorities was sufficient in some Member States, such as Ireland, for banks to offer credit facilities. This option is no longer available and so organisations are less able to engage with Structural Fund programmes than was previously the case.

One of the useful distinctions to be drawn in the consideration of the affect of the crisis on Structural Fund programmes is the extent to which the programmes are part of national delivery programmes and co-financed through central exchequer resources, rather than sub-national public sector budgets or private and third sector resources. In broad terms, those priorities that have central co-financing appear to have been less affected by the economic crisis and public sector austerity measures than those that were more dependent on other sources of co-finance.

Respondents have put forward the view that in a time of budgetary pressures this is due to a desire not to 'lose' the additional funds available from the EU programmes. In practice, the opportunity cost of cutting programmes with EU funding attached is greater than the immediate savings made. However, as the case of Ireland demonstrates, this argument only applies where a central government department is responsible for the delivery of the programme priority or measure itself. In Ireland's Southern and Eastern Competitiveness Programme, the Innovative Actions Measure under Priority 1 has not been delivered, as no Ministry would provide additional funds from their own budget lines to do so.

The crisis has also affected the pattern of expenditure in some programmes. This is most clearly seen in the case of ESF-financed programme activities where participation of employers in workforce training projects has reduced for example, but demand for training courses by individuals (either within the workforce or seeking work) has increased. It is also evident in programme activities financed by the ERDF, where some priorities have proved more able to maintain planned co-finance levels resulting in a shift in programme emphasis by default. This is illustrated in Table 9.1, which provides data for Southern and Eastern Ireland and Western Macedonia, demonstrating the asymmetric effects on programme expenditure. In Ireland, there is also a suggestion that the economic crisis precipitated an increase in demand for some farm-based measures in the Rural Development Programme, leading to the early closure of these measures.

Table 9.1 Actual expenditure as a proportion of planned values

Southern and Eastern Ireland		**Western Macedonia**	
Priority Axis	*% of planned 2007-13 expenditure (2010)*	*Priority Axis*	*% of planned 2007-13 expenditure (2011)*
Innovation and Knowledge Economy	208	Accessibility to infrastructure and services	53
Environment and Accessibility	113	Digital Convergence and Entrepreneurship	67
Sustainable Urban Development	39	Sustainable Growth and Quality of Life	17

Source: Annual Implementation Reports

It is perhaps worth noting that some of the activities that have proved most difficult to secure co-finance for have been in the area of sustainable (urban) development, where urban authorities have either withdrawn from planned activities or novel means to secure their involvement have had to be found (Baden-Württemberg and Southern and Eastern Ireland for example). This reflects the challenging fiscal climate for many sub-national authorities and civil society organisations.

One further area where Programme authorities are reporting the effects of the economic crisis is in terms of the outputs and results being achieved by the programmes. Whilst there is increasing demand for some activities, such as support for the unemployed, results for other activities are proving more challenging to achieve owing to the effects of the crisis. Reportedly, this is particularly so for measures of jobs created.

One effect of the crisis has been the reorganization of governance structures in Member States such as Greece and Ireland. In the case of Greece, the 'Kallikratis reform'[20] have affected the implementation of programmes through the need to transfer programme management responsibility, and project implementation, to new instititutions, which have no experience of such roles. Implementation delays have affected the ability of programmes to respond to the effects of the crisis.

Response by Programme Authorities to crisis

[20] The program Kallikratis concerns the administrative reform of the country by creating secondary local administrations at the regional level and the restructuring of the first level local administration with fewer and bigger municipalities.

As noted, all programme authorities report at least some measure of response to the economic crisis. The most common response has been to ease the administrative procedures for accessing programme funds. This has been achieved in five principal ways.

1. Through increasing the speed of decision-making on project applications in order to reduce delays in the system. This was particularly the case in Estonia, but was also explicitly highlighted in the case of Ireland.

2. Through changing rules on eligibility for grant support to encourage additional applications, this has been particularly significant for those programmes seeking to stimulate additional private sector activity. In Baden-Württemberg for example, the state government successfully applied to the Commission to extend eligibility for some measures to non-SMEs.

3. Through the greater use of advances, which in some cases have been used to seed particular measures that were proving difficult to implement. This was a strong feature of the approach in the Southern and Eastern Ireland programme, which used the advances to seed investments in sustainable urban development projects, which were proving difficult to get off the ground. It was also cited by programme managers from Territorial Cooperation Programmes, where they sought to move the advances out to beneficiaries as soon as possible.

4. Increasing the speed of payments in order to reduce the risks of cashflow difficulties. Again, this was highlighted by a number of programmes, which reported that payments were often made before all the required audit checks had been made.

5. Changing co-finance rates. This has been adopted in some programmes but not all. It is particularly the case in Western Macedonia where the maximum proportion of European funding rose to 85% in July 2011. After December 2011, with each application from the Greek authorities the share can be raised to 95% for payments that have been credited or will be credited from May 2010-December 2013. This change in co-finance rates is aimed not only at the absorption of funds but also at protecting national funds for other activities, a valuable consideration at times of fiscal austerity. However, the opportunity provided by the Amending Regulation has not been utilized in all programmes. It has not been applied in the South and Eastern Ireland Programme for example, although co-finance rates were changed in the Border, Midlands, West Programme of Ireland, nor has it been applied in the Central Greece or South Aegean Programmes in Greece. Other programmes, such as West Wales and the Valleys, have also taken the opportunity to

increase their planned co-finance rates which, originally, were set at a level below the maximum eligible.

In some cases programmes have also amended their activities more significantly. This has been most evident in areas of activity supported by the European Social Fund, where measures supporting the unemployed rapidly took on a greater significance. It is also evident to a certain extent programme activities supported by the ERDF. In the case of Estonia the Structural Funds provided a strong and active stimulus to the economy with a conscious effort to direct the funds at private sector to stimulate trade and entrepreneurship. There is a strong acknowledgement amongst many beneficiary firms in Estonia that this support made the difference between their survival and failure in difficult economic times.

In Uusimaa and Baden-Württemberg, despite being less affected initially by the crisis, a proactive approach was also taken, particularly to stimulating entrepreneurial activity and mobilizing short-term 'emergency' support. In Western Macedonia, stronger emphasis has been placed on measures to stimulate entrepreneurship and increase the involvement of the private sector in the programme. In Wales, projects were introduced to support those affected by firm closures (React) and, following criticism that this was too reactive, those at risk of firm closure (Proact).

The timescales for these actions have varied though. Whereas in Estonia, Uusimaa and Baden-Württemberg this was an almost immediate response to the emerging economic crisis, the real changes in Western Macedonia did not fully materialize until 2012. The expenditure figures illustrated in Table 2, thus reflect both a reaction to the crisis (where co-finance becomes more scarce for some measures than others) as well as reflecting responses to the crisis by programme authorities and national/regional governments.

There is some evidence that suggests that programmes that were able to draw upon pre-existing procedures were more able to make rapid changes to their activities in the face of the economic crisis. In Baden-Württemberg for example, procedures that had been used in East German Lander (or in the case of serious flooding) to offer additional funds to crisis-hit areas were mobilized to provide short-term support from the Structural Fund programme. Similarly, in 2012, national procedures for tackling problems in geographical areas or sectors affected by abrupt structural change were implemented to support two localities in the Uusimaa area. This was the first time that this approach had been required in the region.

Owing to the changing fiscal circumstances and the effects of austerity measures, most programmes have reported some difficulties in securing anticipated levels of match funding. This has proven to affect some programme measures and priorities more than others. In consequence, most programmes have tended to focus support on those areas where demand has held up and to reduce the emphasis on measures where

demand has not been as strong as originally anticipated. This is particularly so in Ireland, Malta and Portugal (European Commission, 2013). In their response to the crisis, our results suggest that programme authorities are also maintaining a longer-term perspective around Structural Fund programmes, with a strong focus on protecting the longer-term growth effects of investments in research and innovation. This is a finding echoed by the broader analysis carried out by the EC (European Commission, 2013).

Our own analysis has reinforced the perspective that these distributional changes are not regarded as undercutting the programme strategies. The Expert Evaluation Network reports that the economic crisis is regarded as a short-term event that does not fundamentally affect the longer-term structural objectives set out in the programmes themselves. This longer-term perspective explains the fact that whilst programmes have responded to the short-term financial implications of the crisis, few have been subject to serious re-programming activities. In general, the strategies that were set out at the beginning of 2008 remain the same in 2013, albeit with a shift in the balance of resource allocation between Measures and Priorities.

In most cases, reprogramming has only occurred following the completion of mid-term evaluation exercises. In Ireland this concluded that the basis of the programme remained sound and that resources should be redirected towards those priorities and measures that where demand remained strong. In Greece, reprogramming was delayed until late in the programme lifecycle as there was a concern that to make formal programme changes earlier would lead to additional delays in initiating project activity and expenditure. From 2012, the Operational Programme for West Macedonia places a greater emphasis on:

- Enhancement of new development actions including entrepreneurship
- Dealing with the consequences of unemployment, especially for young people, new scientists, women or unemployment with regional characteristics, through actions to increase productivity and innovation
- Encourage the participation of the private sector in the NSRF programmes and actions through PPPs or funding tools such as JEREMIE, JESSICA etc.

Although our own research has not shown a strong use of financial instruments such as JEREMIE, this is partly to do with the small sampling frame. Certainly, as sources of bank finance have reduced, instruments such as JEREMIE have become a popular source through which to bridge funding gaps. However, experience also demonstrates the importance of having these instruments in place. In Ireland, for example, the ready-availability of credit prior to 2008 meant that financial instruments, such as JEREMIE, were not considered for inclusion in the Structural Fund programmes. This meant that there was no available instrument to provide bridging finance for firms following the onset of the credit crunch in Ireland. In other regions, these instruments were available and so could be rolled out more quickly. As one

respondent in Wales noted, it can take two years or more to develop such schemes, reinforcing the point that there are response-lags if mechanisms are not already in place.

The time-lags involved in developing new instruments is also apparent in West Macedonia, Greece. Here, the Financing Agreement for the JESSICA instrument was signed on the 1st of July 2010 and the call for expression of interest for the establishment of Urban Development Funds was published in 2011, with regional proposals for Integrated Plans for Sustainable Urban Development in the Regions to follow. Actual investment activity could not begin until 2012 at the earliest, some five years after the official launch of the programme.

The effects of some of the measures introduced under the Temporary Union framework are not visible within the individual case studies undertaken for this project. However, the Commission's own analysis is instructive. Of the schemes approved by the Commission only around 7% of the funds allocated by Member States have actually been paid out, with the majority of expenditure occurring in Germany (which accounted for 78% of all funds granted under this measure) and Italy (which accounted for a further 8%)[21]. This spatial concentration of activity was one of the reasons the Commission determined that whilst this measure had been useful as a short-term stimulus measure it was at risk of creating disparities in the internal market and so was phased out after 2011. The slow take-up of available funds may also be indicative of programmes learning to put mechanisms in place on a 'just-in-case' basis. Certainly, one programme authority provides evidence of this pre-emptive mentality in its raising of the intervention rate for the programme, although it acknowledges that it does not intend to grant aid at the new rate unless further changes in circumstances occur.

National level (and multi-level governance) responses have also been an important dimension in some Member States. This is clearly the case in the smaller economies such as Ireland and Estonia where national ministries are key participants in the programmes. It is also apparent in Greece where the scale of the challenges has emphasised the role of joint national and European governance approaches to securing the absorption of available funds to stimulate economic development. This ranges from the identification of 181 priority projects (of which 13 are in Western Macedonia) through to the launch of a Taskforce involving the Greek Government, European Commission, European Investment Bank and the International Monetary Fund.

One reported effect of the crisis is the reduced significance attached to tackling regional economic disparities in some of those Member States that are most affected

[21] Temporary Union framework for State Aid measures to support access to finance in the current financial and economic crisis *Official Journal of the European Union* 11.1.2011 C6/5

by the crisis, as national attention is redirected towards macro-economic growth and recovery (European Commission, 2013). This was partly visible in our work in Greece, but was less apparent in our other programme examples.

9.3.4 Summary of the Structural Funds response

From the evidence available it is apparent that the effects of the crisis on Structural Fund programmes have varied across the EU. One common feature has been the challenges presented by budget cut-backs and austerity measures to the overall absorption of the funds. A challenge recognized early-on at the level of the Commission, Council and Parliament. The effects of this have not been evenly distributed and the programmes appear to have maintained funding of research and innovation activities, and those financed by national ministries, more readily than those activities reliant on sub-national budgets or civil society. The tight financial environment has also led to a reduction in demand owing to organisations being unwilling to commit to longer-term projects, whilst some organizations that have made the commitment have found that their costs are lower than anticipated, reducing absorption rates further.

The crisis has also affected demand for certain activities over others, this is most clearly seen in the case of ESF programmes, where demand for in-company training has reduced and demand for support for the unemployed has increased. It is also evident in some rural development measures, as farmers have taken advantage of early retirement schemes and a new generation have taken the opportunity to enter the industry as alternative opportunities, particularly in the construction sector, become more limited.

Programmes have almost universally responded to the absorption challenges presented by the economic crisis. Making use of the headroom provided by the various Amending Regulations, programmes have initiated a number of measures to encourage the full use of EU funding programmes. This has largely been through simplifying procedures and enhancing access to funds.

The economic crisis has also witnessed something of a shift towards a greater emphasis on involving the private sector, stimulating entrepreneurship and, as noted previously, supporting the unemployed. In only one programme (Estonia) do the Structural Funds appear to have been consciously deployed as a macro-economic stimulus programme, although in both Baden-Württemberg and Uusimaa they have been used to focus on targeted support for sectors or geographical areas particularly hard-hit by the crisis. In both cases, this was facilitated by the ability of the programmes to tap in to institutional arrangements that predated the crisis itself.

Where programmes have sought to develop new instruments there is a more mixed picture emerging. The West Wales and the Valleys Programme demonstrates that

developing traditional projects with a new focus is relatively straightforward, but that developing novel financial instruments can be more time-consuming. This was particularly so in Greece, where the JESSICA instrument was only ready to be rolled out some 5 years into the life of the programme.

What is particularly noticeable is that there have been very few fundamental changes to the Structural Fund programmes themselves. In general, programme amendments have amounted to a re-distribution of resources amongst previously agreed priorities and measures. This appears to have been led by logic of financial absorption, although programme authorities argue that it reflects the fact that the underlying logic of the programmes remains sound over the longer-term. This reflects the argument that the Structural Fund programmes are broadly regarded as supporting longer-term, structural, economic adjustment rather than acting as a short-term stimulus measure. This perspective holds even in those programmes that are described by participants and programme authorities as 'small-scale' or 'niche'.

The argument that Structural Fund programmes are inflexible and so unable to react in the short-term to changes in circumstances is not found to be wholly true. There are numerous examples, even from our limited sample, of programmes flexibly responding to changing circumstances. Amendments to the Regulations governing the Structural Funds provided room to manouevre by programme authorities, even if not all availed of the opportunities available.

However, inflexibility can emerge as programmes become increasingly committed during their implementation cycle. It is notable that in the case of Estonia, programme authorities are of the view that the crisis occurred at an opportune point in the programme life-cycle, being sufficiently close to the start of the programmes to enable a rapid response. Several respondents also comment on the eligibility rules for Structural Fund activities preventing fully flexible responses.

Our work illustrates the significance of Structural Fund programmes in some Member States. In many instances they have provided the only source of external investment funds as domestic budgets have been cut-back and bank-lending has diminished. The economic value of this cannot be judged on the basis of our work, but it is fair to argue that it is likely to be substantial.

Yet, in several of our cases, there are clear (and recognized) capacity constraints that affect the ability of sub-national authorities to engage with Structural Fund programmes. Some of these constraints are financial, but they are also technical and institutional (see also Charron et al 2011, for example). Measures taken in some Member States to reform institutional structures have, in the short-term at least, exacerbated these challenges and highlight the importance of taking appropriate actions in a pre-emptive manner, rather than being crisis-led.

A final consideration in our review has been a tendency across several case studies to move towards larger, more strategic projects, and away from smaller more locally-focused activities. This is apparent in West Wales and the Valleys. Baden-Württemberg and Southern and Eastern Ireland. Whilst this appears to reflect a changing political agenda in all cases, rather than an explicit response to the economic crisis, it arguably supports those that argue for a more effective use of Structural Fund programmes, as measured by traditional economic indicators.

10 A ROADMAP FOR POLICY IMPLEMENTATION AND FURTHER RESEARCH

The challenge of economic shocks is that we do not know how they will necessarily play out in different places owing to the significant influence of slight differences in context, starting conditions and the choices made by households, firms and policy-makers. Not only does this make it difficult to pre-determine appropriate policy responses it also highlights the importance of the engagement of local and regional actors in the policy-making process. There can be no top-down route to regional economic resilience.

However, this does not mean that policy bottom-up solutions are necessarily superior. Regions often lack knowledge, capacity and resources to deal with wide-ranging economic shocks. The ability to distribute risk across territories is an essential ingredient for resilient economies. Similarly, the degree of integration in modern market economies means that contagion effects rapidly transmit the consequences of economic shocks across territories through unforeseen connections, privileging collective responses over the isolated and local.

Developing a roadmap for policy implementation in this context is complex. In the following section we highlight some key principles. The particular instruments and detailed approaches will vary depending upon institutional context.

Firstly, effective policy implementation requires the ability to react quickly to economic shocks. Whilst the immediate effects of the economic crisis are now behind us there is the opportunity to learn from the experience. To identify where policy instruments were able to react positively, where instruments were missing, and where existing instruments had a negative effect. Effective policy instruments will be required to meet the challenge of future shocks and now is the time to ensure they are available when needed. These are most likely to be policies at the regional or national scale, but international lessons should also be learnt. The speed with which Amending Regulations were approved to facilitate continuing investment by the Structural Funds was highly positive, but this did not always lead to enhanced spending on the ground. A challenge in this process is the ability to acknowledge when disruptive change is required for longer-term transformation to occur.

Secondly, concerted and coordinated efforts are required to assist economies to recover from the crisis. Efforts in this regard are ongoing. It is important that such measures do not reinforce entrenched weaknesses in regional and local economies in pursuit of short-term solutions. Economic growth which merely replicates existing structural weaknesses will leave an economy ill-prepared for a future economic shock. Policy instruments that are aimed at re-orientating economies towards new growth

paths, through assisting new firm formation, the development of new external markets and contributing to the development of a diverse and dynamic industry mix, with a skilled workforce are to be preferred. The policy instruments deployed today determine the resilience of the economy to the next economic shock, so long and medium-term perspectives are fundamental. In developing policy responses, policy-makers should seek to learn from their own experience and that of others. What is it that made their particular territory more or less resilient to the last crisis? At a national level policy instruments that preferentially favour one territory over another in the interests of national growth policies may be justified in the short-term, but their long-term consequences should also be realised.

Thirdly, and most fundamentally, any roadmap for policy implementation must stress the importance of preparing for future economic shocks. This is not about seeking to predict the outcomes of potential shocks, but rather about building the resilience capacity of the economy. To do so requires a focus on the adaptive capacity and capability of social and economic structures. Some of this will be of a traditional form, such as support for firm-level innovation, broader innovation structures and workforce development. However, attention should also be given to the strength of network structures and social capital. Policy may also consider developing the capacity of a regional economy to absorb a future economic shock, where it is unable to withstand it. At a European scale this could involve a slight reconfiguration of the overall aims of EU Cohesion Policy, where convergence and competitiveness objectives are complemented by a commitment to promoting economic resilience. A commitment that would simply positively affirm the value of actions already promoted by Cohesion Policy instruments.

Fourthly, policy makers should seek to anticipate the risks of any future economic shock. Not to predict its timing or nature, but to assess the extent to which the economy might be vulnerable as a whole. This should not be done on the basis of standard indicators, although these may play a part, but rather on a qualitative understanding of the overall working of local economic and social structures. We propose a simple healthcheck as a starting point for this process. The lessons learnt from such an exercise can then feed back into actions to prepare the ground for a more resilient economy. Any such exercise will benefit from real time monitoring information, rather than data that is two or three years out of date. Exploring alternative possibilities in this area and sharing lessons learnt can form an area for wider collaboration. Shared learning is a very important part for a roadmap, the crisis exposed gaps in experience, knowledge and institutions as policy makers sought to react to a rapidly unfolding situation. Developing a store of knowledge, a strong contact network and previous experience of potential scenario developments through peer-based learning can assist future policy implementation.

Finally, we wish to re-emphasise the importance of place-based policy making in any policy roadmap. The unique diversity of territorial experiences to the economic crisis

both highlights the importance of working in a spatially-aware environment, but also the difficulties of crafting the bespoke mix of policy instruments appropriate to each particular context. Similarly, as noted above, regions and localities operate as part of complex national and international systems, limiting the value of creating bounded-spaces of superficially similar places. Rather, successful place-based policy making involves deploying available instruments in mix that responds to the particular characteristics of individual territories, so that the policy mix is place-shaped as much as being place-based. This places a strong onus on the capacity and capability of governing bodies to bring this mix together. Promoting the economic resilience of regions cannot be the responsibility of any single sphere of governance, rather it is a collective endeavour, a shared responsibility. Different solutions will be appropriate in different institutional contexts but enabling a multi-layered sharing of risk across and within territories, whilst supporting the development of endogenous adaptive capacity is crucial for the resilience of places.

Further research

The ESPON ECR2 project constitutes the most comprehensive analysis of regional resilience to the economic crisis yet undertaken. It has been ambitious in its scope and coverage. Naturally, in such a wide-ranging and ground-breaking project, some aspects have been more fully covered than others, whilst the analysis itself has thrown up new areas of potential enquiry. We recommend the following six areas as meriting further research.

There is a strong requirement to further analyse the significance of territorial characteristics as a factor in the observed resilience of regions. Mountainous, coastal and border territories are all associated with less resilient outcomes. This may be due to innate territorial characteristics or could be a statistical effect. In pursuing this research consideration should also be given to the finding that high shares of agricultural employment can be associated with highly resistant outcomes. Analysis of the particular response patterns associated with these regions would provide valuable insights on potential paths to resilience.

A key strand for further analysis is to consider the transformative effects of the economic crisis over the longer-term. Due to the available time-horizon the ECR2 project has been able to assess the extent to which regional economies have returned to their original state following the crisis (as measured by employment or GDP). It has also been able to observe reorientation processes at work, some of which assisted in economic recovery, others appear to lay the foundations for deeper structural shifts. Deeper assessment of the role of the crisis in promoting transformative change, and understanding how this can shift economies to new modes of economic activity (potentially to higher or lower growth paths) would be highly valuable. Now forms an opportune time to do so, and assess the role that policy institutions and instruments play as facilitating or constraining forces.

An associated research priority is to explore in more depth the role that governance plays in promoting resilient economies. This is an aspect where our case study work provided important glimpses of the significance of the processes at work, but where eight cases provided insufficient coverage to draw robust conclusions. The potential of government as a flexible learning organisation able to develop adaptive policies is highlighted as an important component in securing resilient outcomes, but remains to be explored further.
A crucial avenue for further exploration is the role of agency in shaping adaptive structures that are better able to withstand and absorb the effects of economic shocks. Understanding the role of agency as a shaping force in a dynamic and complex socio-economic system could offer new and more effective policy approaches for developing economic resilience capabilities. Actions that strengthen the system's ability to respond to shocks through building self-organising capabilities are particularly significant at times of more frugal fiscal environments.

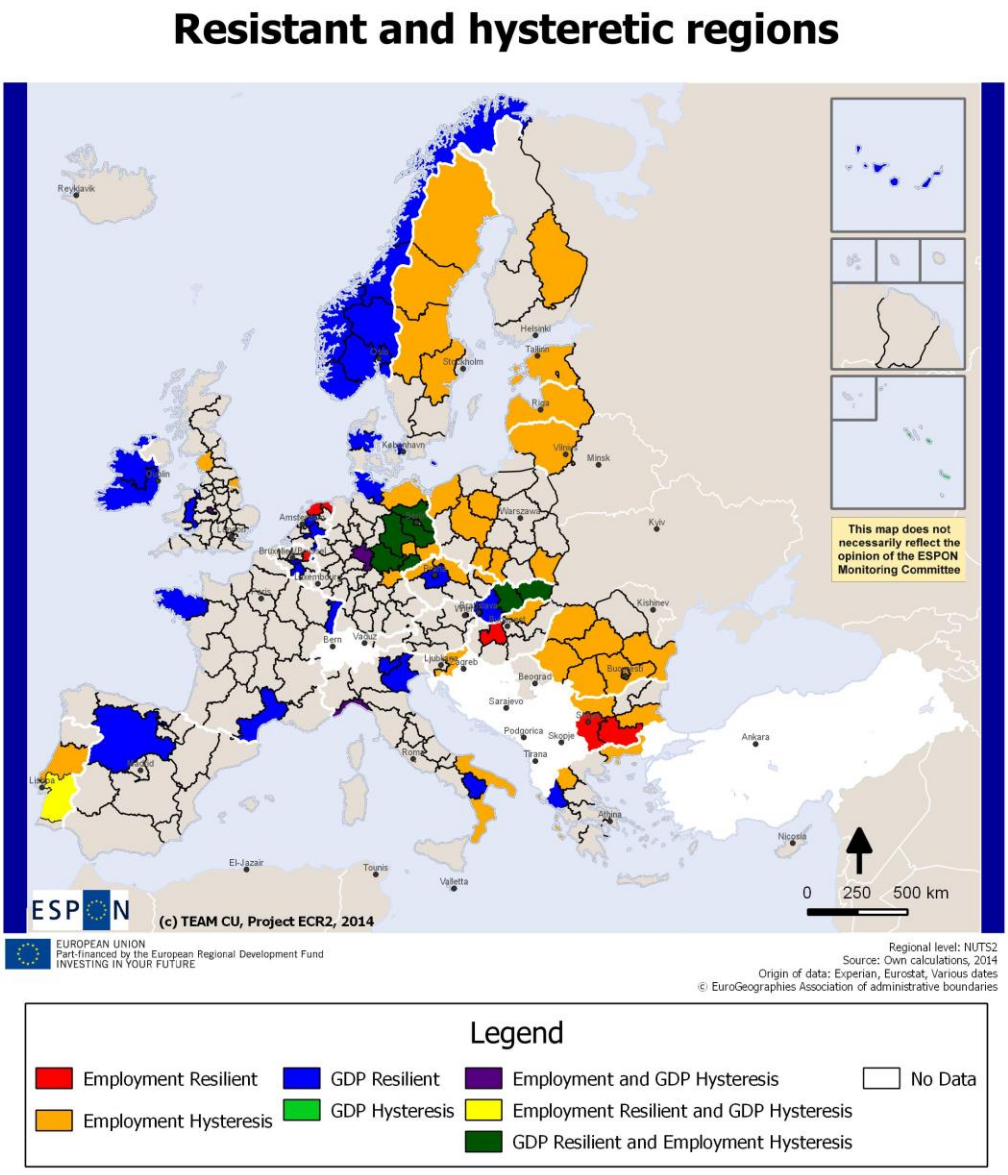
Further research is also required to deepen understanding of the complex interplay between features that enhance resilience within localities. Whilst our research has cast light on the individual factors that are associated with more resilient outcomes, multivariate analysis demonstrates that the interplay of these is complex and unpredictable, with positive features in some circumstances becoming negative in others. Further research as to how resilience attributes combine within spaces and over time could provide strong, policy relevant, findings.

