Economic Resilience in European Regions: 1990-2016

The concept of resilience:

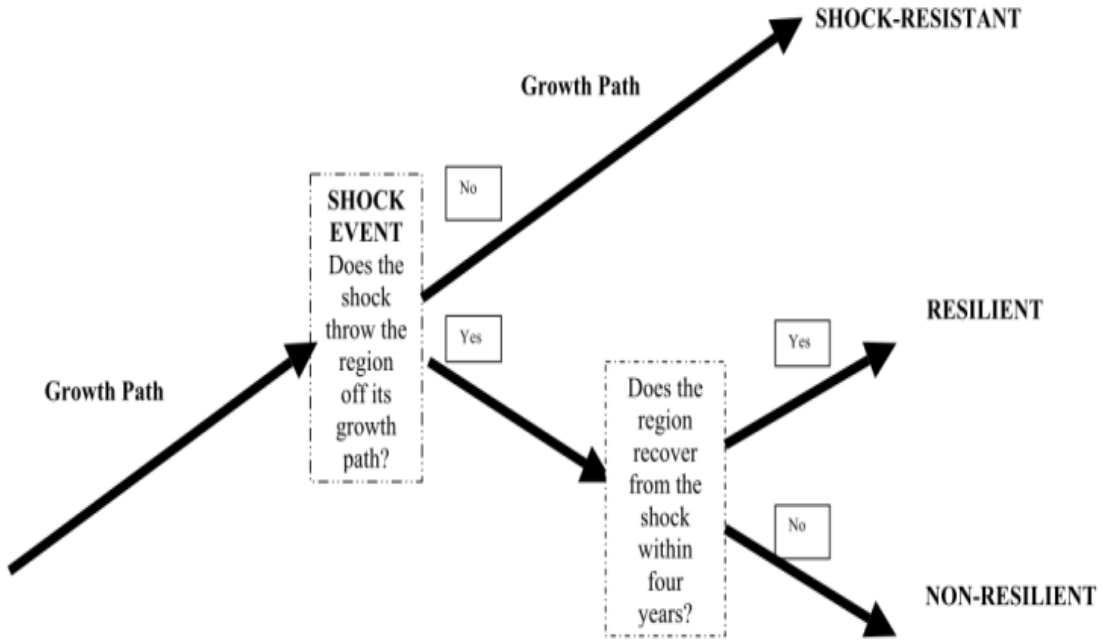

Illustration by: Hill et al. 2012

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Concepts of resilience:

- **Engineering/equilibrium resilience:** Ability (and speed) of a system to return to an assumed stable equilibrium following a shock or disturbance (i.a. Pimm 1984, Hill et al. 2011).

- **Ecological Resilience:** „[A] measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables“ (Holling 1973, 14)
  - Ecological Resilience: The scale of shock or disturbance a system can absorb before it is destabilized and moved to another stable state/configuration (multiple equilibria)
  - Adaptive Resilience: Ability of a system to undergo reorganization of form/function to minimize the impact of a shock event (i.a. Martin 2010/12, Foster 2012)
    - Resistance: Susceptibility to shock event
    - Recovery: Extend of return to pre-shock growth path
    - Re-orientation: adaptation or regional economy
    - Renewal: resumption of pre-shock growth path or hysteretic shift to new growth path

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Identification of shock events: (Hill et al. 2012, Foster 2012)

- Duration:
  - Acute shocks: One-time sudden ocurences (e.g. natural disasters etc.)
  - Chronic stresses: prolonged duration of event (e.g. financial/economic crisies, industrial decline due to shift in technology etc.)

- Scope:
  - **National economic shock:** Economic downturn of the national economy as a whole (measured by GDP and total employment)
    - Defined as an annual decline of more than 2 percentage points from the growth rate of the previous eight years
  - **National industry shock:** National downturn in employment in the industry(s)/sector that contributes most to a regions employment base
    - Defined as an one-year decline of more than 0.75% of the total national employment within one sector/industry
  - **Local industry shock:** Regional downturn in employment in the industry(s)/sector that contributes most to a regions employment base not experienced on at the national level
    - Defined as an one-year decline of more than 0.75% of the total regional employment within one sector/industry

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Evaluation of resilience performance:

- Main indicators:
  - Real growth of GRP
  - Regional Unemployment/employment growth
  - GRP per capita in PPS

- Treatment:
  - **Regional shocks:** A region will be considered resilient if, within four years of the shock event the annual growth rate/employment levels/GRP per capita return to their eight year regional average pre-shock (cf. Hill et al. 2012). **Absolute resilience performance**
  - **National shocks:** A region will be considered the more resilient the further if it outperforms the all-region mean across all indicators over four years (z-score index) (cf. Foster 2012). **Relative resilience performance.**
  - Categorization of regional economies by their resilience performance to test validity of explanatory variables. Further identification of structural changes in the underlying economies to distinguish btw. engineering and adaptive resilience (composition of economy and employment).

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Origins of the capacity for resilience:

- Structural factors:
  - Industrial/sectoral homogeneity vs. heterogeneity
    - Hypothesis: A more diverse sectoral/industrial composition increases the resilience of a region (equilibrium resilience)
    - Indicator: GVA by sectoral contribution, sectoral employment as share of total employment (Herfindhal index)
  - Nature of dominant industry sector (e.g. business cycle dependence vs. independent sector)
    - Hypothesis: Growth in certain types of industries (i.e. manufacturing) are more dependent on business cycles than others (i.e. services), making them more susceptible to shocks but may potentially profit from post-shock recovery (equilibrium resilience)
    - Indicator: Relative sectoral size by employment and contribution to GVA
  - Presence of knowledge/technology based industries
    - Hypothesis: Innovative capability of regional economy increases the capability to adapt an economy/industry (adaptive resilience)
    - Indicator: EPO-applications, R&D-share of expenditure by non-state actors, European Community innovation survey
  - Firm characteristics
    - Hypothesis: Firm age can serve as a proxy for firm capital stock pre-crisis, firm structure/size can serve as an indicator for flexibility in production/employment (both types of resilience)
    - Indicators: firm age, size and (if possible) structure (horizontal vs- vertical)

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Origins of the capacity for resilience:

- Institutional factors
  - Microeconomic flexibility
    - Hypothesis: More flexible economic framework allows for a faster response to a shock event (adaptive resilience)
    - Indicators: Ease of doing business index (national), European Regional Competitiveness index, avg. cost of employment, level of unionization
  - Government policies
    - Control for the influence of government activities in crisis period (national stabilization policies) and potentially involvement in regional structural funds (both types of resilience)
    - Indicator: Dummy variable dependent on government policy in response to an identified crisis event
  - Existence of knowledge networks
    - Hypothesis: Knowledge networks further innovation and increase the flexibility of the workforce/firms to adapt to shock events (adaptive resilience)
    - Indicators: Presence of high-level research institutions (e.g. CWTS rankings of universities), public spending on research, presence of knowledge driven clusters (European Cluster Observatory)

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Origins of the capacity for resilience:

- Social/demographic factors
  - Human capital:
    - Hypothesis: Better educated workforce can be utilized more flexible, has an increased chance to find micro-economic problem solutions (adaptive resilience)
    - Indicator: Share of population (25 and above) with tertiary education
  - Inequality/Poverty:
    - Hypothesis: Inequality/poverty increase the effect of the initial shock event by indicating more insecure employment situations (equilibrium resilience)
    - Indicator: Regional Gini-coefficient, share of population below national poverty line
  - Social capital/connectedness:
    - Hypothesis: High connectedness/social capital increases the possibility for adaptation through the identification of new growths paths (adaptive resilience)
    - Indicators: ESS (national values), club and party membership
  - Demographic change
    - Hypothesis: Control variable for population movements mitigating shock effects on the employment market (both types of resilience)
    - Indicators: Population growth/change, regional migration