A final area for research acknowledges the limitations of existing metrics for the measurement of resilience and its evolution over time. Standard measures based on employment, economic output and incomes all offer conceptual limitations. They, and other available metrics, also suffer from lags in availability. Exploring different approaches for securing real-time dynamic measures of resilience capabilities offers real potential to assist those policy makers who wish to manage the resilience of their economy to future potential economic shocks.

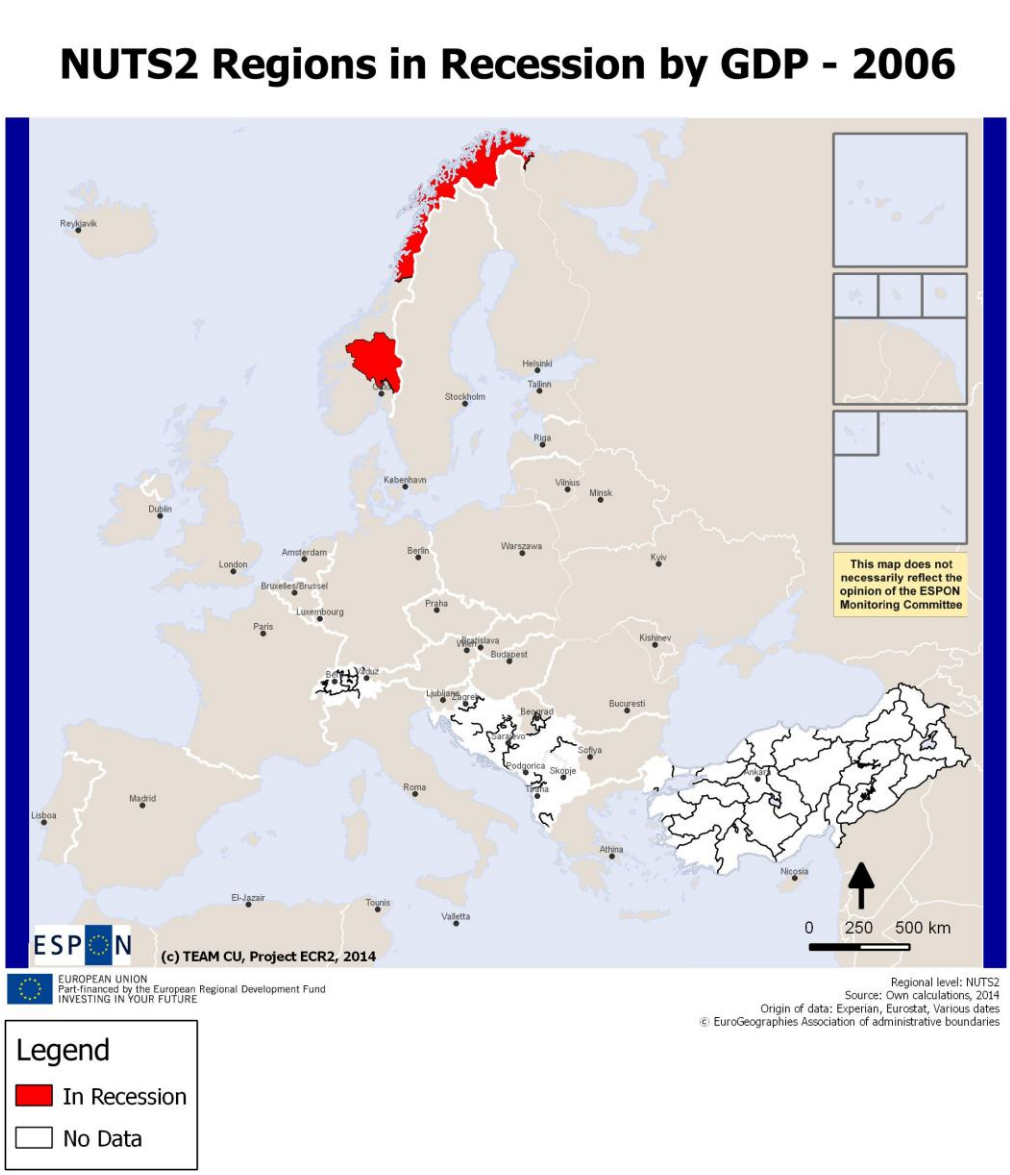
11 MAPPING THE CRISIS AND ECONOMIC RESILIENCE

In the analysis of the crisis and economic resilience, the ECR2 project created a number of maps which are referenced throughout this report. These are set out here. Original maps are contained in the file accompanying this report.

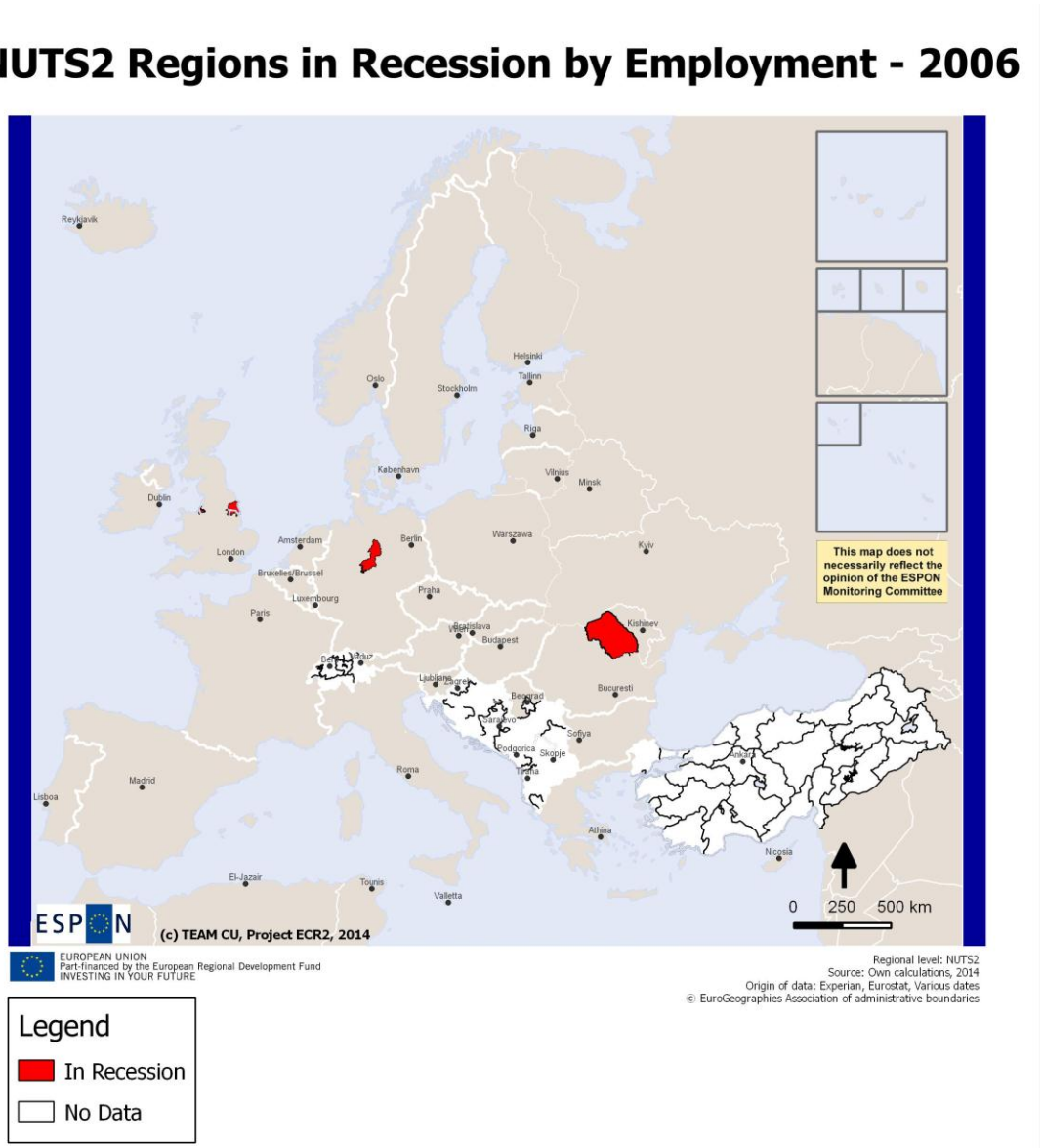
Map 4.1


Resistant and hysteretic regions
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Employment Resilient
Employment Hysteresis
GDP Resilient
GDP Hysteresis
Employment and GDP Hysteresis
Employment Resilient and GDP Hysteresis
GDP Resilient and Employment Hysteresis
No Data

Map 5.1


NUTS2 Regions in Recession by GDP - 2006
Reykjavik
Helsinki
Tallinn
Stockholm
Riga
København
Vilnius
Minsk
Dublin
Amsterdam
London
Berlin
Warszawa
Kyiv
Bruxelles/Brussel
Luxembourg
Praha
Paris
Kishinev
Budapest
Bucuresti
Beograd
Sofiya
Skopje
Roma
Madrid
Lisboa
Athina
Nicosia
El-Jazair
Tounis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

Map 5.2


NUTS2 Regions in Recession by Employment - 2006
Reykjavik
Oslo
Helsinki
Tallinn
Stockholm
Riga
Kobenhavn
Vilnius
Minsk
Dublin
London
Amsterdam
Berlin
Warszawa
Kyiv
Bruxelles/Brussel
Luxembourg
Praha
Paris
Kishinev
Budapest
Bucuresti
Ljubljana
Beograd
Sofiya
Skopje
Roma
Madrid
Lisboa
Athina
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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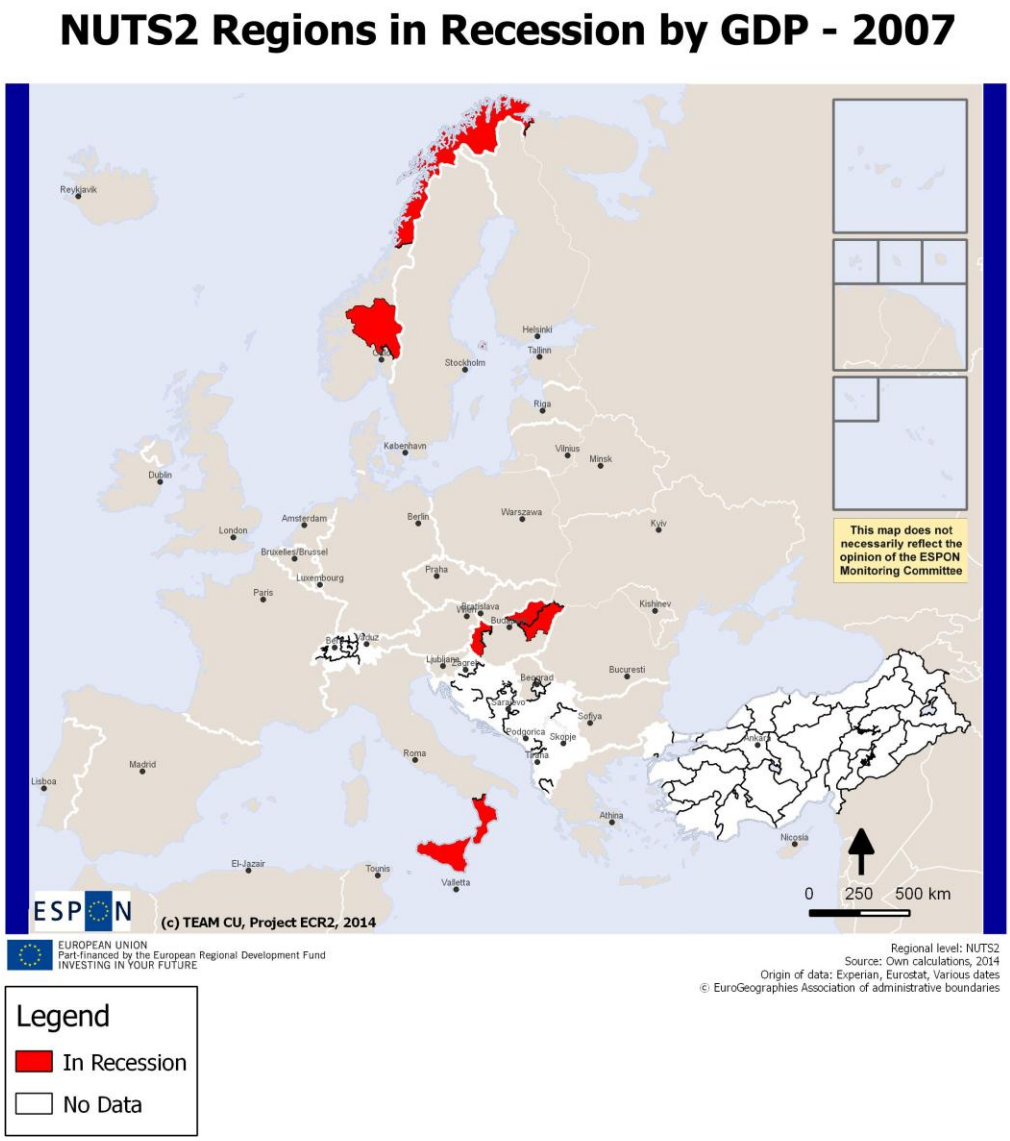
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

Map 5.3


NUTS2 Regions in Recession by GDP - 2007
Reykjavik
Helsinki
Tallinn
Stockholm
Riga
København
Vilnius
Minsk
Dublin
Amsterdam
London
Berlin
Warszawa
Kyiv
Bruxelles/Brussel
Luxembourg
Paris
Praha
Kishinev
Bucuresti
Ljubljana
Zagreb
Beograd
Sofiya
Podgorica
Skopje
Roma
Madrid
Lisboa
Athina
Nicosia
El-Jazair
Tounis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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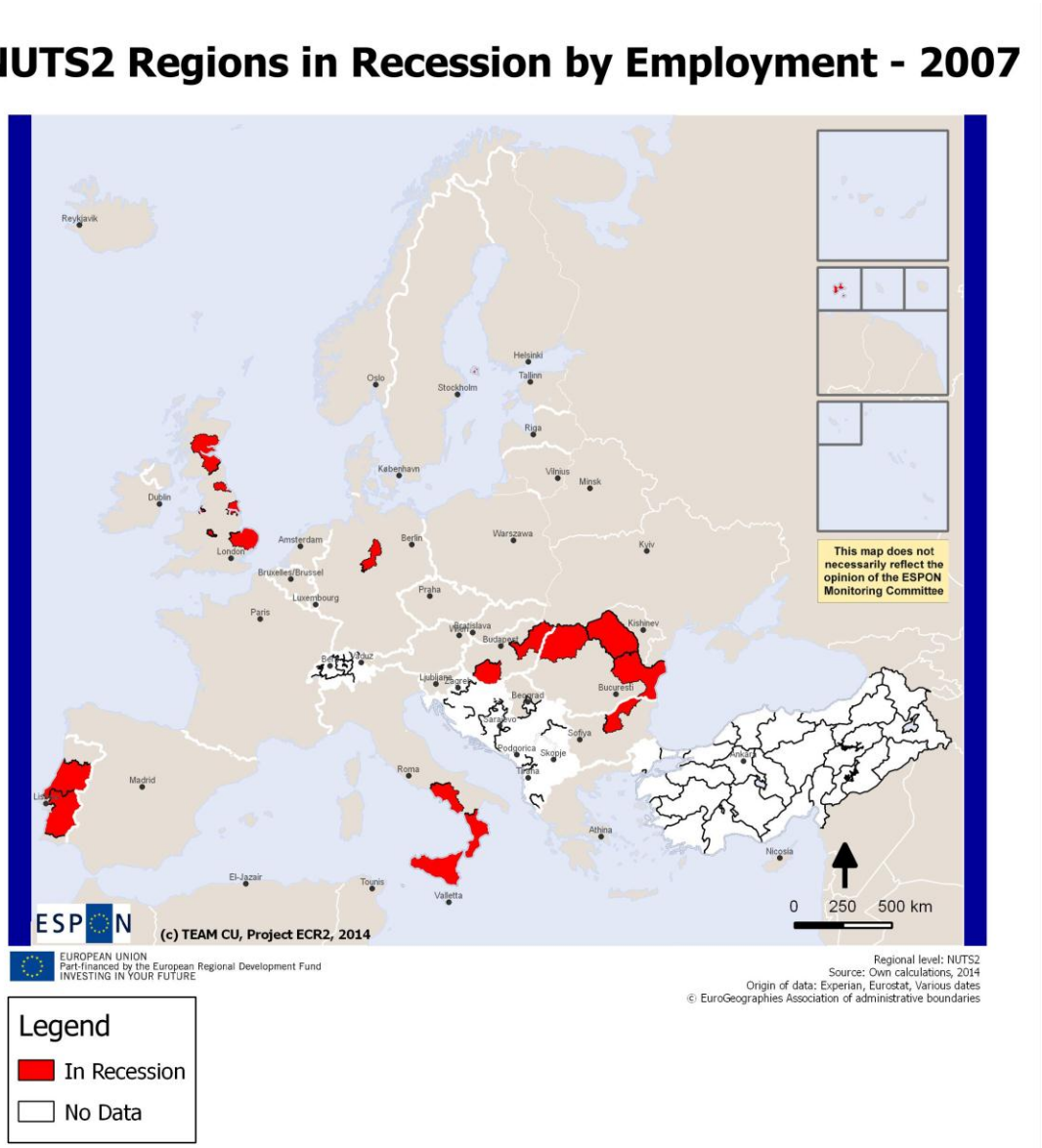
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

Map 5.4


NUTS2 Regions in Recession by Employment - 2007
Reykjavik
Oslo
Stockholm
Helsinki
Tallinn
Riga
København
Vilnius
Minsk
Dublin
Amsterdam
London
Berlin
Warszawa
Kyiv
Bruxelles/Brussel
Luxembourg
Paris
Praha
Kishinev
Bucuresti
Beograd
Sofiya
Skopje
Roma
Madrid
Athina
Nicosia
El-Jazair
Tounis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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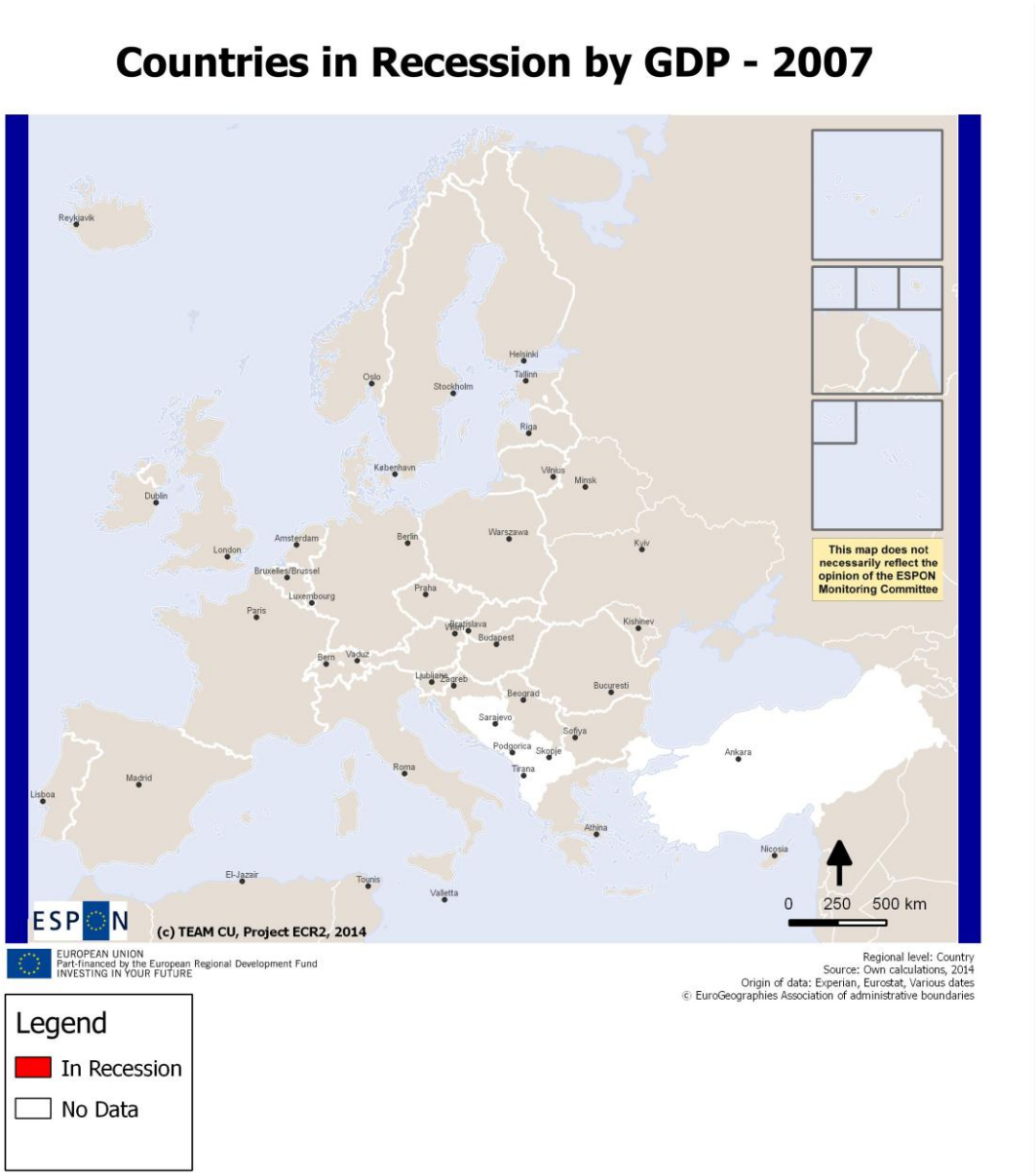
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

Map 5.5


Countries in Recession by GDP - 2007
Reykjavik
Oslo
Stockholm
Helsinki
Tallinn
Riga
København
Vilnius
Minsk
Dublin
London
Amsterdam
Berlin
Warszawa
Kyiv
Bruxelles/Brussel
Luxembourg
Paris
Praha
Bratislava
Budapest
Kishinev
Bern
Vaduz
Ljubljana
Zagreb
Beograd
Bucuresti
Sarajevo
Sofiya
Podgorica
Skopje
Tirana
Ankara
Roma
Madrid
Lisboa
Athina
Nicosia
El-Jazair
Tounis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
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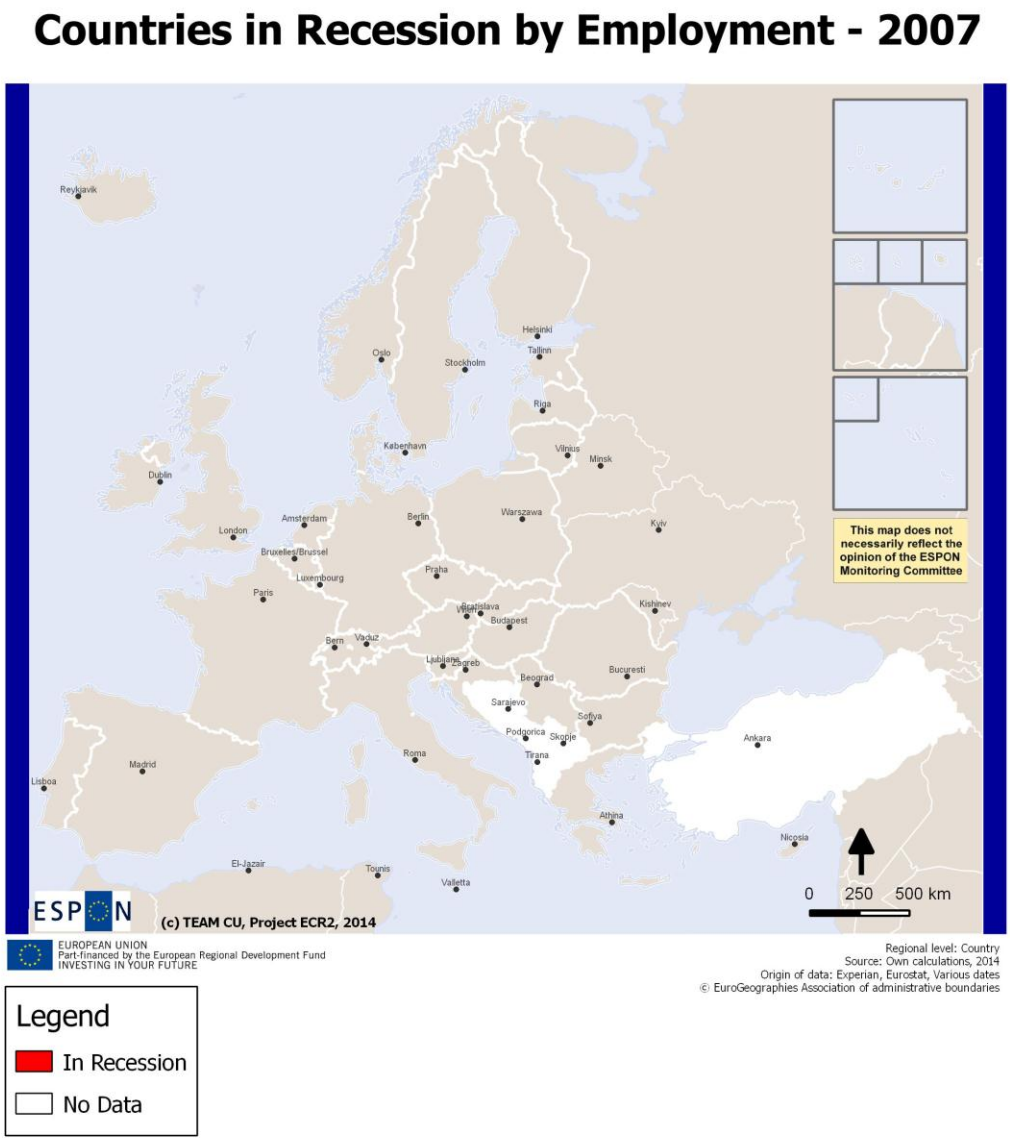
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