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European resilience capacity index

- **Observation size:**
  - NUTS 2 regions: 1990-2016: EU15 (216 regions)/2000-2016: EU28 (273 regions)
  - Main data source: Eurostat
- **Research design**
  1. Identification of crisis events (national and regional)
     - Crisis index, identification of timing of shock events on a national and regional scale based on gliding 8 year growth and employment numbers
     - Test of validity of observation: Comparison with known shock events during time-frame (national events), selected case analysis of regional shock events
  2. Evaluation of resilience performance
     - Classification of NUTS 2 regions by performance in response to shock events (resilient/non-resilient), individual treatment of national and regional economic shocks
     - Control for developments beyond the chosen 4 year threshold of recovery for resilience (potential expansion of resilient/non-resilient categorization)
  3. Test of explanatory variables
     - Multivariate analysis of explanatory variables based on hypotheses about resilience capacity
     - Potential additional verification of findings though selected case studies
  4. Generation of an European resilience capacity index
     - Year-by-year resilience capacity score of European regions over the observed time-frame
     - Open index allowing for further expansion of data set and/or dynamic modeling of government policies with regard to regional resilience

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Expanded concept of resilience:

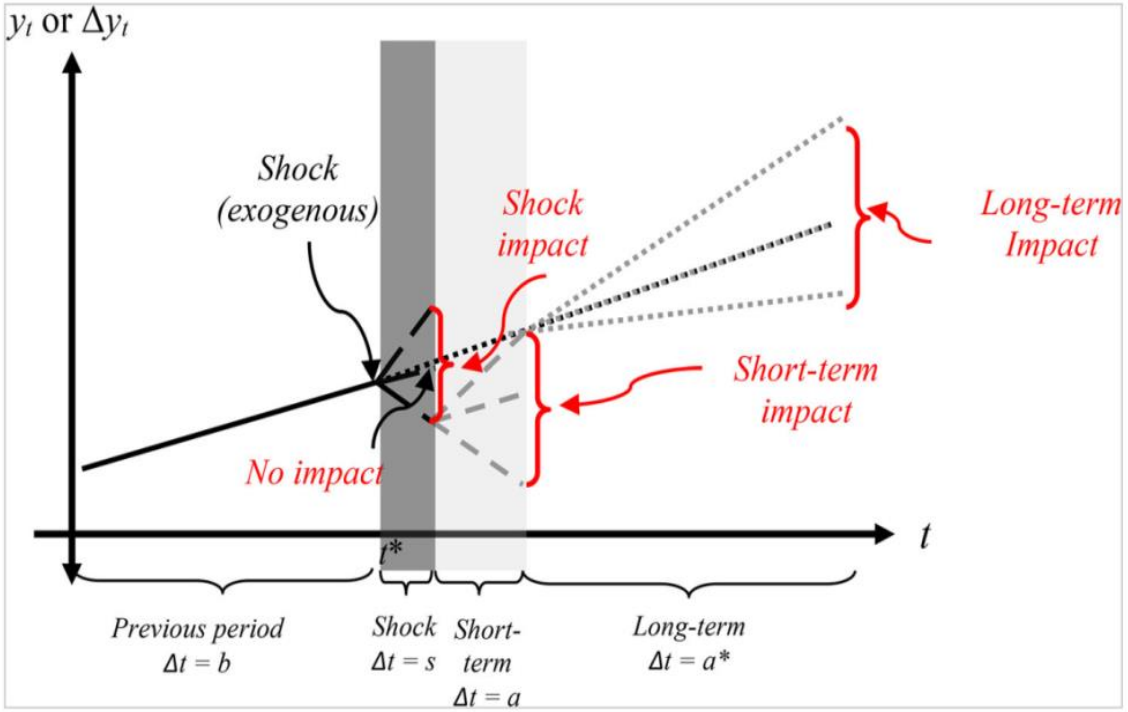

Fig. 1. Schematic representation: resilience scenarios

Illustration by: Dubé, Polèse 2016