Map 5.6


Countries in Recession by Employment - 2007
Reykjavik
Oslo
Stockholm
Helsinki
Tallinn
Riga
København
Vilnius
Minsk
Dublin
London
Amsterdam
Berlin
Warszawa
Kyiv
Bruxelles/Brussel
Luxembourg
Paris
Praha
Bratislava
Budapest
Kishinev
Bern
Vaduz
Ljubljana
Zagreb
Beograd
Bucuresti
Sarajevo
Sofiya
Podgorica
Skopje
Tirana
Roma
Madrid
Lisboa
Ankara
Athina
Nicosia
El-Jazair
Tounis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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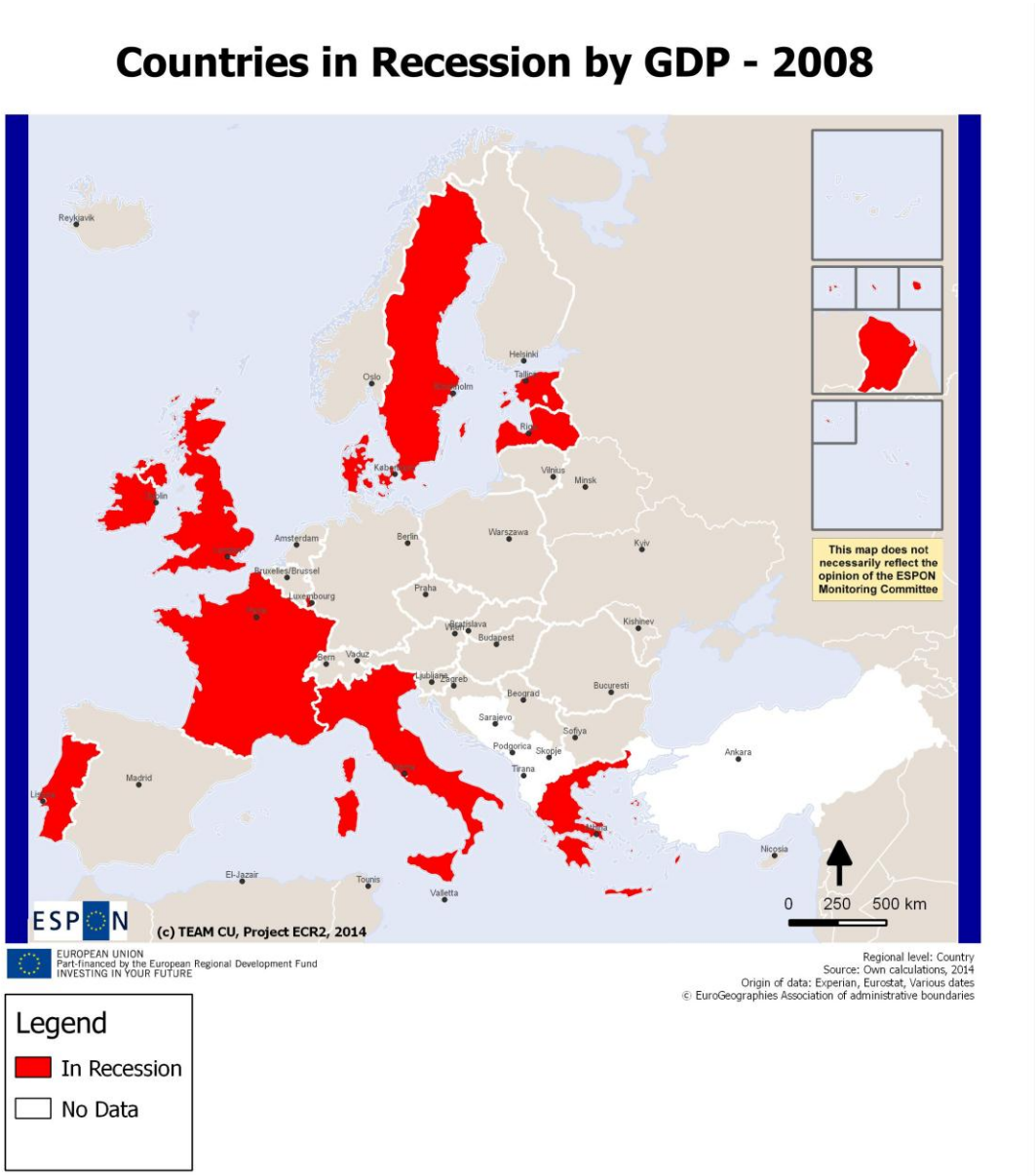
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

Map 5.7


Countries in Recession by GDP - 2008
Reykjavik
Oslo
Helsinki
Tallinn
Riga
Vilnius
Minsk
Kyiv
Amsterdam
Berlin
Warszawa
Bruxelles/Brussel
Luxembourg
Praha
Bratislava
Budapest
Kishinev
Bern
Vaduz
Ljubljana
Zagreb
Beograd
Bucuresti
Sarajevo
Sofiya
Podgorica
Skopje
Tirana
Ankara
Madrid
Nicosia
El-Jazair
Tounis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
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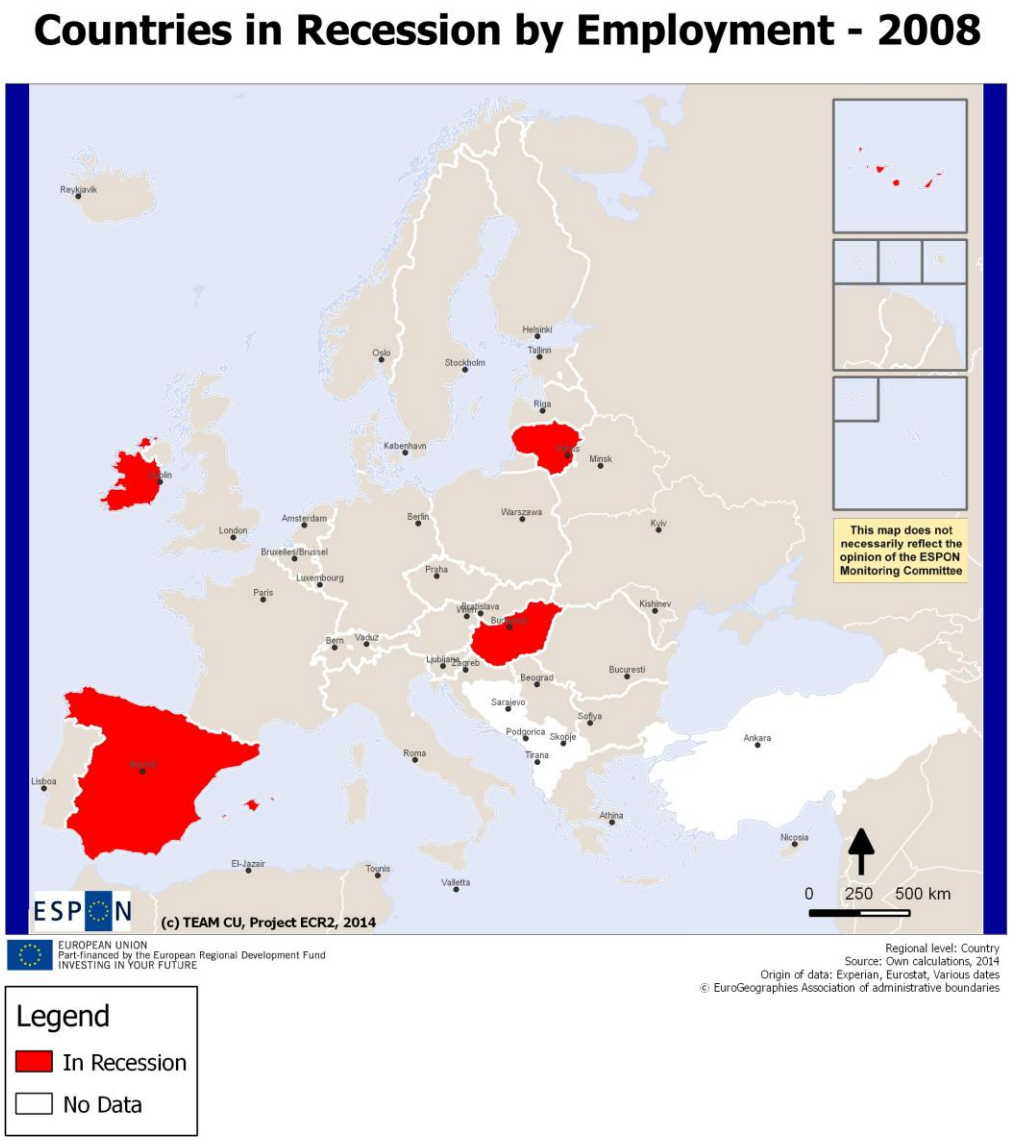
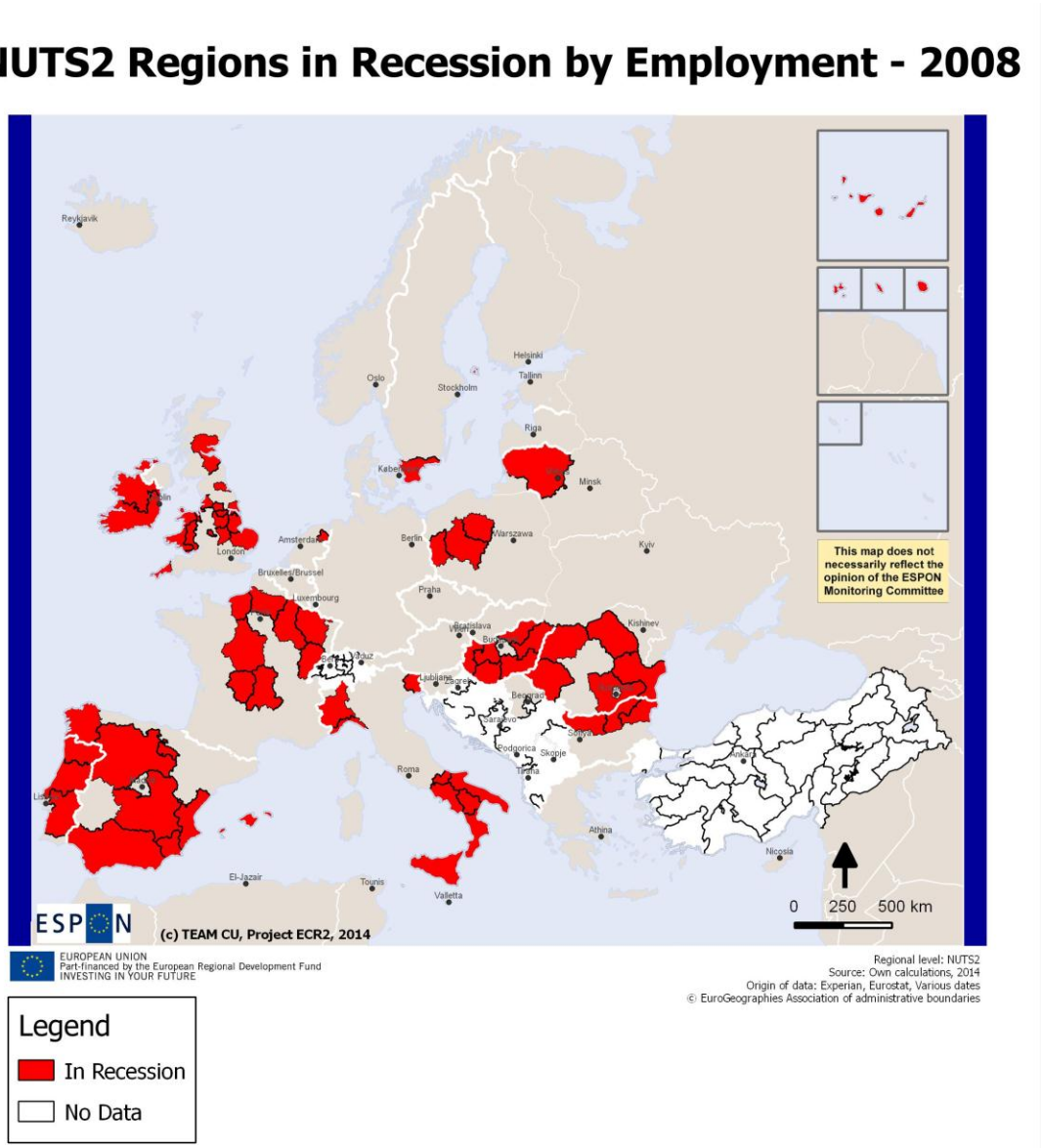
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

Map 5.8


Countries in Recession by Employment - 2008
Reykjavik
Oslo
Stockholm
Helsinki
Tallinn
Riga
København
Minsk
Dublin
London
Amsterdam
Berlin
Warszawa
Kyiv
Bruxelles/Brussel
Luxembourg
Paris
Praha
Kishinev
Bern
Vaduz
Ljubljana
Zagreb
Beograd
Bucuresti
Sarajevo
Sofiya
Podgorica
Skopje
Tirana
Ankara
Roma
Lisboa
Athina
Nicosia
El-Jazair
Tounis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

Map 5.9


NUTS2 Regions in Recession by Employment - 2008
Reykjavik
Oslo
Stockholm
Helsinki
Tallinn
Riga
Minsk
Kobenhavn
Amsterdam
London
Berlin
Warszawa
Kyiv
Bruxelles/Brussel
Luxembourg
Praha
Kishinev
Ljubljana
Beograd
Sarajevo
Podgorica
Skopje
Roma
Athina
Nicosia
El-Jazair
Tounis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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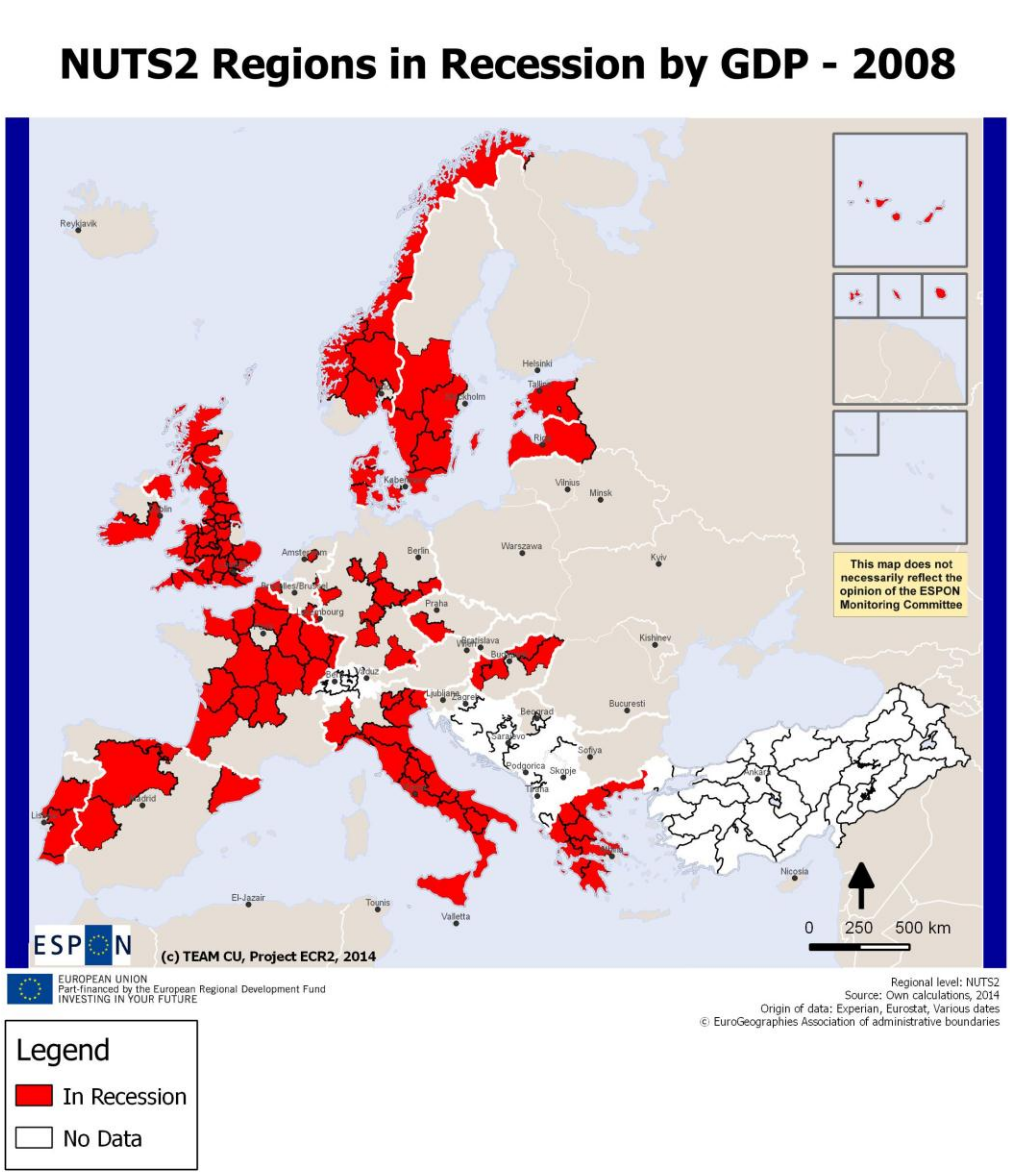
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

Map 5.10


NUTS2 Regions in Recession by GDP - 2008
Reykjavik
Helsinki
Tallinn
Stockholm
Riga
Kobenhavn
Vilnius
Minsk
Amsterdam
Berlin
Warszawa
Kyiv
Luxembourg
Praha
Kishinev
Bucuresti
Ljubljana
Zagreb
Beograd
Sarajevo
Sofiya
Podgorica
Skopje
Tirana
Madrid
Nicosia
El-Jazair
Tounis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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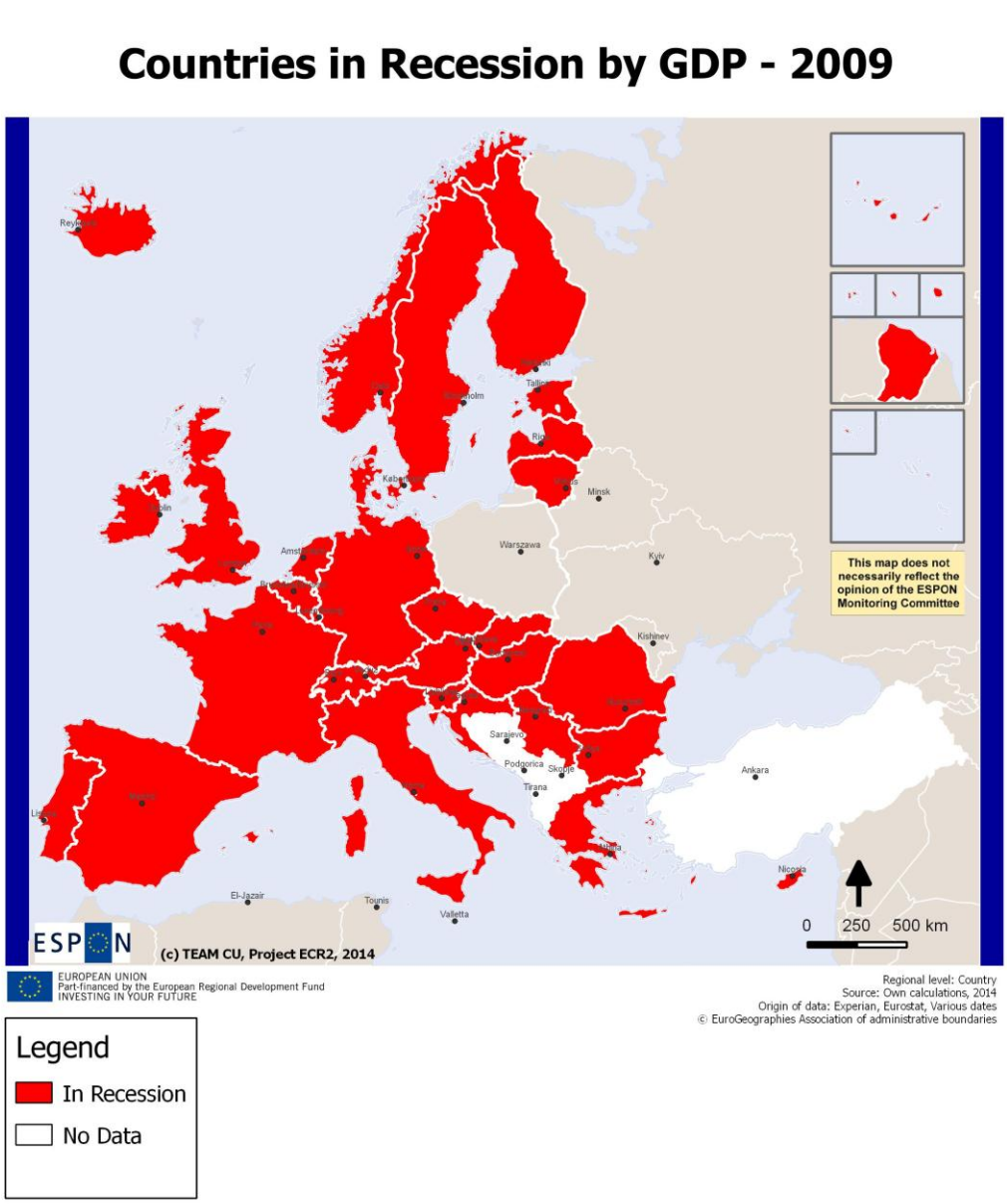
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

Map 5.11


Countries in Recession by GDP - 2009
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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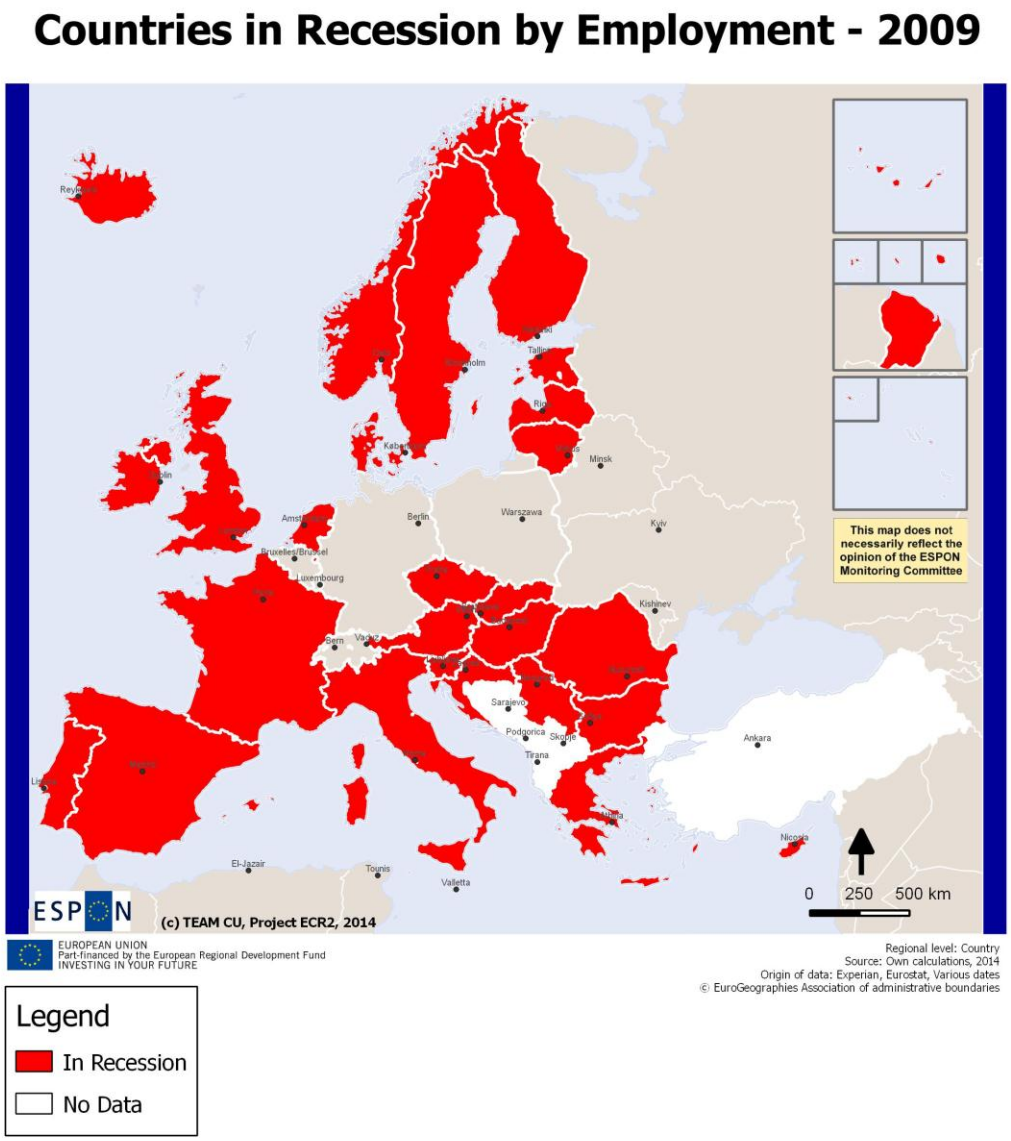
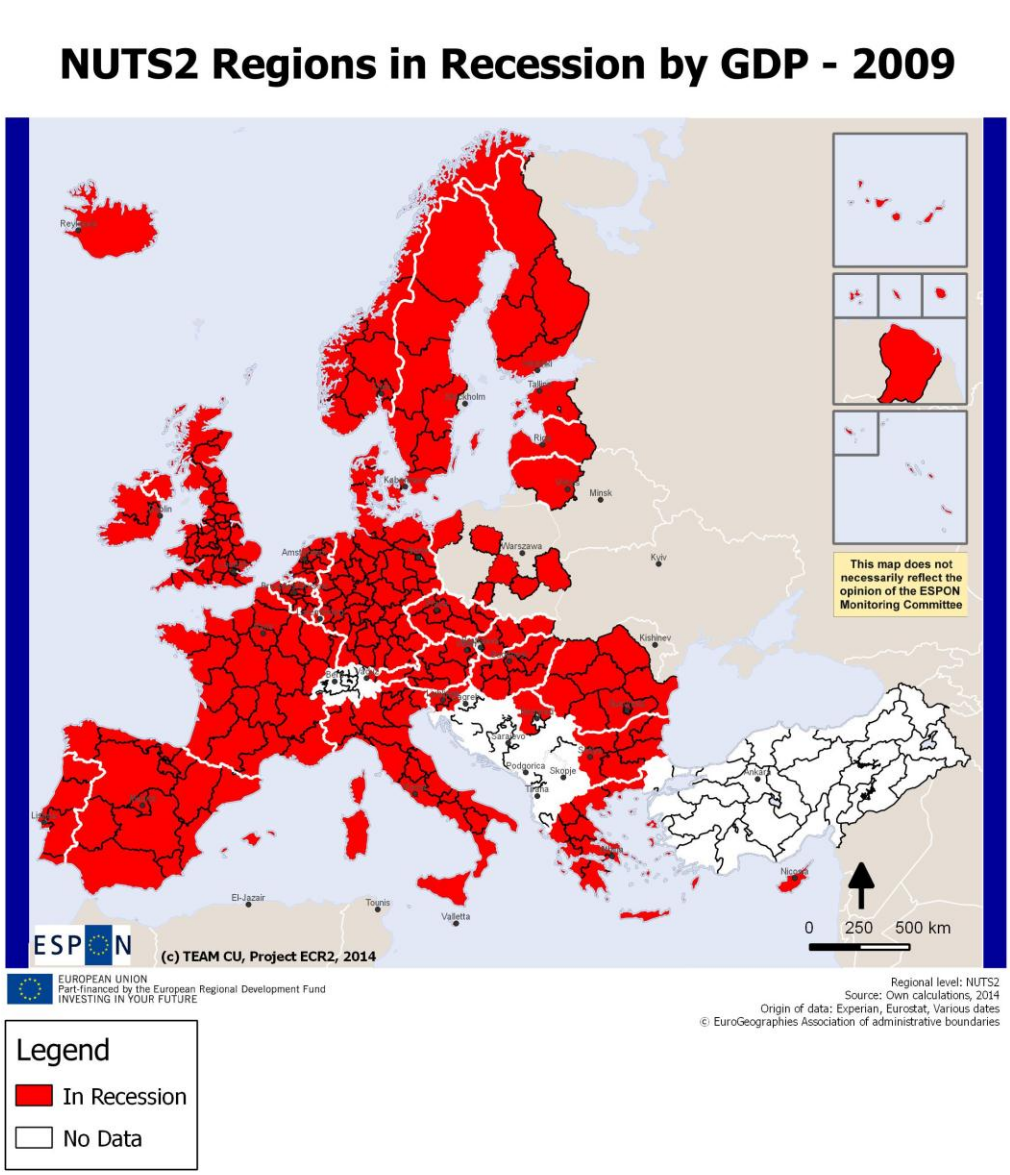
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

Map 5.12


Countries in Recession by Employment - 2009
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

Map 5.13


NUTS2 Regions in Recession by GDP - 2009
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
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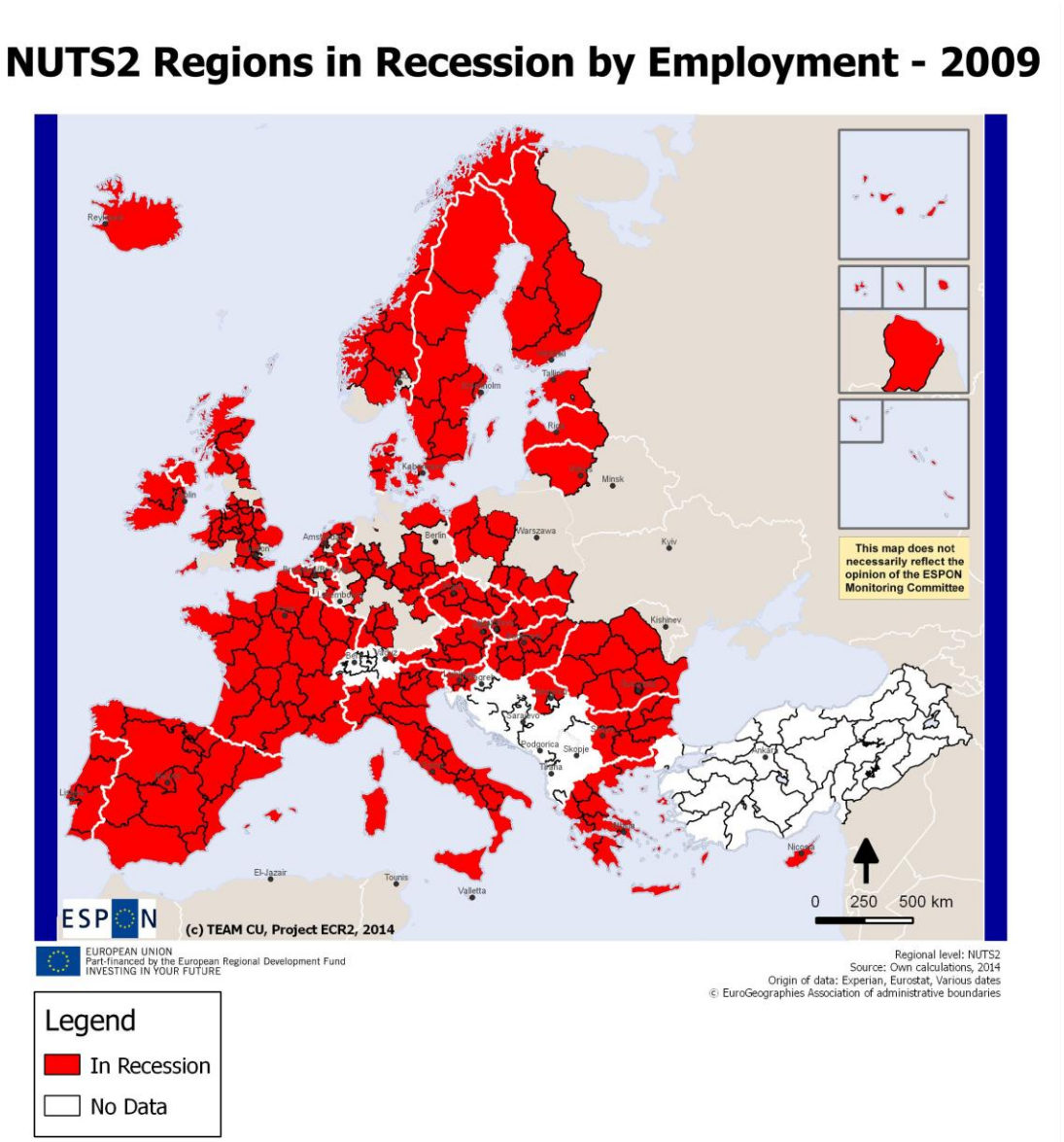
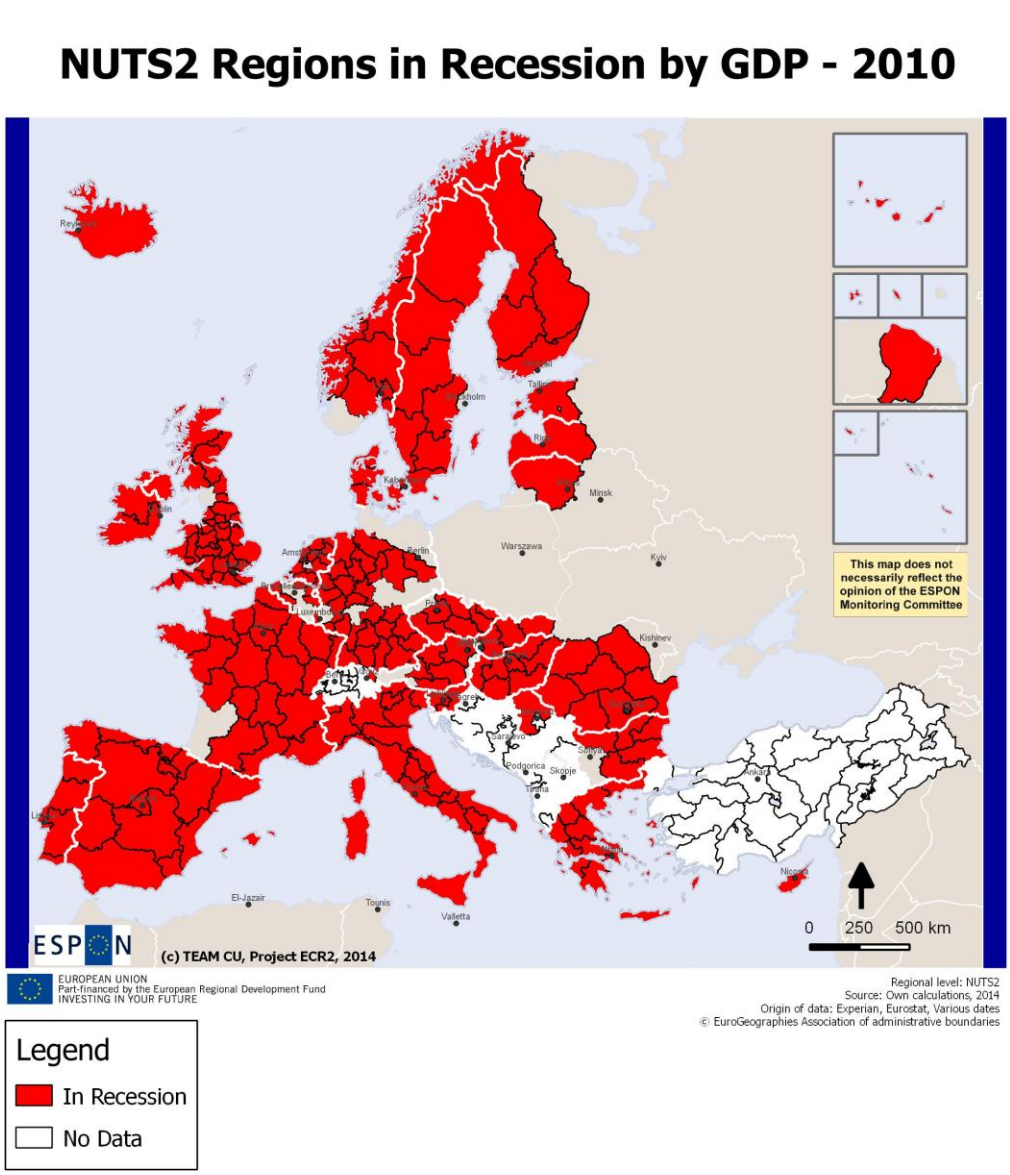
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

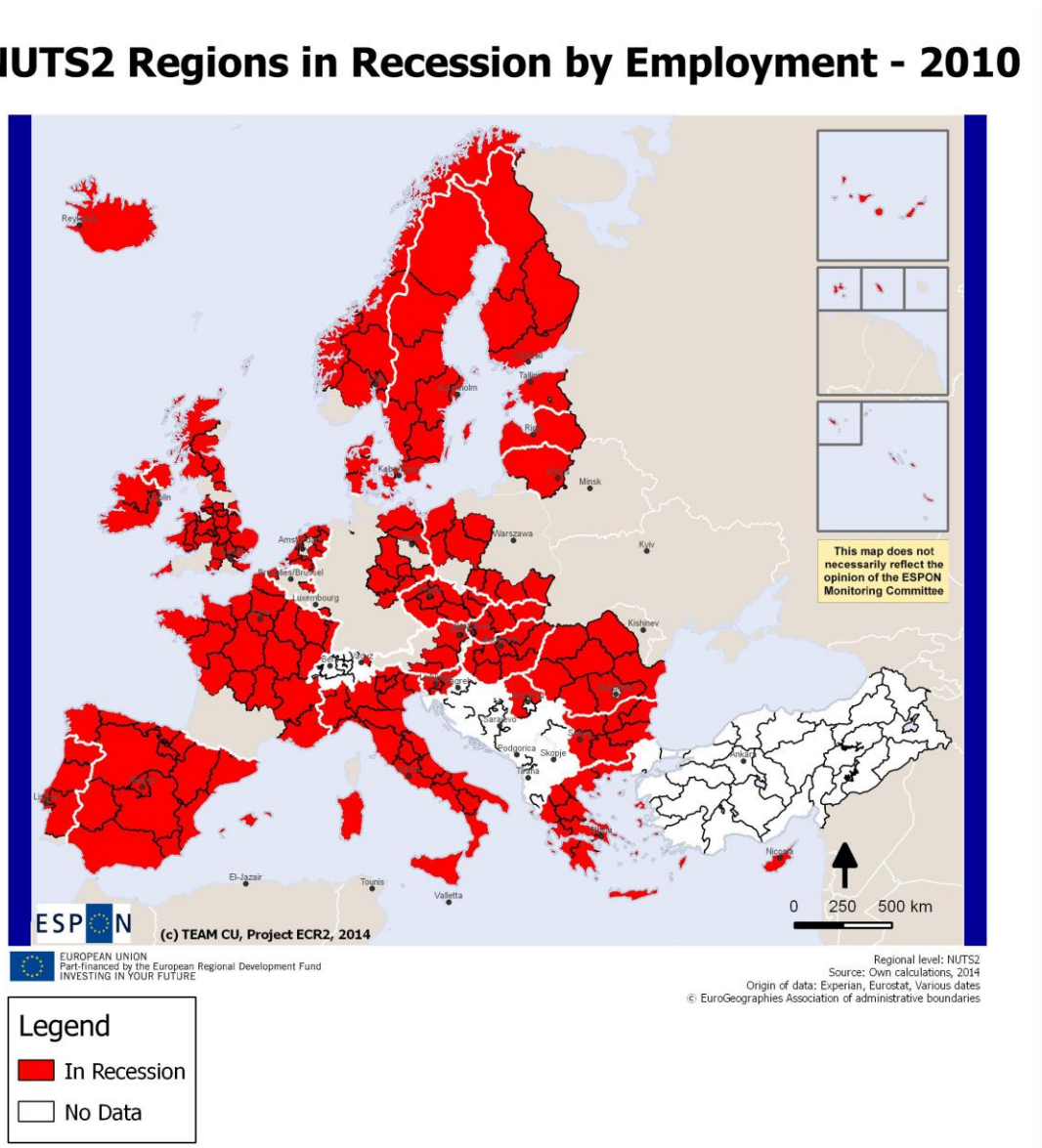
Map 5.14


NUTS2 Regions in Recession by Employment - 2009
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

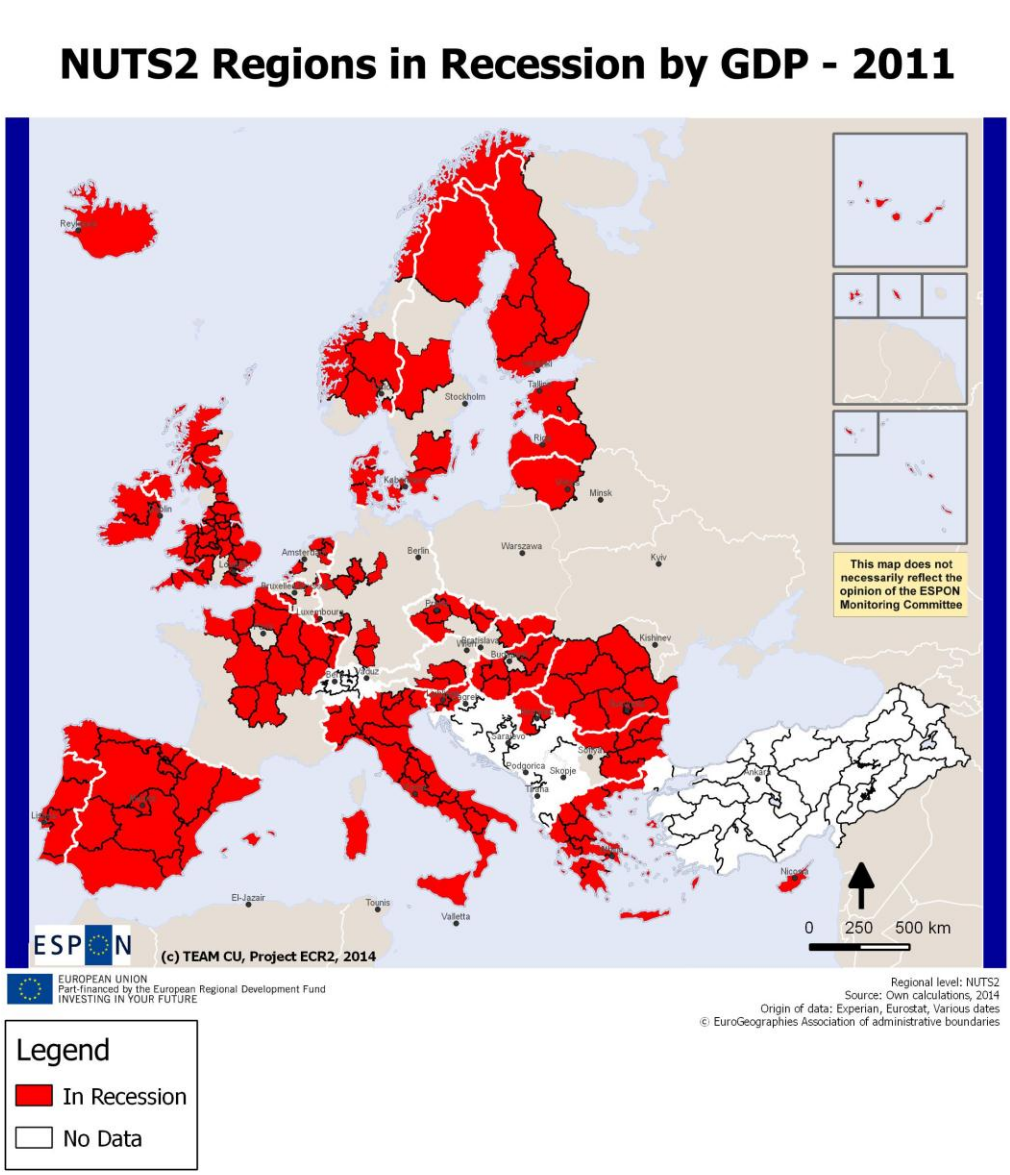
Map 5.15


NUTS2 Regions in Recession by GDP - 2010
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

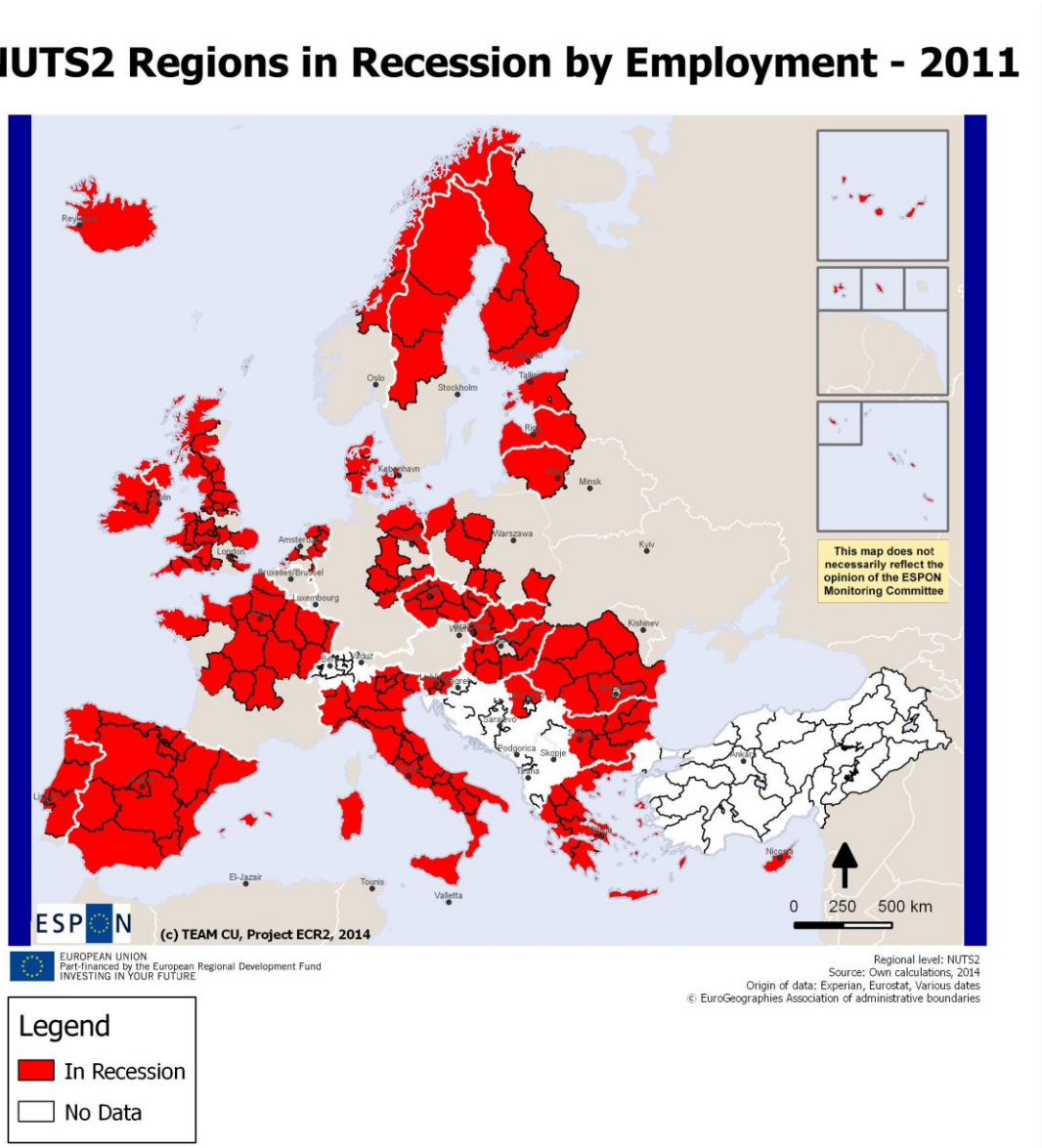
Map 5.16


NUTS2 Regions in Recession by Employment - 2010
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

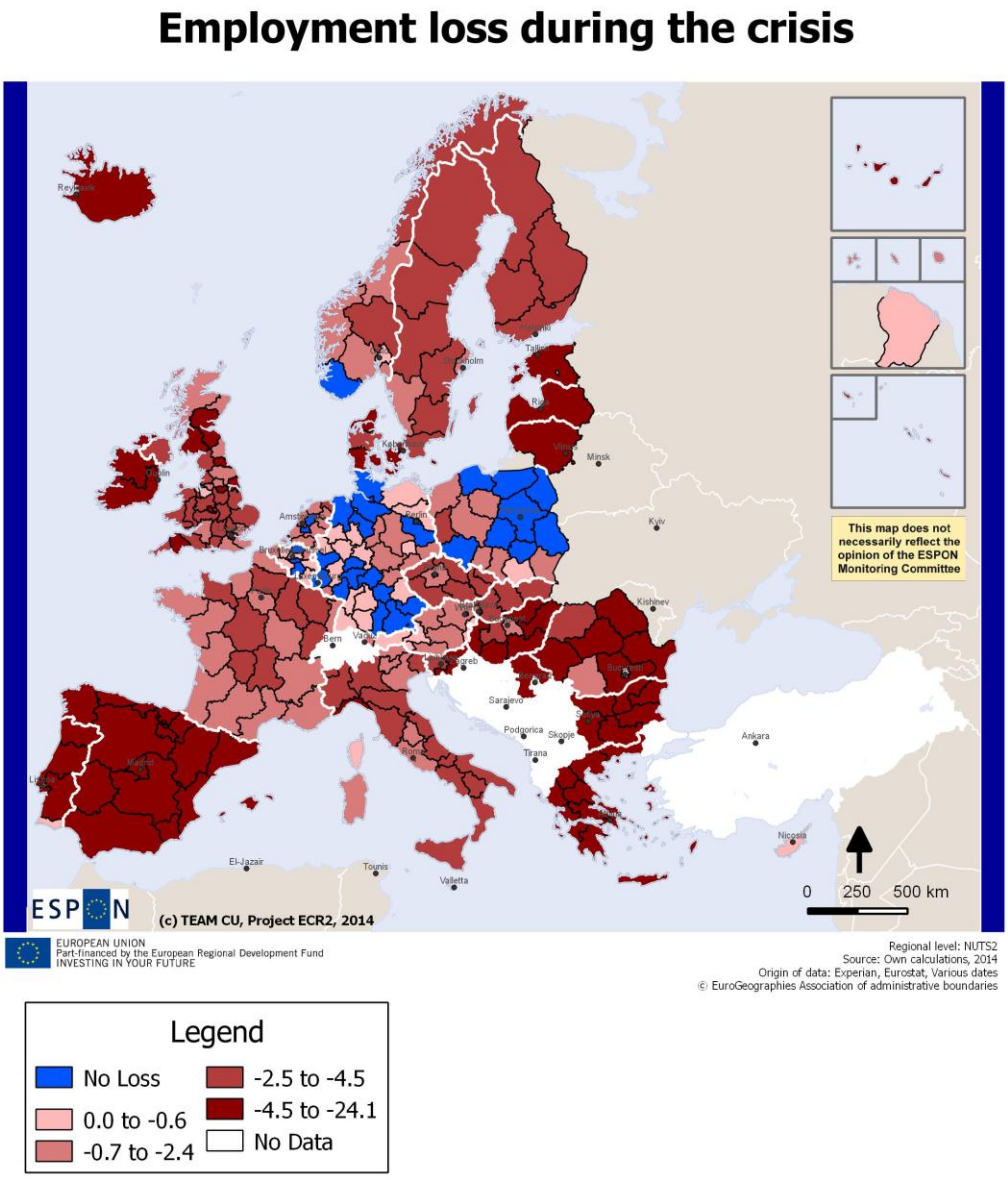
Map 5.17


NUTS2 Regions in Recession by GDP - 2011
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

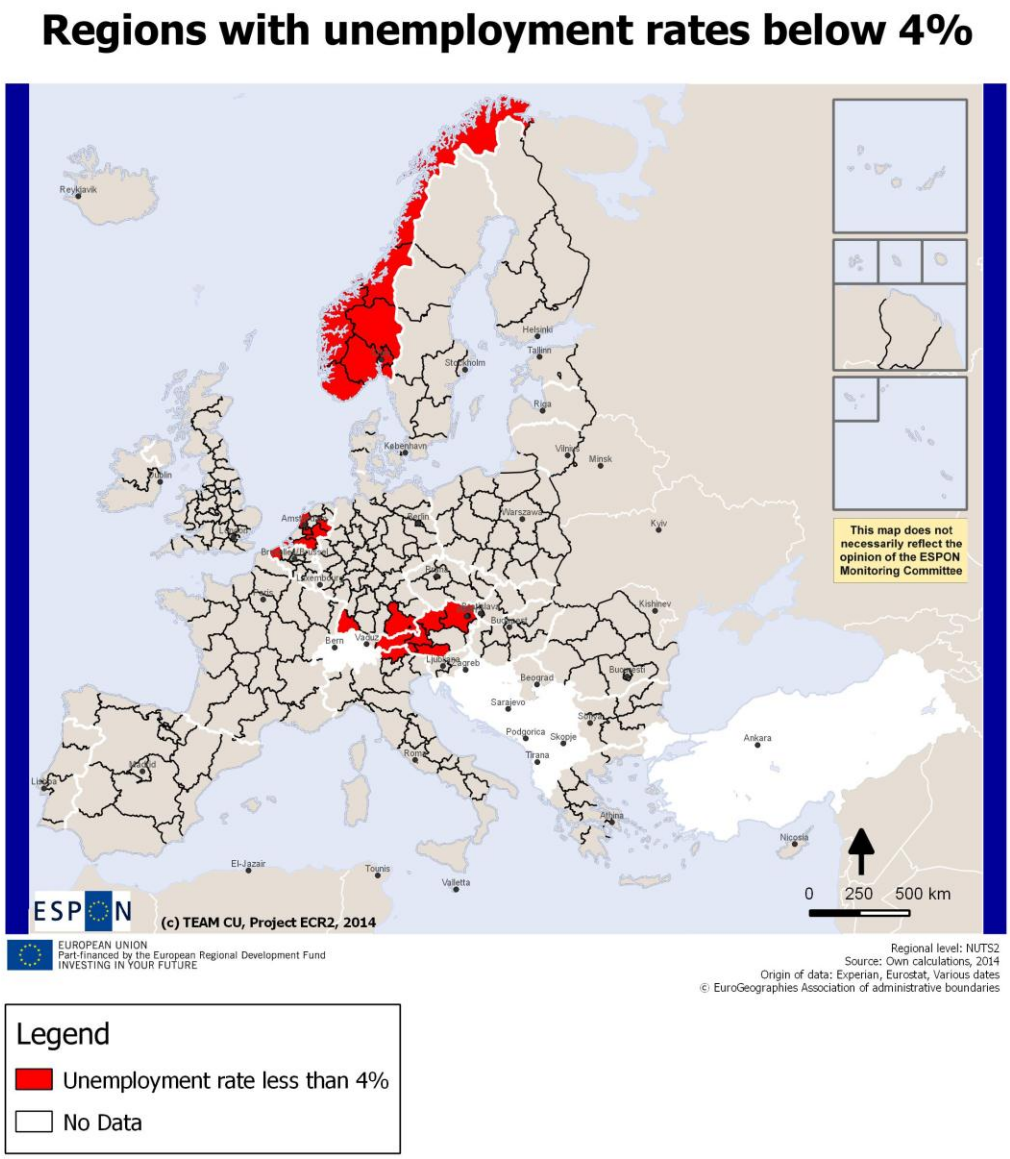
Map 5.18


NUTS2 Regions in Recession by Employment - 2011
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
In Recession
No Data

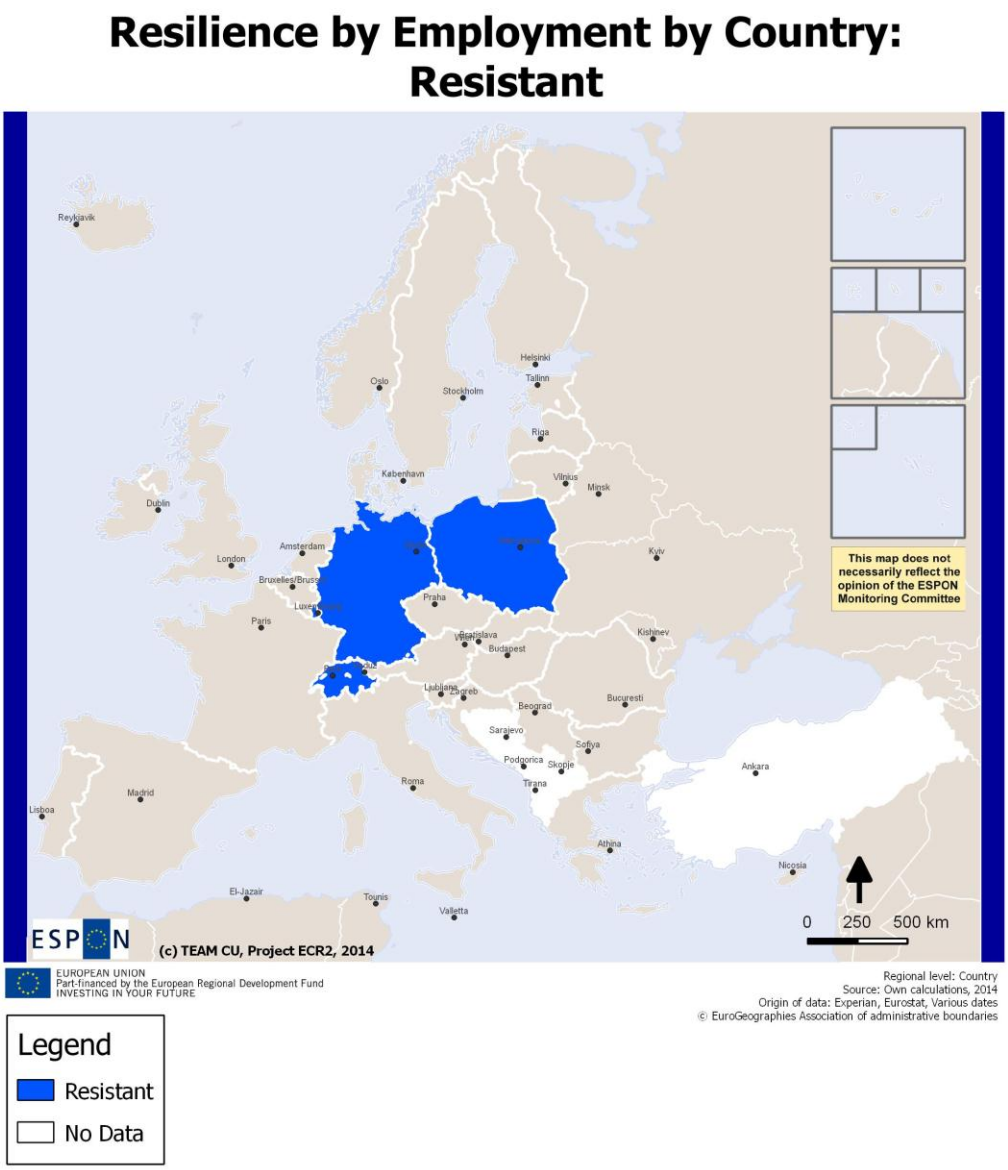
Map 5.19


Employment loss during the crisis
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
0 250 500 km
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
No Loss
0.0 to -0.6
-0.7 to -2.4
-2.5 to -4.5
-4.5 to -24.1
No Data

Map 5.20


Regions with unemployment rates below 4%
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Unemployment rate less than 4%
No Data

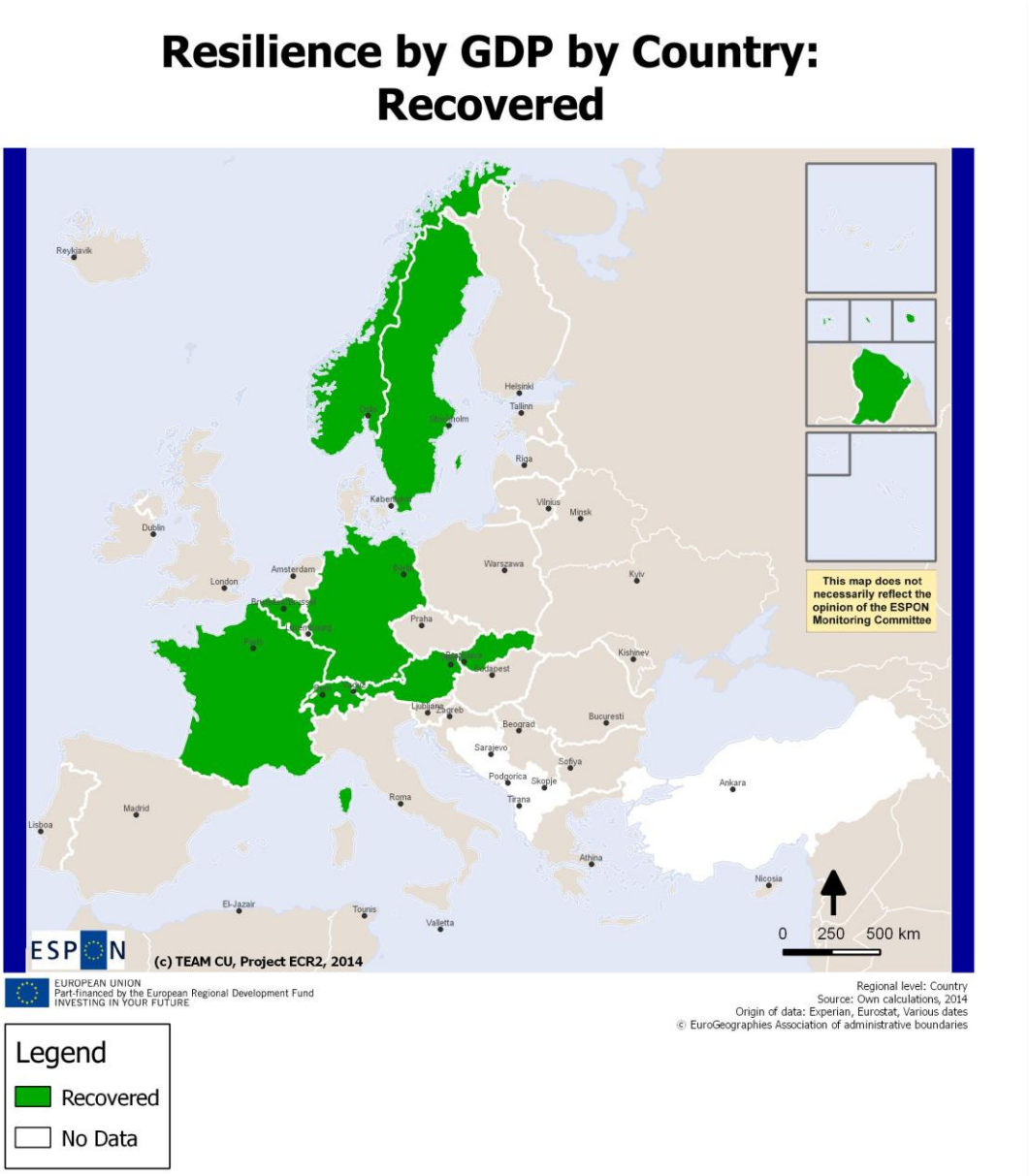
Map 6.1


Resilience by Employment by Country: Resistant
Reykjavik
Oslo
Helsinki
Tallinn
Stockholm
Riga
København
Vilnius
Minsk
Dublin
Amsterdam
London
Bruxelles/Brussel
Praha
Paris
Kyiv
Kishinev
Budapest
Ljubljana
Zagreb
Beograd
Bucuresti
Sarajevo
Sofiya
Podgorica
Skopje
Tirana
Roma
Madrid
Lisboa
Ankara
Athina
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Resistant
No Data

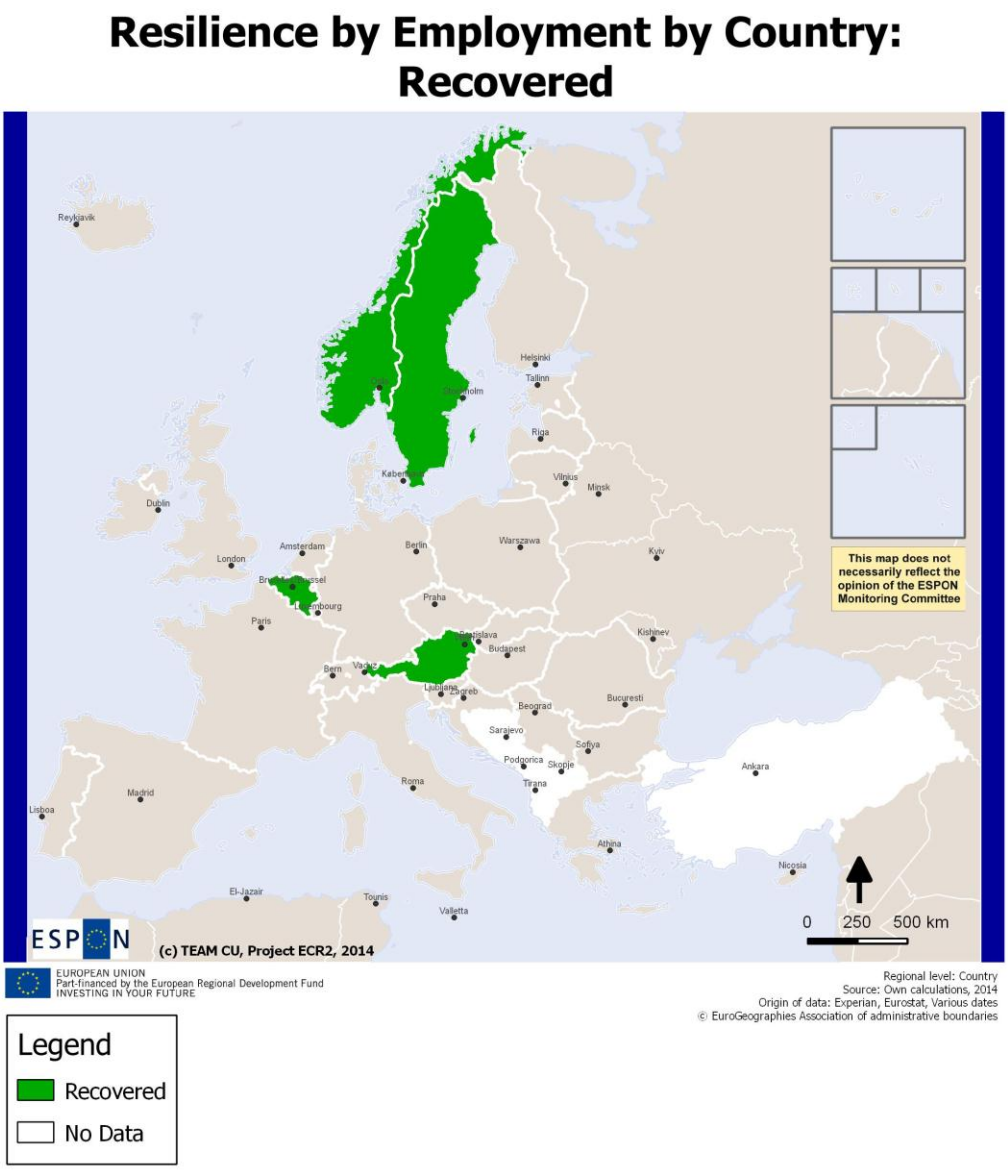
Map 6.2


Resilience by GDP by Country:
Resistant
Reykjavik
Oslo
Helsinki
Tallinn
Stockholm
Riga
København
Vilnius
Minsk
Dublin
Amsterdam
Berlin
London
Kyiv
Bruxelles/Brussel
Luxembourg
Praha
Paris
Kishinev
Budapest
Bern
Vaduz
Ljubljana
Zagreb
Beograd
Bucuresti
Sarajevo
Sofiya
Podgorica
Skopje
Ankara
Roma
Tirana
Madrid
Lisboa
Athina
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Resistant
No Data

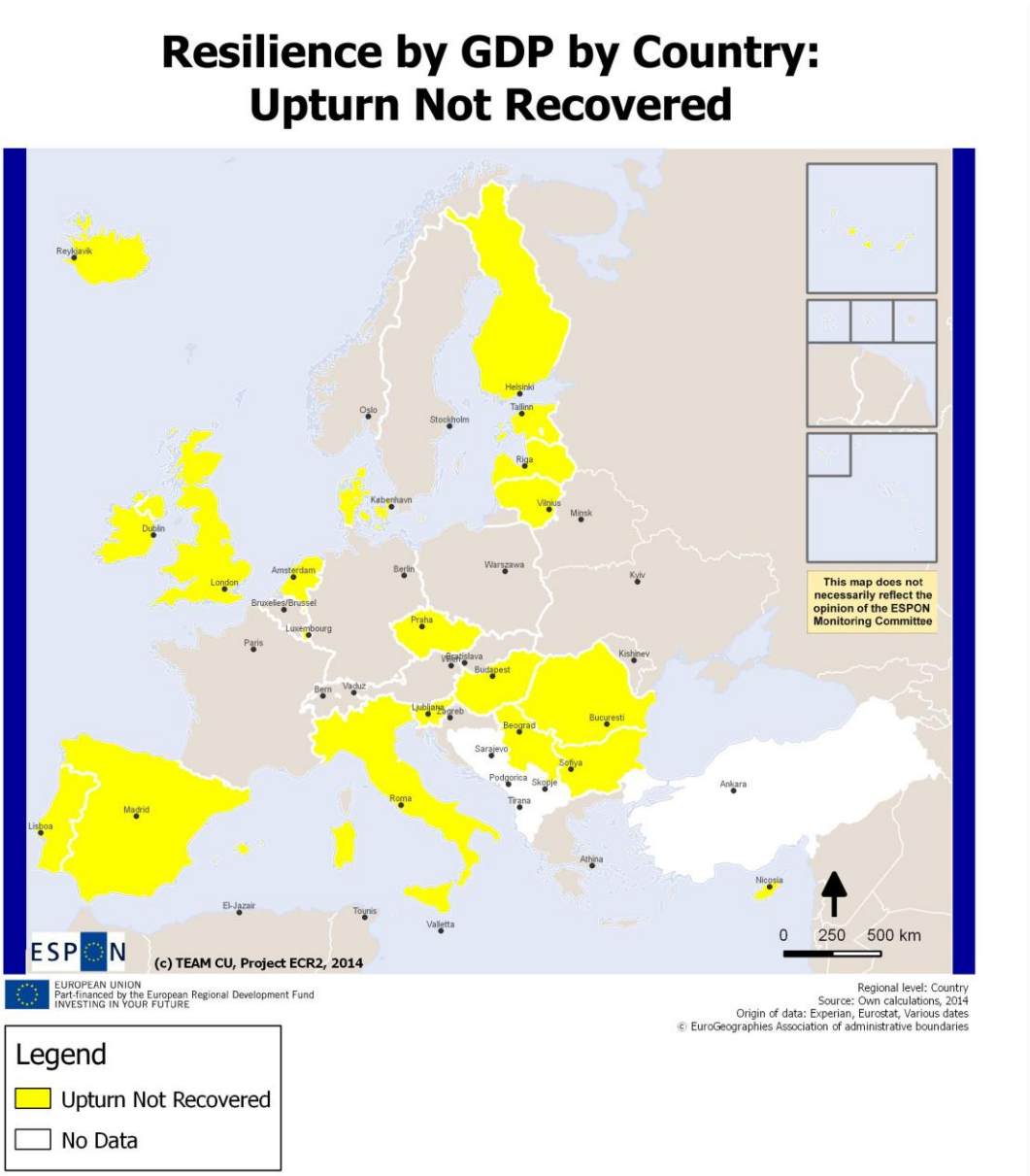
Map 6.3


Resilience by GDP by Country:
Recovered
Reykjavik
Helsinki
Tallinn
Riga
Vilnius
Minsk
Dublin
London
Amsterdam
Warszawa
Kyiv
Praha
Kishinev
Budapest
Ljubljana
Zagreb
Beograd
Bucuresti
Sarajevo
Sofiya
Podgorica
Skopje
Tirana
Ankara
Roma
Madrid
Lisboa
Athina
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Recovered
No Data

Map 6.4


Resilience by Employment by Country: Recovered
Reykjavik
Helsinki
Tallinn
Riga
Vilnius
Minsk
Dublin
London
Amsterdam
Berlin
Warszawa
Kyiv
Praha
Paris
Kishinev
Budapest
Bern
Beograd
Bucuresti
Saraievo
Sofiya
Podgorica
Skopje
Ankara
Roma
Tirana
Madrid
Lisboa
Athina
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Recovered
No Data

Map 6.5


Resilience by GDP by Country:
Upturn Not Recovered
Reykjavik
Oslo
Stockholm
Helsinki
Tallinn
Riga
København
Vilnius
Minsk
Dublin
London
Amsterdam
Berlin
Warszawa
Kyiv
Bruxelles/Brussel
Luxembourg
Paris
Praha
Bratislava
Budapest
Kishinev
Bern
Vaduz
Ljubljana
Zagreb
Beograd
București
Sarajevo
Podgorica
Skopje
Sofiya
Tirana
Roma
Madrid
Lisboa
Ankara
Athina
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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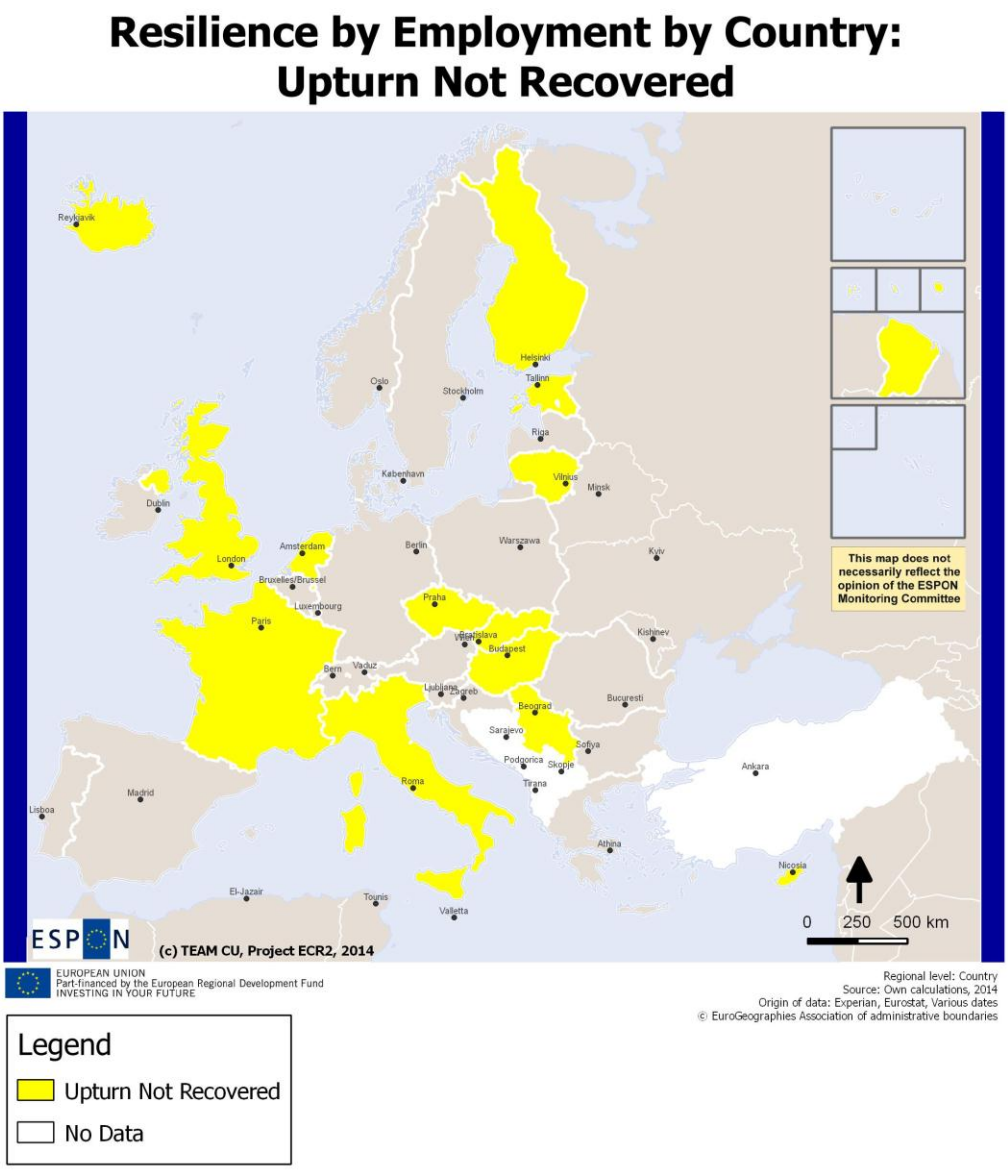
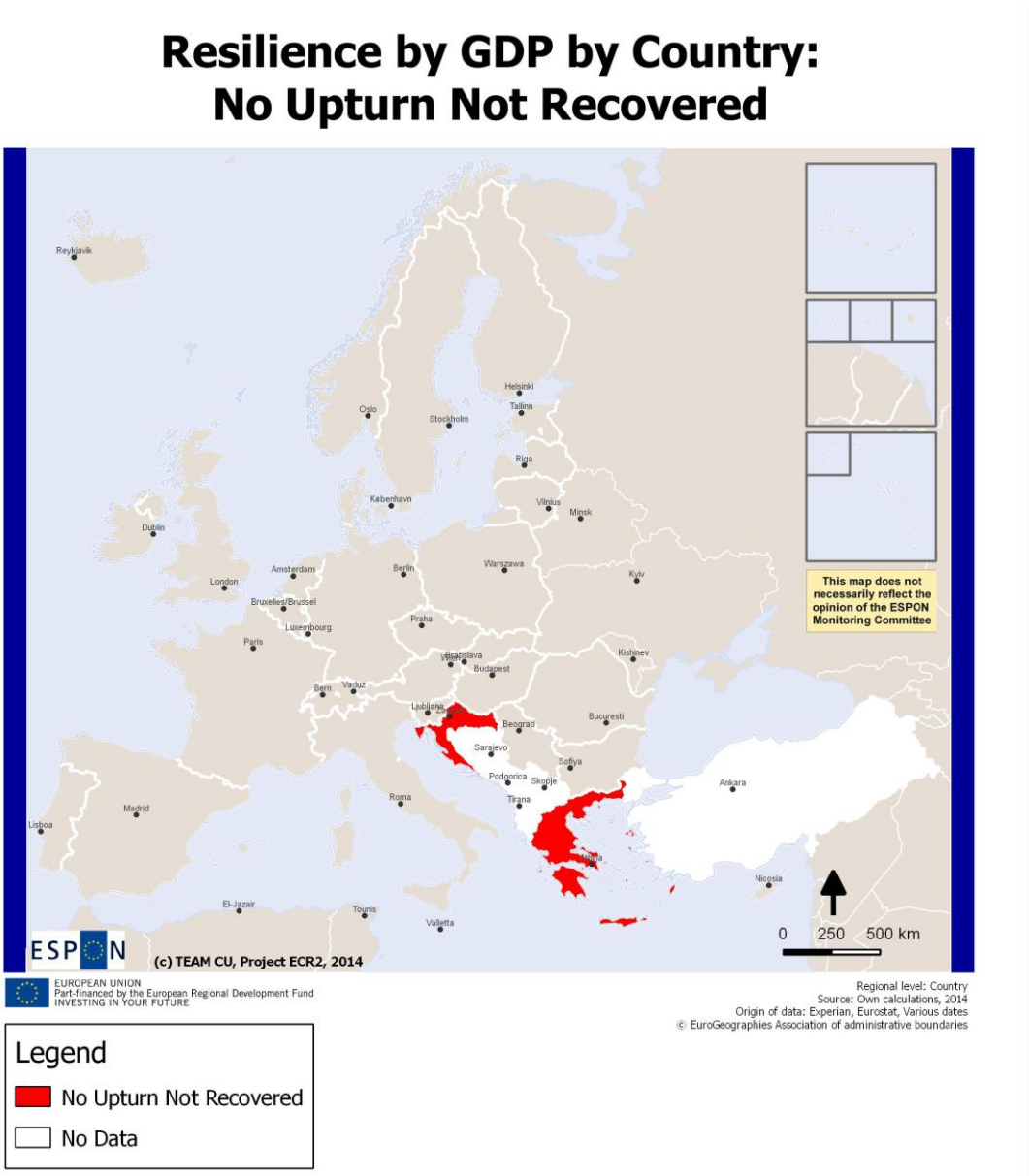
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Upturn Not Recovered
No Data

Map 6.6


Resilience by Employment by Country:
Upturn Not Recovered
Reykjavik
Oslo
Stockholm
Helsinki
Tallinn
Riga
København
Vilnius
Minsk
Dublin
London
Amsterdam
Berlin
Warszawa
Kyiv
Bruxelles/Brussel
Luxembourg
Praha
Paris
Bratislava
Budapest
Kishinev
Bern
Vaduz
Ljubljana
Zagreb
Beograd
Bucuresti
Sarajevo
Sofiya
Podgorica
Skopje
Tirana
Ankara
Roma
Madrid
Lisboa
Athina
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Upturn Not Recovered
No Data

Map 6.7


Resilience by GDP by Country:
No Upturn Not Recovered
Reykjavik
Oslo
Helsinki
Tallinn
Stockholm
Riga
København
Vilnius
Minsk
Dublin
Amsterdam
Berlin
Warszawa
Kyiv
London
Bruxelles/Brussel
Luxembourg
Praha
Paris
Kishinev
Budapest
Bern
Vaduz
Ljubljana
Beograd
Bucuresti
Sarajevo
Sofiya
Podgorica
Skopje
Ankara
Roma
Tirana
Madrid
Lisboa
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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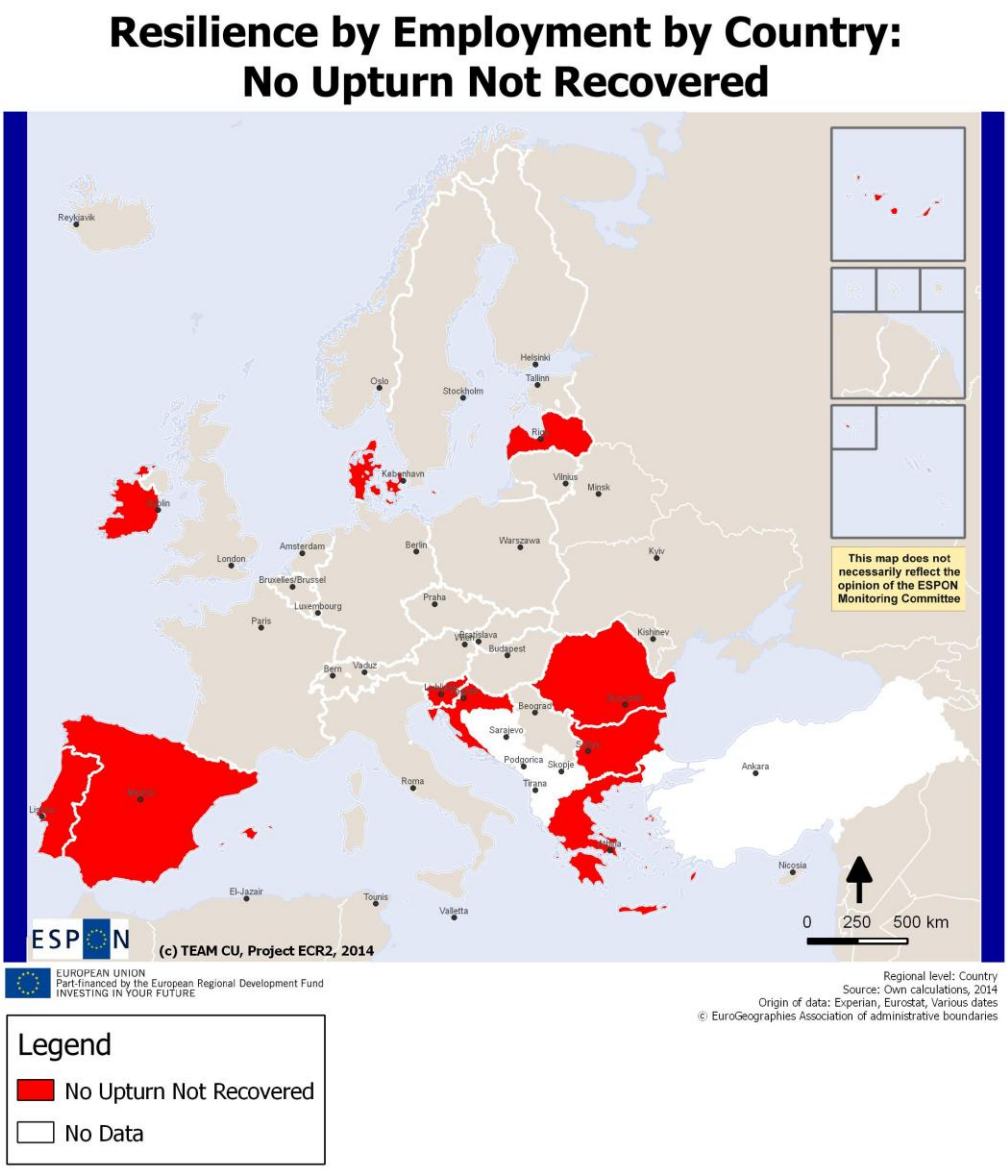
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
No Upturn Not Recovered
No Data

Map 6.8


Resilience by Employment by Country:
No Upturn Not Recovered
Reykjavik
Oslo
Helsinki
Tallinn
Stockholm
Riga
Kobenhavn
Vilnius
Minsk
Dublin
London
Amsterdam
Berlin
Warszawa
Kyiv
Bruxelles/Brussel
Luxembourg
Praha
Paris
Kishinev
Budapest
Bern
Vaduz
Beograd
Sarajevo
Podgorica
Skopje
Roma
Tirana
Ankara
Lisboa
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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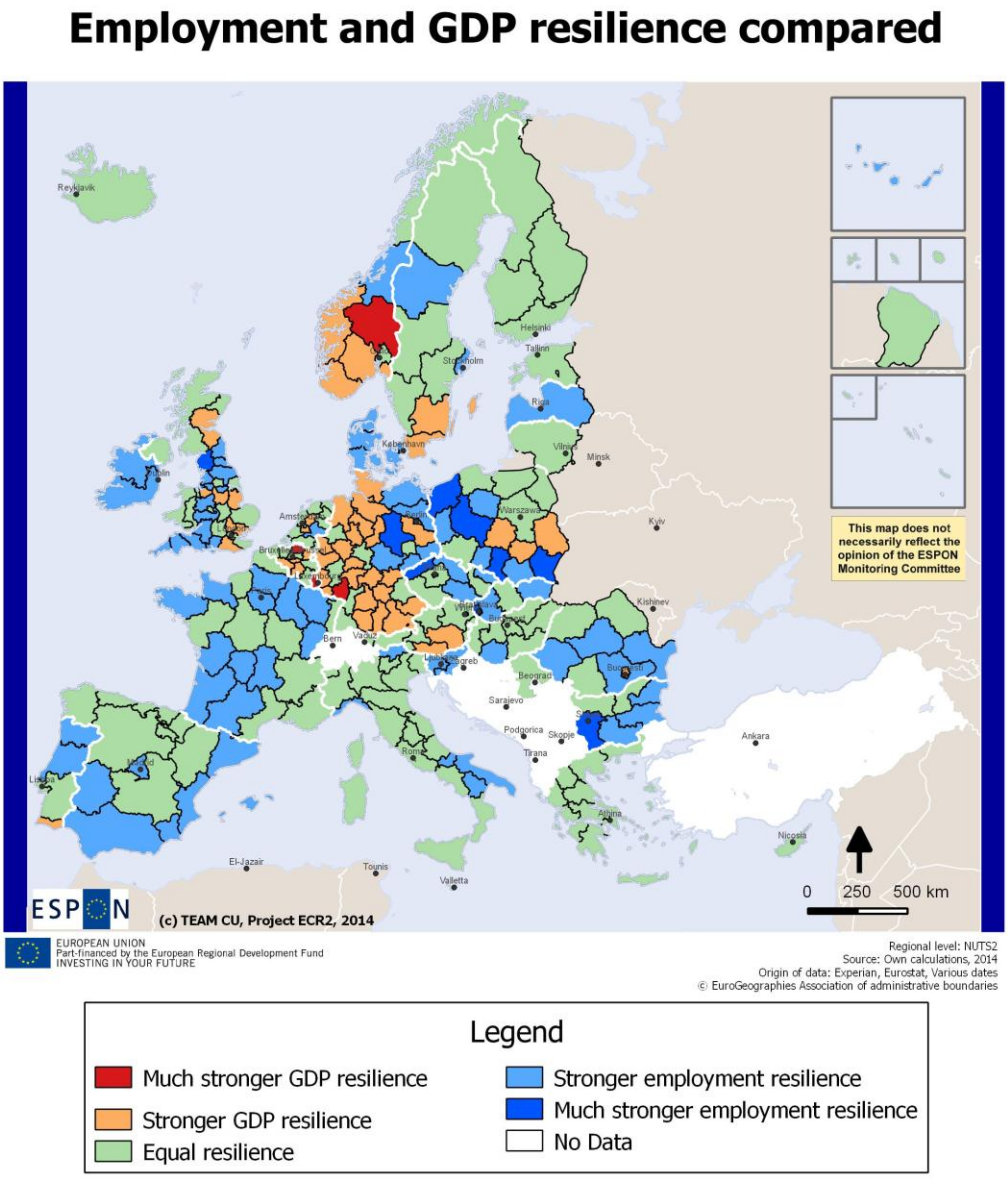
INVESTING IN YOUR FUTURE
Regional level: Country
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
No Upturn Not Recovered
No Data

Map 6.9


Employment and GDP resilience compared
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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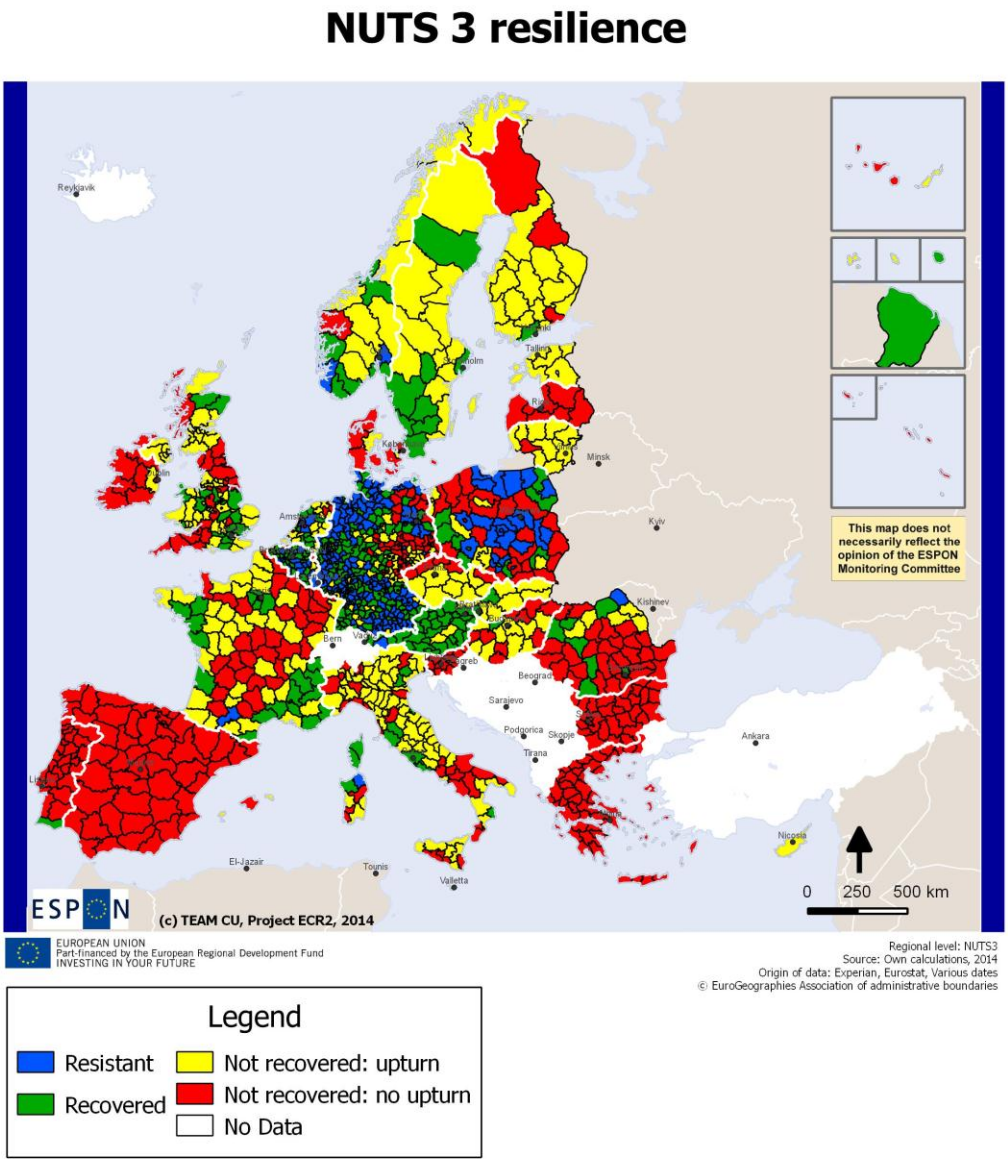
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Much stronger GDP resilience
Stronger GDP resilience
Equal resilience
Stronger employment resilience
Much stronger employment resilience
No Data

Map 6.10


NUTS 3 resilience
Reykjavik
Tallinn
Minsk
Kyiv
Kishinev
Amsterdam
Bern
Zagreb
Belgrad
Sarajevo
Podgorica
Skopje
Tirana
Ankara
Nicosia
El-Jazair
Tounis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
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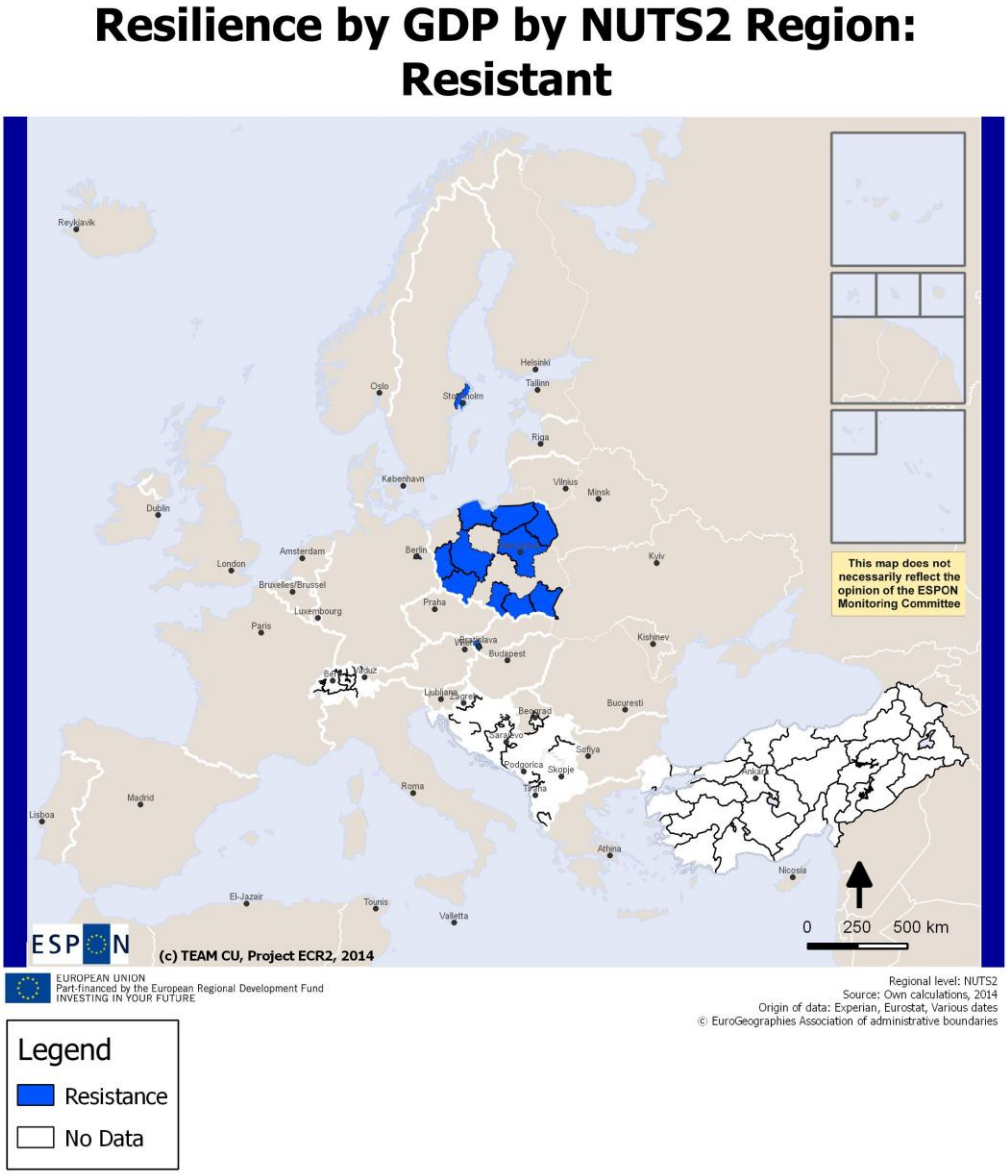
INVESTING IN YOUR FUTURE
Regional level: NUTS3
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Resistant
Recovered
Not recovered: upturn
Not recovered: no upturn
No Data

Map 6.11


Resilience by GDP by NUTS2 Region:
Resistant
Reykjavik
Oslo
Helsinki
Tallinn
Stockholm
Riga
Kobenhavn
Vilnius
Minsk
Dublin
Amsterdam
London
Berlin
Kyiv
Bruxelles/Brussel
Luxembourg
Praha
Paris
Kishinev
Budapest
Ljubljana
Beograd
Bucuresti
Sofiya
Podgorica
Skopje
Roma
Madrid
Lisboa
Athina
Nicosia
El-Jazair
Tounis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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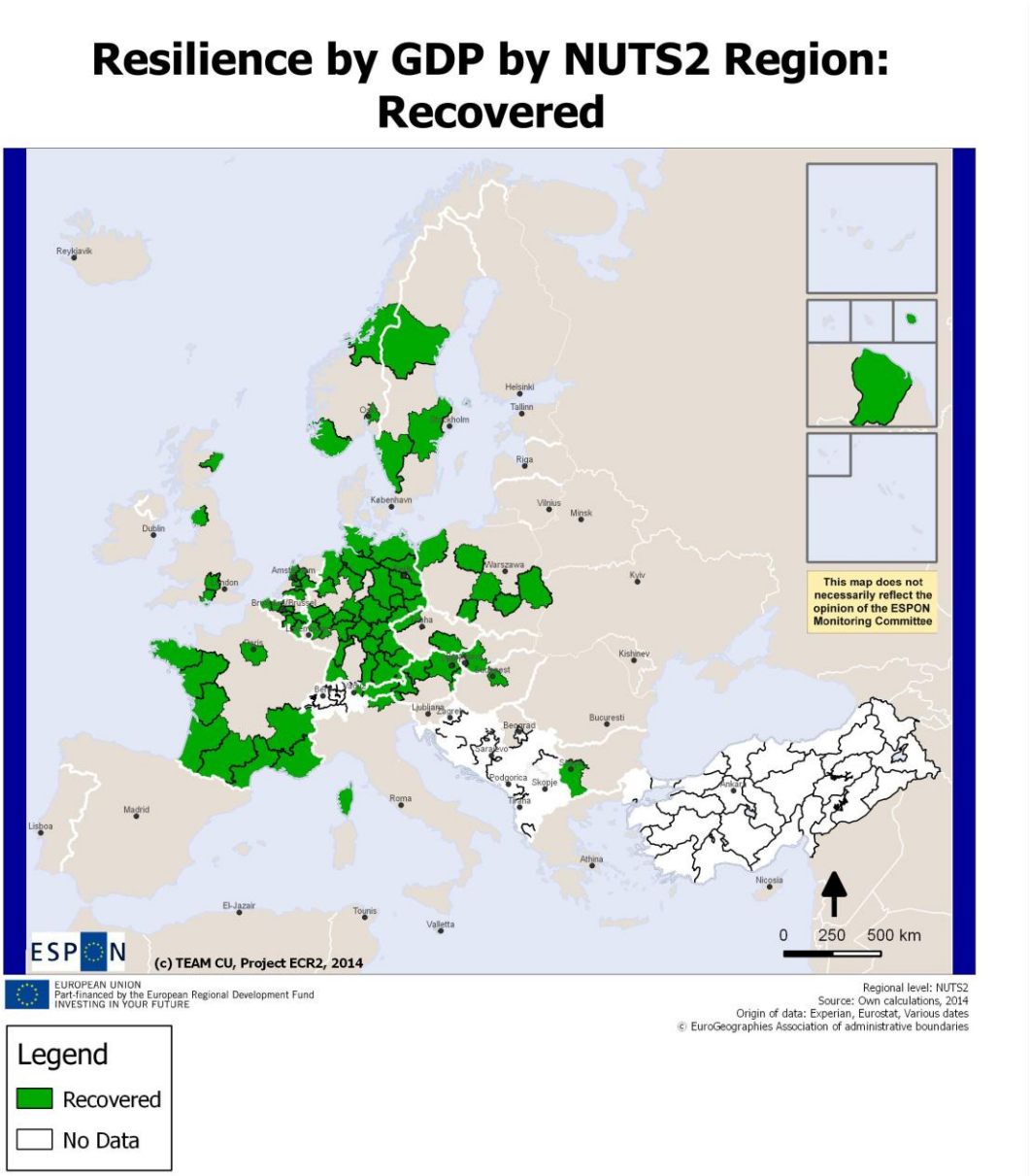
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Resistance
No Data

Map 6.12


Resilience by GDP by NUTS2 Region:
Recovered
Reykjavik
Helsinki
Tallinn
Riga
Kobenhavn
Vilnius
Minsk
Dublin
Amsterdam
London
Warszawa
Kyiv
Paris
Kishinev
Bucuresti
Beograd
Ljubljana
Zagreb
Sarajevo
Podgorica
Skopje
Roma
Madrid
Lisboa
Athina
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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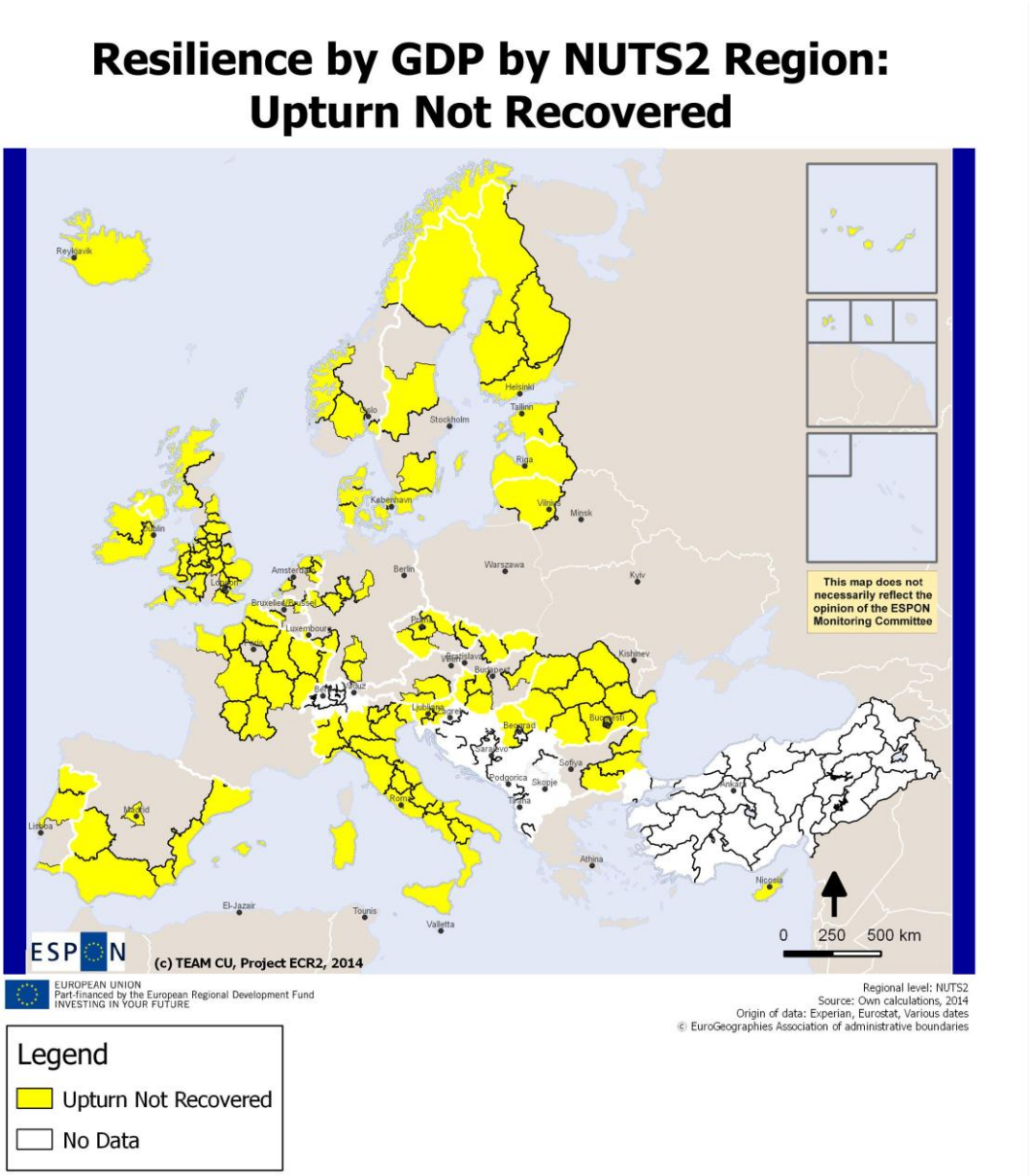
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Recovered
No Data

Map 6.13


Resilience by GDP by NUTS2 Region:
Upturn Not Recovered
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
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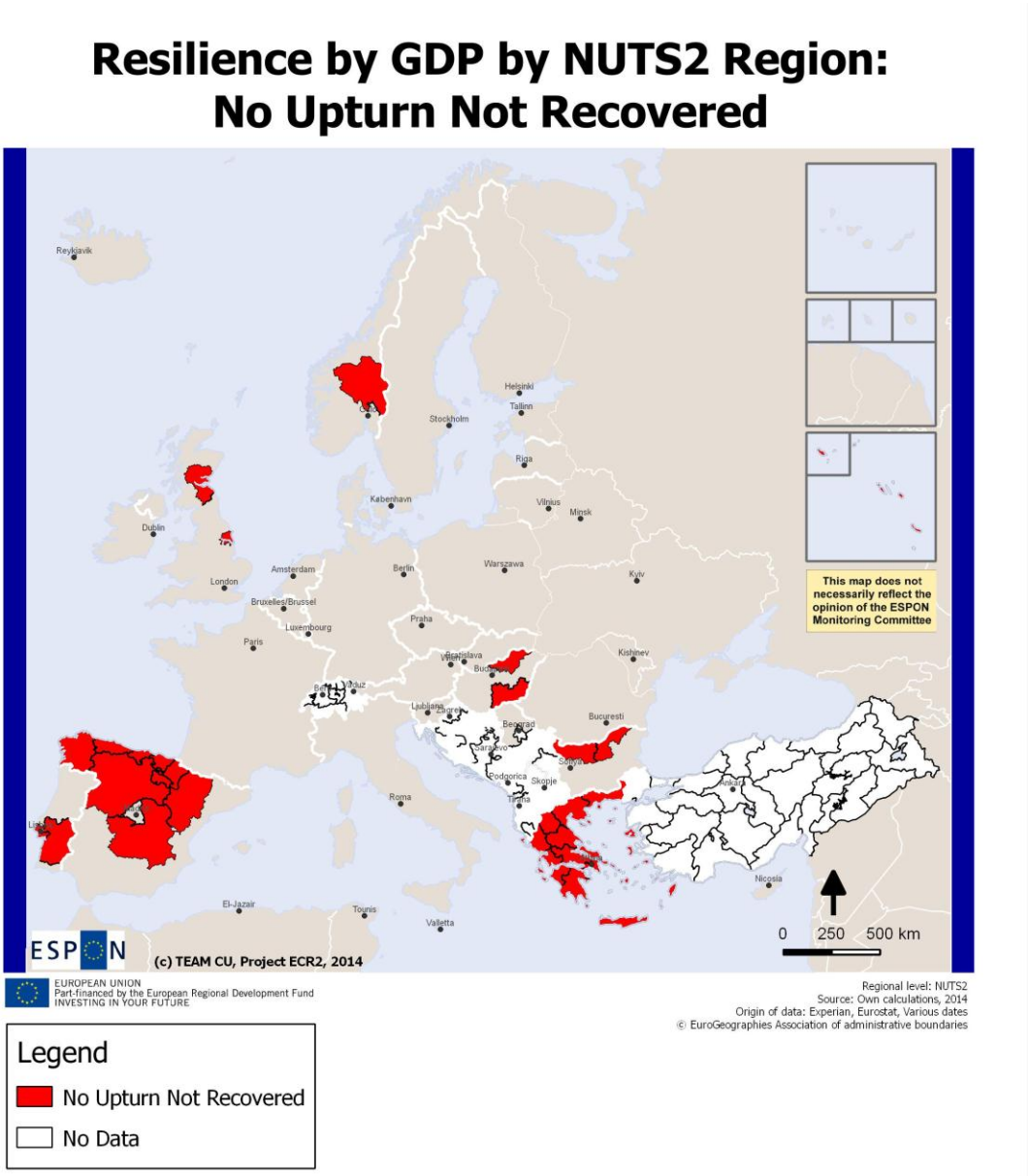
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Upturn Not Recovered
No Data

Map 6.14


Resilience by GDP by NUTS2 Region:
No Upturn Not Recovered
Reykjavik
Helsinki
Tallinn
Stockholm
Riga
København
Vilnius
Minsk
Dublin
Amsterdam
Berlin
Warszawa
Kyiv
London
Bruxelles/Brussel
Luxembourg
Praha
Paris
Kishinev
Bucuresti
Beograd
Sarajevo
Podgorica
Skopje
Roma
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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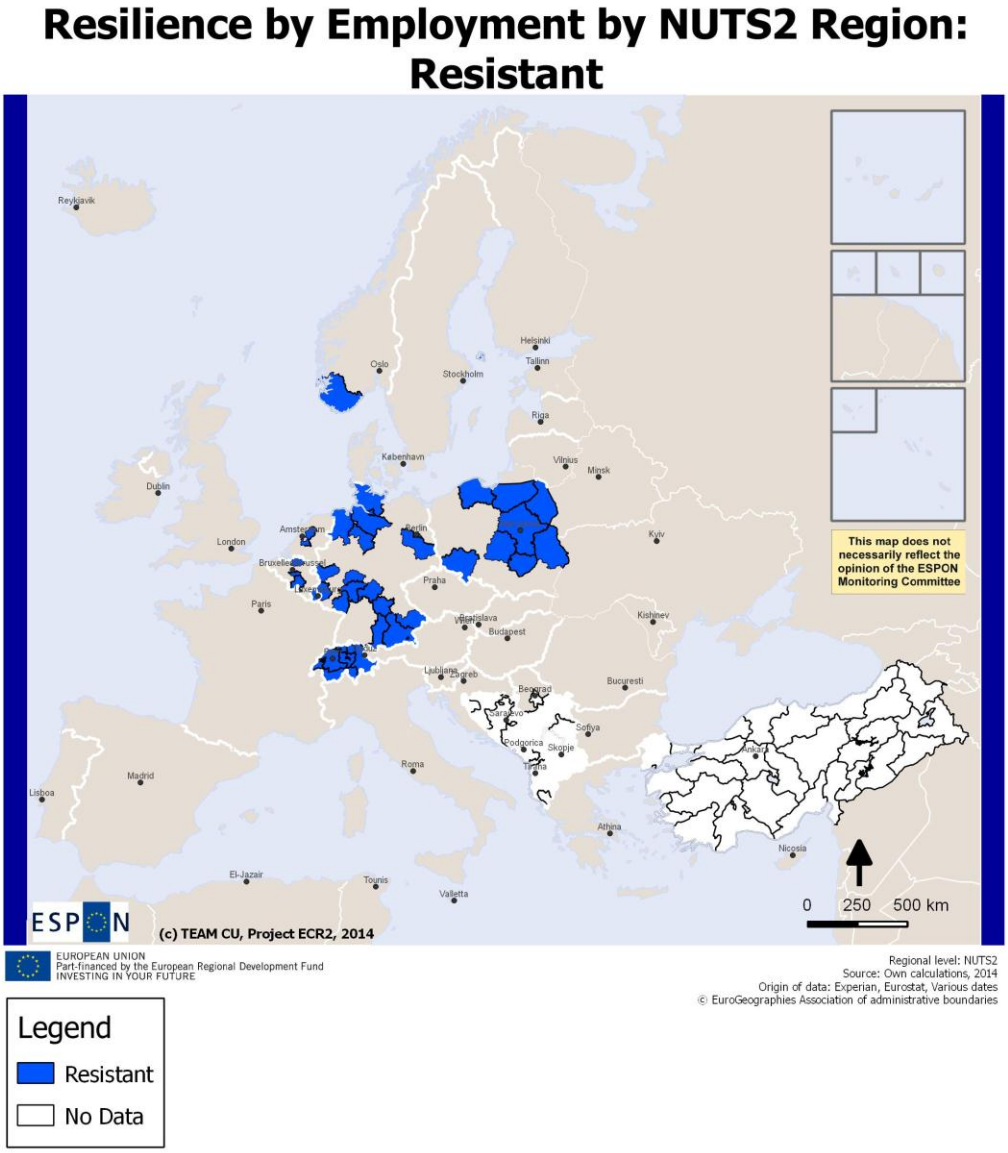
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
No Upturn Not Recovered
No Data

Map 6.15


Resilience by Employment by NUTS2 Region: Resistant
Reykjavik
Oslo
Helsinki
Tallinn
Stockholm
Riga
København
Vilnius
Minsk
Dublin
London
Amsterdam
Berlin
Kyiv
Bruxelles/Brussel
Praha
Paris
Kishinev
Budapest
Ljubljana
Zagreb
Bucuresti
Beograd
Sofiya
Podgorica
Skopje
Roma
Madrid
Lisboa
Athina
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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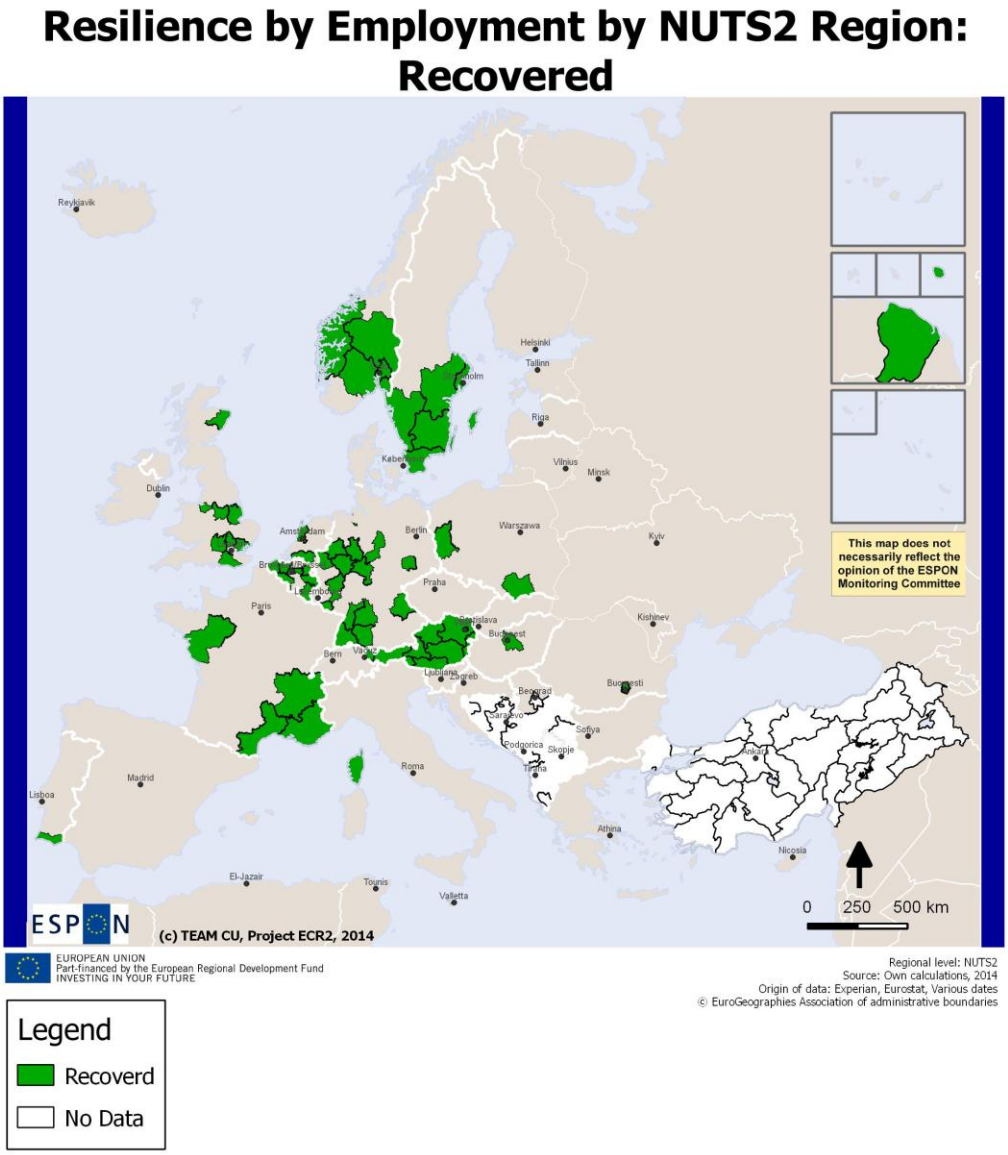
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Resistant
No Data

Map 6.16


Resilience by Employment by NUTS2 Region: Recovered
Reykjavik
Helsinki
Tallinn
Riga
Vilnius
Minsk
Dublin
Warszawa
Kyiv
Paris
Praha
Kishinev
Bucuresti
Madrid
Lisboa
Roma
Athina
Nicosia
El-Jazair
Tounis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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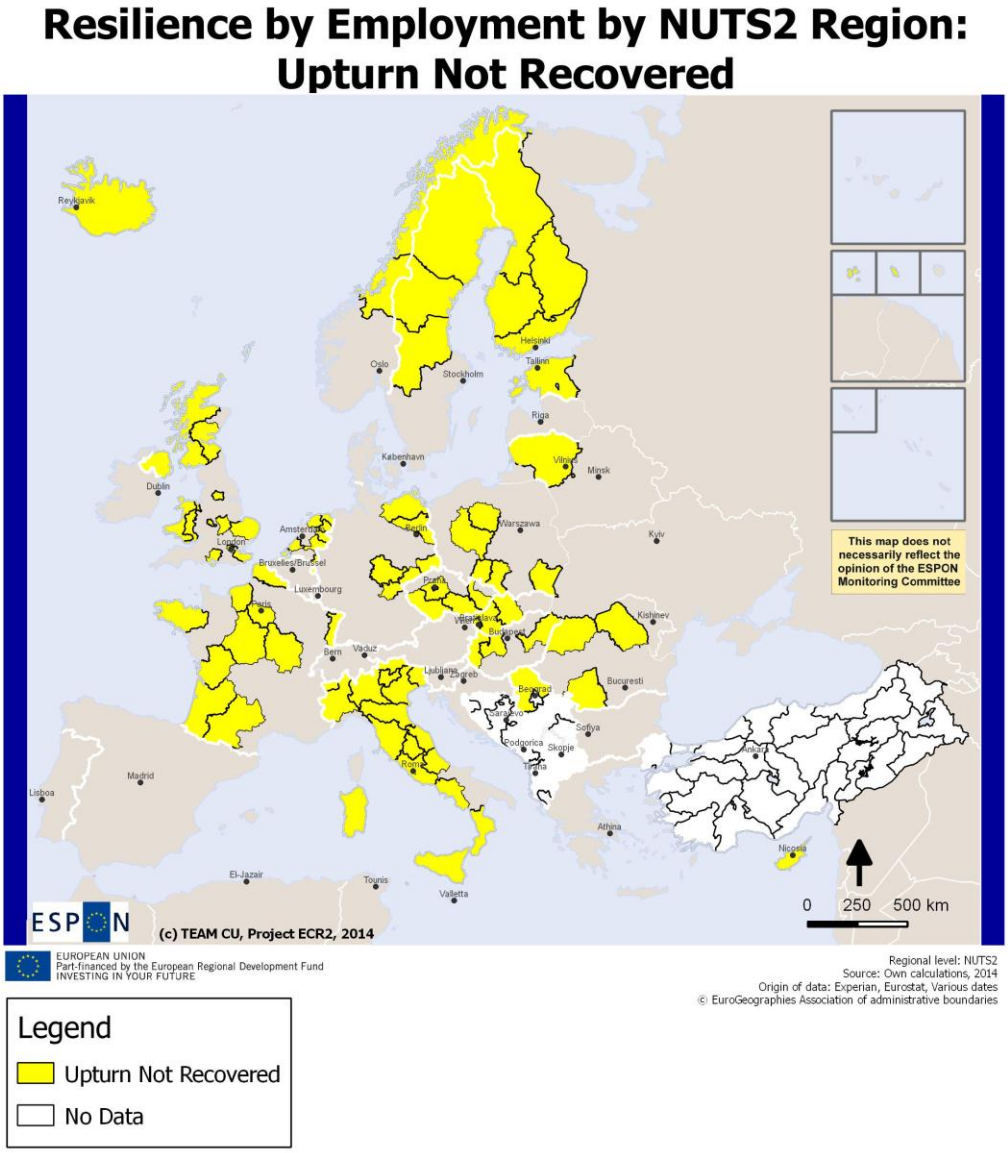
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Recoverd
No Data

Map 6.17


Resilience by Employment by NUTS2 Region:
Upturn Not Recovered
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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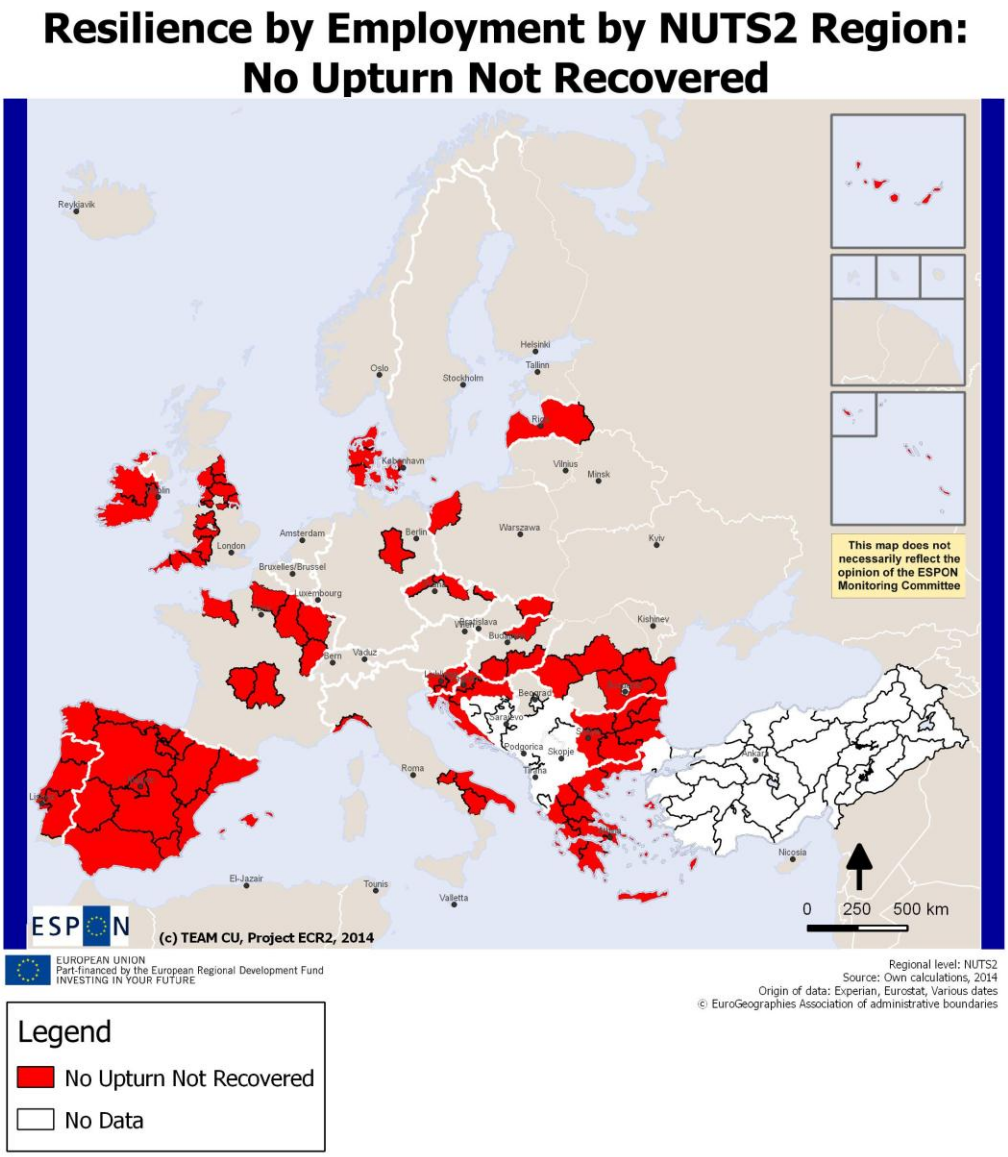
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Upturn Not Recovered
No Data

Map 6.18


Resilience by Employment by NUTS2 Region:
No Upturn Not Recovered
Reykjavik
Oslo
Stockholm
Helsinki
Tallinn
Riga
Vilnius
Minsk
Kobenhavn
Amsterdam
London
Bruxelles/Brussel
Luxembourg
Berlin
Warszawa
Kyiv
Kishinev
Bratislava
Budapest
Beograd
Sarajevo
Podgorica
Skopje
Roma
Nicosia
El-Jazair
Tunis
Valletta
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
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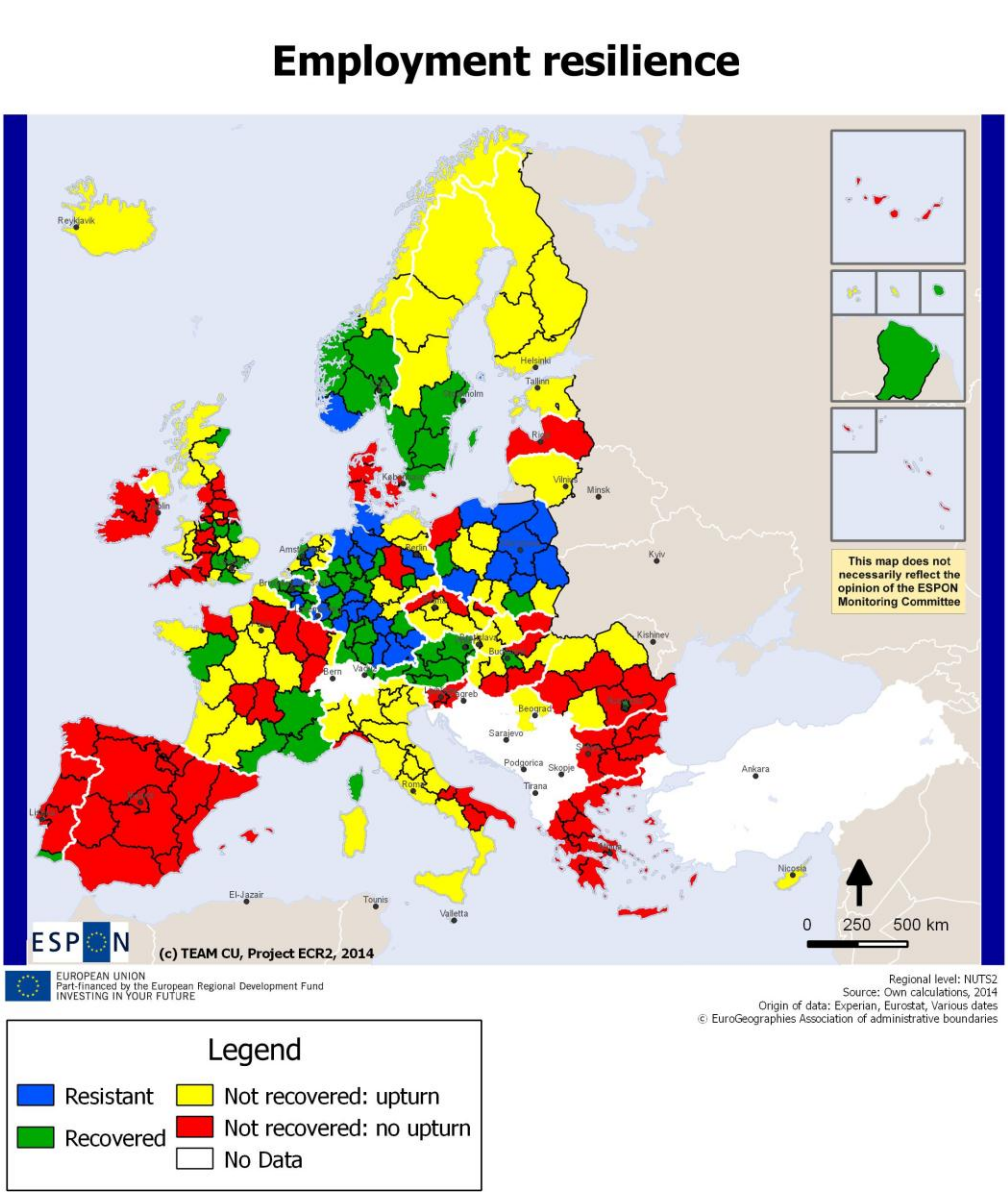
Legend
No Upturn Not Recovered
No Data

Map 6.19


Employment resilience
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
(c) TEAM CU, Project ECR2, 2014
EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
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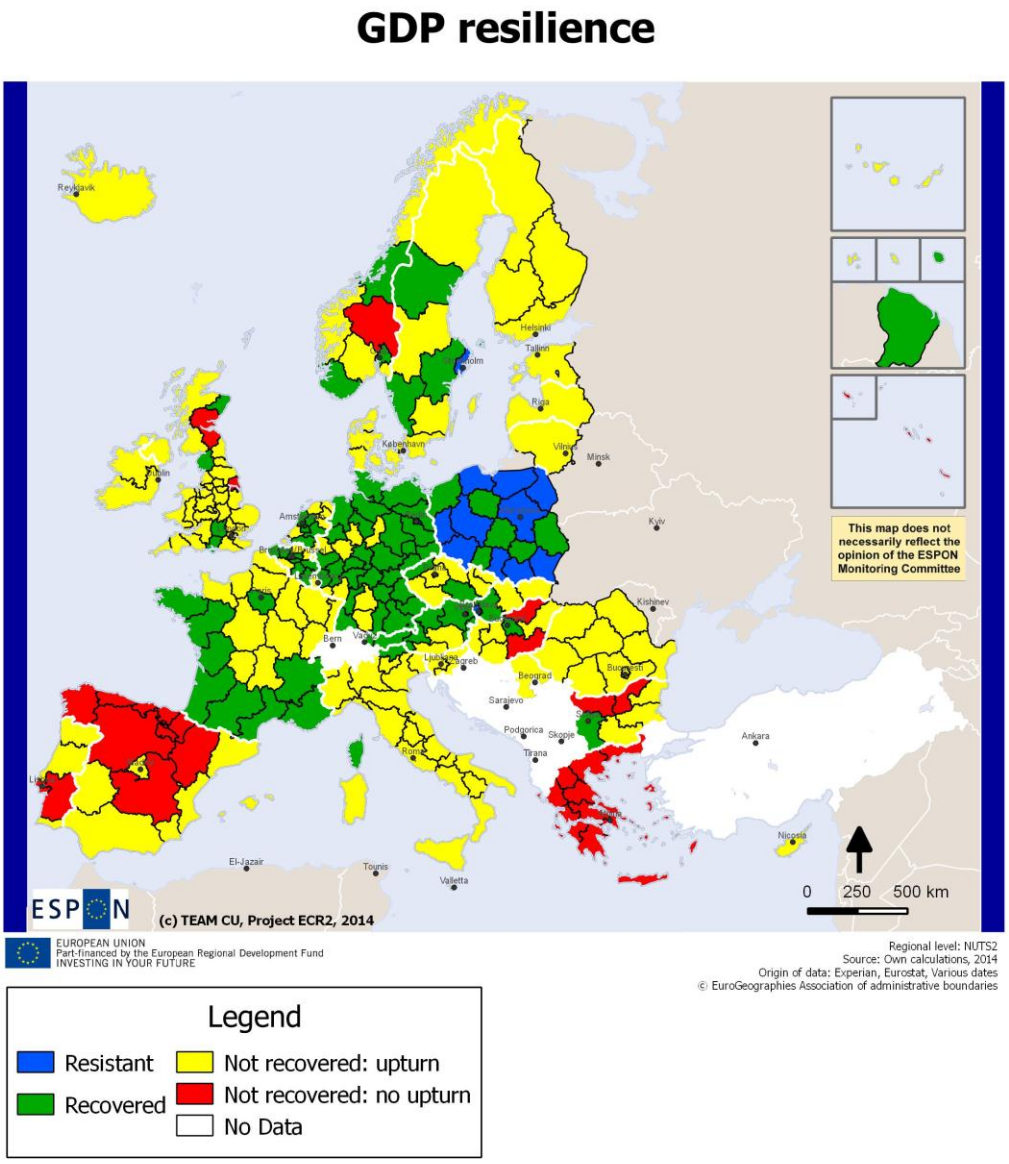
Legend
Resistant
Recovered
Not recovered: upturn
Not recovered: no upturn
No Data

Map 6.20


GDP resilience
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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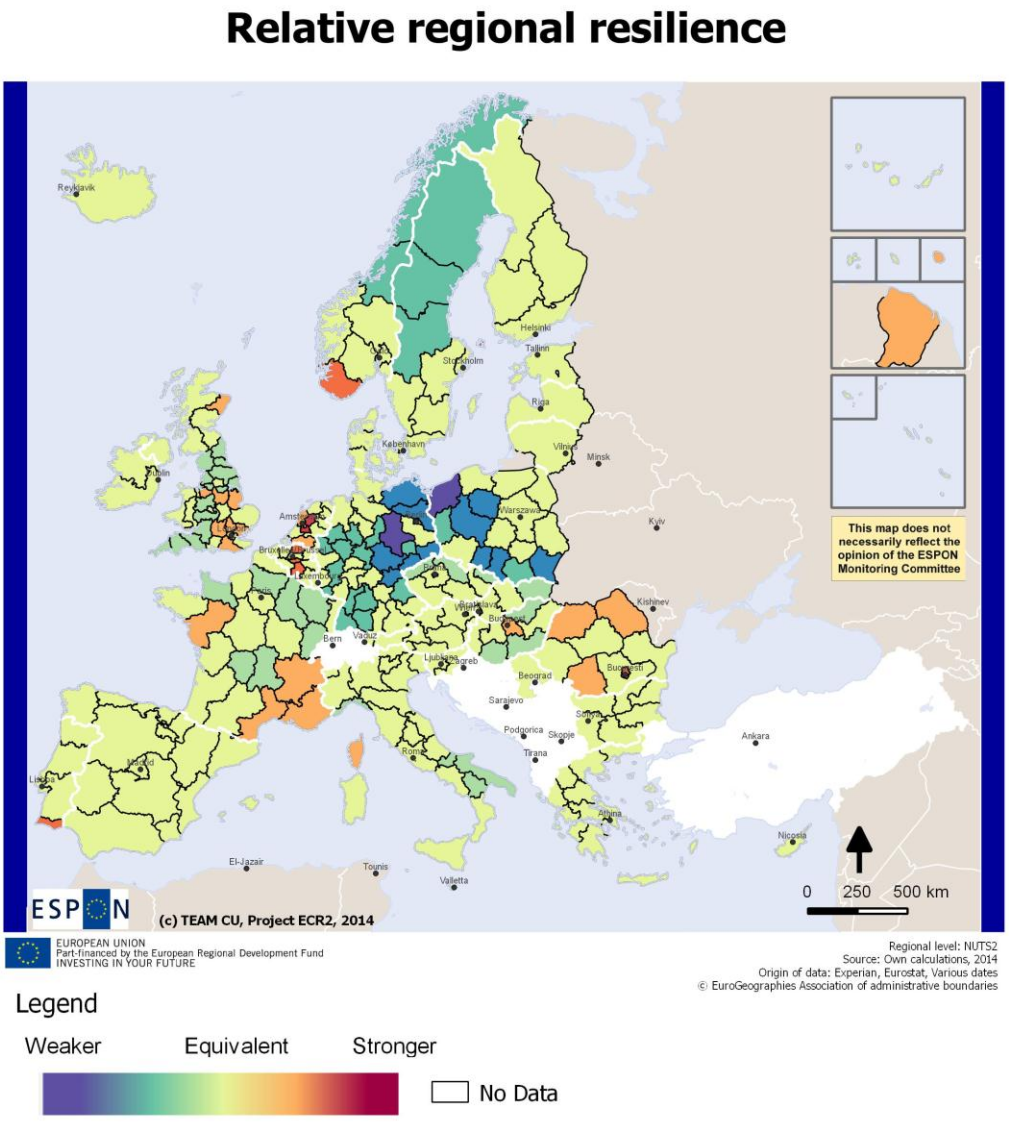
INVESTING IN YOUR FUTURE
Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Resistant
Recovered
Not recovered: upturn
Not recovered: no upturn
No Data

Map 6.21


Relative regional resilience
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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Regional level: NUTS2
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
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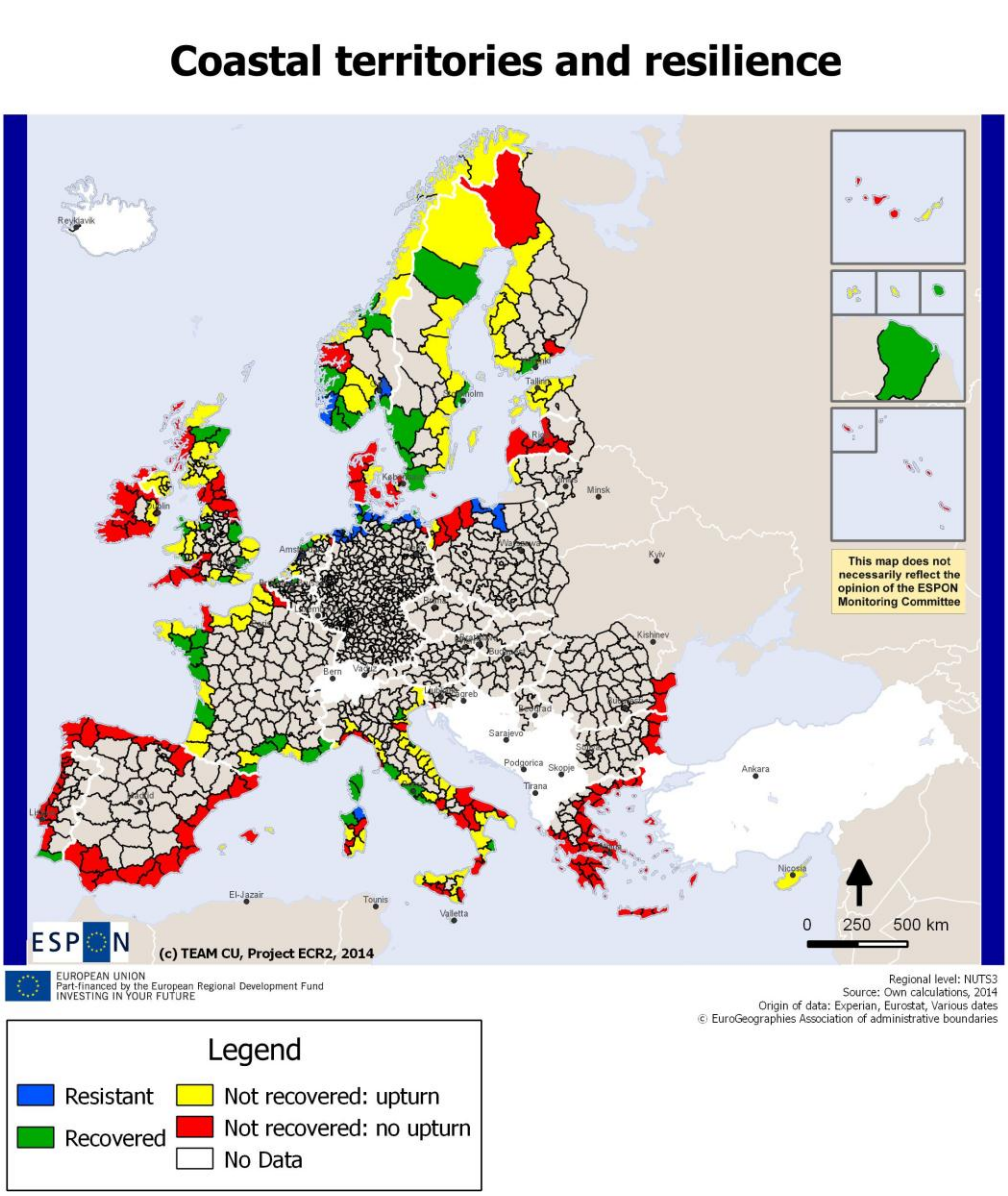
Legend
Weaker
Equivalent
Stronger
No Data

Map 6.22


Coastal territories and resilience
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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INVESTING IN YOUR FUTURE
Regional level: NUTS3
Source: Own calculations, 2014
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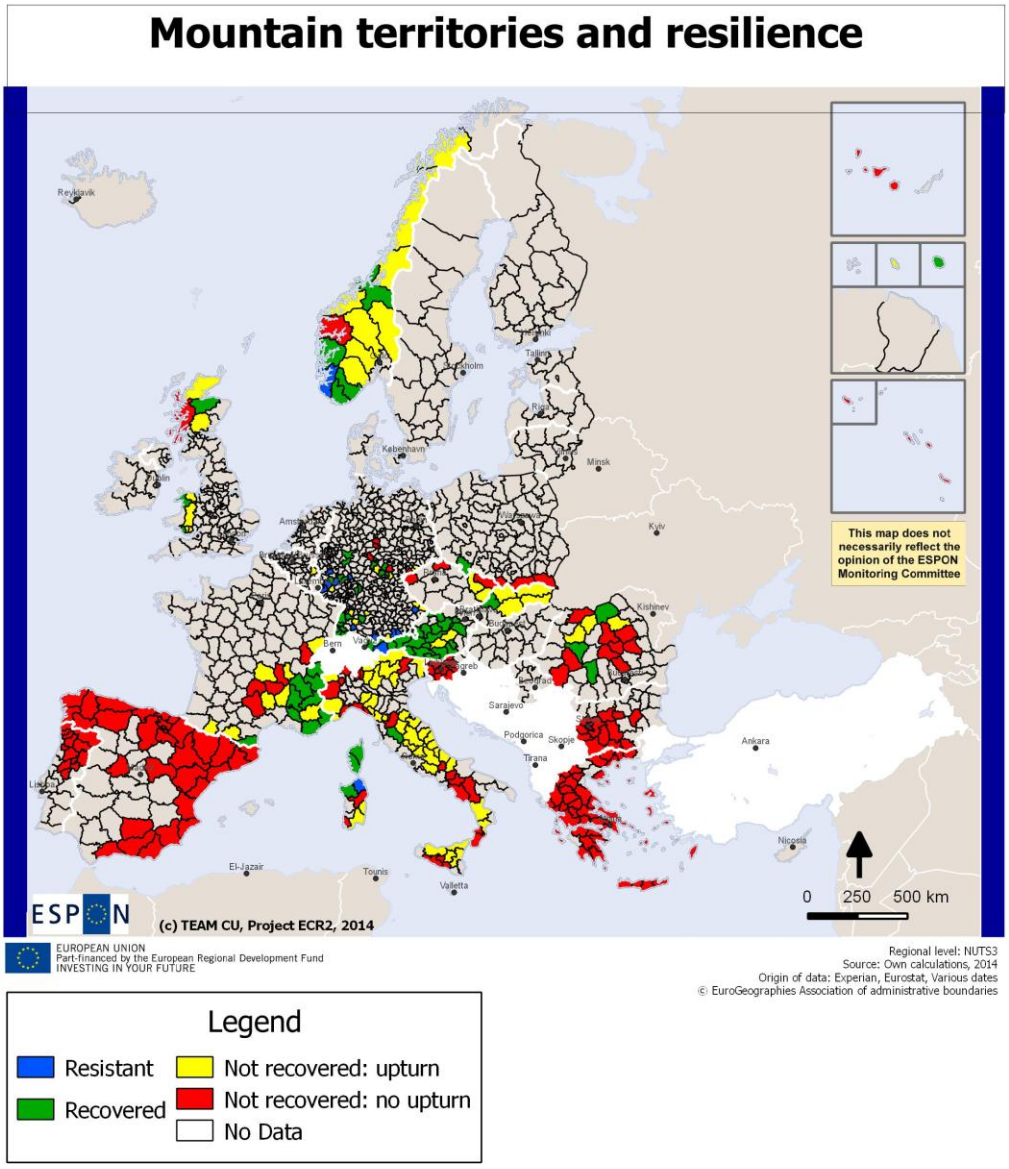
Legend
Resistant
Recovered
Not recovered: upturn
Not recovered: no upturn
No Data

Map 6.23


Mountain territories and resilience
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
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INVESTING IN YOUR FUTURE
Regional level: NUTS3
Source: Own calculations, 2014
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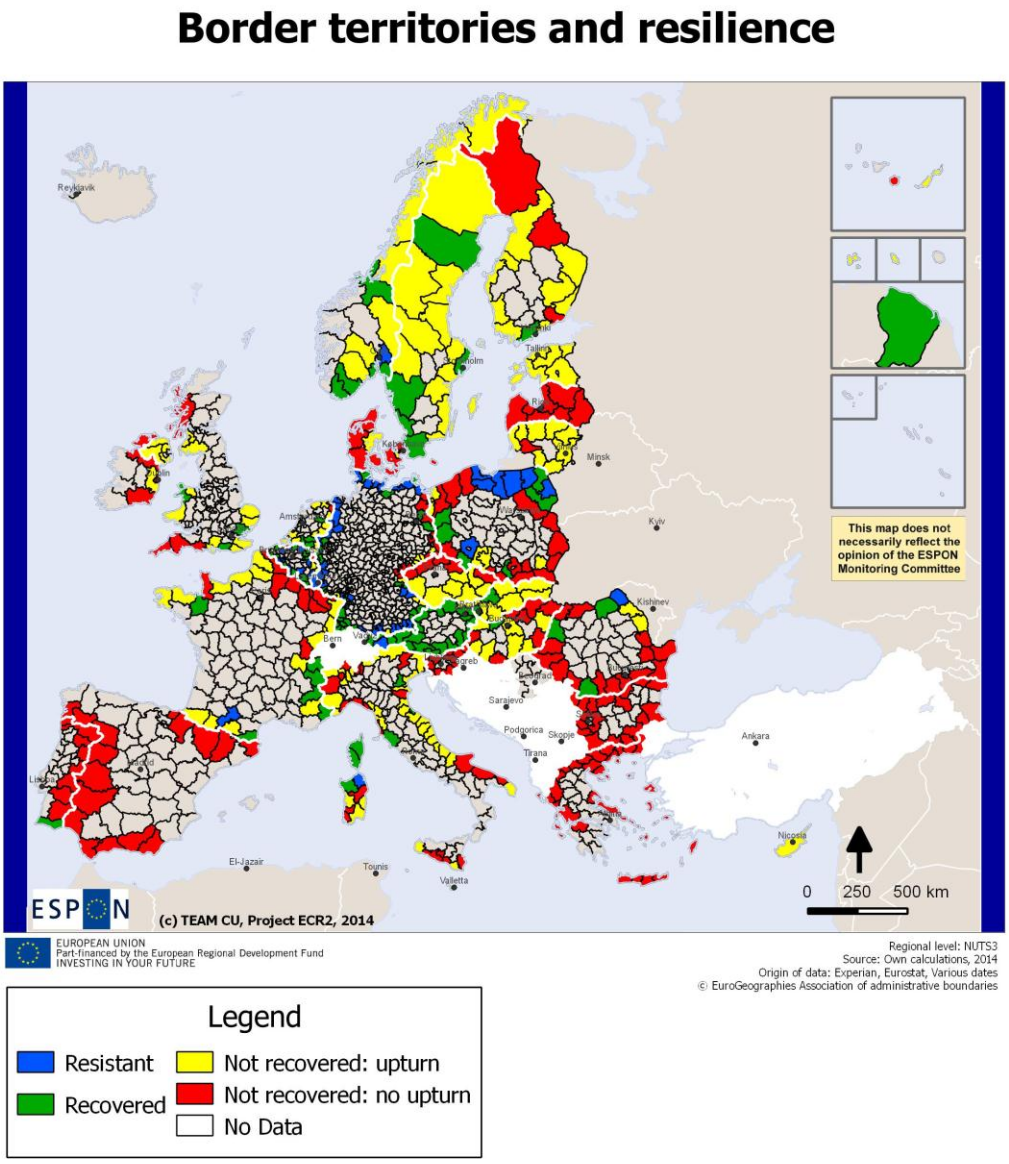
Legend
Resistant
Recovered
Not recovered: upturn
Not recovered: no upturn
No Data

Map 6.24


Border territories and resilience
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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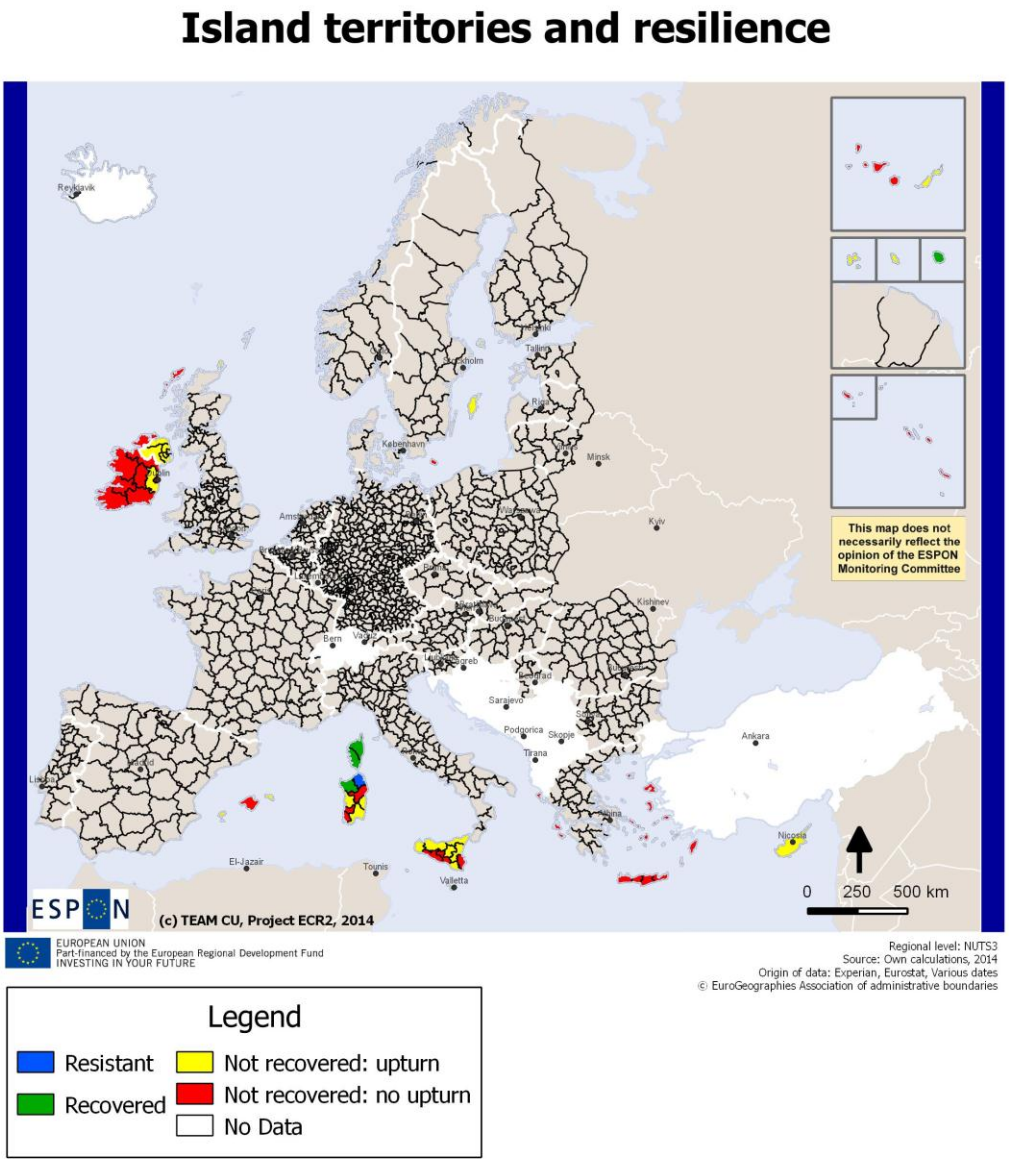
INVESTING IN YOUR FUTURE
Regional level: NUTS3
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Resistant
Recovered
Not recovered: upturn
Not recovered: no upturn
No Data

Map 6.25


Island territories and resilience
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
0 250 500 km
ESPON
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EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE
Regional level: NUTS3
Source: Own calculations, 2014
Origin of data: Experian, Eurostat, Various dates
© EuroGeographies Association of administrative boundaries
Legend
Resistant
Recovered
Not recovered: upturn
Not recovered: no upturn
No Data

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ISBN