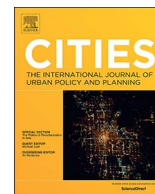




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Resilience capacity and vulnerability: A joint analysis with reference to Slovak urban districts

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ABSTRACT

The concept of resilience has recently been investigated from the perspective of several disciplines. This extensive research has produced many approaches to determine the key definitions, linked to both the notion of stability in dynamics (return to the previous equilibrium after a shock) and the idea of adaptivity (absorption of the shock leading to new equilibria). Among the various definitions and measurements which can be found in the literature, the Resilience Capacity Index (RCI) defines a kind of 'potential resilience', i.e. the potential ability of a region to recover, or bounce back in the presence of external shocks. However, the RCI should also be tested empirically versus other resilience/vulnerability indicators. Vulnerability denotes a different view on the state of the system in the presence of shocks, i.e. the degree to which a system is susceptible to harm. In the present paper, this concept will be adopted by analysing the dynamics of the unemployment growth rate, and then comparing it to the RCI.

The country of interest in this paper is Slovakia. Slovakia is a small country in Central-Eastern Europe and can serve as a good example of an open and export-based economy, subjected to the global crisis. Thus, in the context of the 2007–2008 economic crisis, the RCI in the 79 Slovak districts is examined with respect to their vulnerability in the first period of rising unemployment (2008–2012), as well as in the second period following vulnerability to the economic shock (2012–2014). A clear West-East divide in the resilience capacity can be seen. The more urban and export-oriented districts with high RCI values are shown to be exposed to high vulnerability compared with the rural districts. On the other hand, the small, peripheral districts respond to a lesser extent, or with a delay, to the shock.

1. Introduction

Extreme events, such as financial crises, terrorist attacks and natural disasters, have given rise to many studies when explore the response capacity of a system to external shocks (see, for example, Gunderson & Holling, 2002; Hutter, Kuhlicke, et al., 2011; Pelling, 2011). Resilience studies have mainly focused on the length of the period needed – for a regional system – to return to its equilibrium after the impact of a shock (engineering resilience), or on the ability and time required to absorb the disruptions (ecological resilience) (Reggiani, Nijkamp, & Lanzi, 2015). The third concept of adaptive resilience (Martin, 2012), which is based on the theory of complex adaptive systems, refers to a systems ability to reorganise its structure, in order to generate new ways of operating, and to minimise the extent of the shock. Compared with one single steady state (engineering resilience) or several steady states (ecological resilience), adaptive resilience does

not suppose any steady state and is characterised by endless change (Gallopín, 2006; Gunderson & Holling, 2002). No regional system (economy, households, communities, ecosystems) is immune to the impact of shocks, and the underlying factors of vulnerability and resilience change over time. In addition, the region may be relatively more resistant only in some respects. Thus, resilience should be understood as a multifaceted concept, and its investigation can reveal the potential risks of regional development, including ecological and economic disruptions, such as slow-acting and long-lasting processes of recovery (Pendall, Foster, et al., 2010).

Most of the new definitions of regional resilience refer to the idea of the ability of a local socio-economic system to recover from an external disruption or shock. Foster (2007, p.14) defines regional resilience as 'the ability of a region to anticipate, prepare for, respond to, and recover from a disturbance'. Hill et al. (2008, p.4) define resilience as: 'the ability of a region ... to recover successfully from shocks to its economy that either

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throw it off its growth path or have the potential to throw it off its growth path'. A definition of resilience in connection with regions is arousing some criticism because of substantial differences compared with ecological and disaster studies (Hassink, 2010). Generally, there is scepticism when bearing in mind equilibrium and multi-equilibria thinking in relation to evolutionary economic geography, path dependence, and regional economic development. In such a case empirical studies can shed a light on the behaviour of regions (Martin, 2012).

The previous approaches have mainly focussed on the study of the impact of shocks on regional output and the number of jobs, as well as on the time taken for recovery and the bounce back to the pre-shock state. Such an approach is borrowed from engineering resilience. However, the global economic shock should also be examined from the point of view of ecological resilience, with the aim of understanding the mechanisms of absorption, and dealing with the shock in the global and local context.

In reality, there is a limited possibility to study the resilience of different systems. Alternative approaches reflect rather the latent ability of the region to respond to future shocks. The approach of resilience capacity is multidimensional and takes into account economic and demographic factors, as well as social connectivity (Foster, 2007). The Resilience Capacity Index (RCI), in its original version developed by Foster, has been adopted in this paper to classify the regional status on the basis of 12 resilience factors. The RCI has been successfully applied to the US Metropolitan Regions.¹ It represents a potential responsiveness to external shocks and its universal nature implies its 'potential' ability to assess the response to both local and global shocks. As a generalised index of the hypothesized response to a crisis, independently of the level of development, the RCI approach serves as a diagnostic tool of resilience (Thibert, 2015). For example, RCI has been adopted by the Food and Agriculture Organization of the United Nations (FAO), as a basis for the Resilience Index and Measurement Analysis methodology (FAO, 2016). Recently has also been used in combination with accessibility (Östh, Reggiani, & Galiazzo, 2015) and social capital (Östh, Reggiani, Dolciotti, & Nijkamp, 2017), with reference to the Swedish cities.

As a way to provide a more complete investigation and measurement of economic resilience, this paper suggests the combination of this index with economic vulnerability.

Vulnerability research has been shaped by human ecology, political economy, geophysical sciences, and political ecology (Eakin & Luers, 2006; McLaughlin & Dietz, 2007). There have been several significant vulnerability studies: in psychology to examine cognitive vulnerability (Riskind & Black, 2005), in a military context in terms of survivability (Ball, 2003), and in transportation research (Berdica, 2002; O'Keefe, Westgate, & Wisner, 1976; Reggiani et al., 2015). Vulnerability has also been examined regarding environmental hazards and risks (Blaikie, Cannon, Davies, & Wisner, 1994; Kasperson, Kasperson, Turner, Schiller, & Hsieh, 2005). According to these studies, politically disempowered and economically marginal groups are considered to be the most vulnerable owing to their lower coping capacities. These groups tend to be the most exposed and sensitive to the hazard.

Vulnerability is related to resilience, and usually means exposure to shocks. It represents the structural characteristic of the region generated by multiple factors and processes. If the term 'risk' is used to designate the potential of shocks to affect the state of systems (or communities, households, or individuals), then vulnerability is 'the propensity or predisposition to be adversely affected' (IPCC, 2012, p.5). In studies which have examined the impacts of global environmental change, vulnerability is included in the notion of resilience (Gallopín, 2006). However, in the research on hazards, the concepts of vulnerability and resilience are treated as separate but with a certain degree of integration (Cutter et al., 2008).

Hence, our key research question is: Can RCI sufficiently predict the response to the economic crisis? In fact, RCI, given the underlying variables based on 12 socio-economic dimensions, appears to be a rather static approach. Consequently, RCI might be considered as background information, useful for providing both preliminary and possible future indications of resilience. It would therefore be worth testing this RCI configuration vs. specific indicators of resilience/vulnerability, i.e. considering a joint approach in order to obtain more insights into the dynamics of the resilience/vulnerability characteristic of the system under analysis.

This paper contributes to the measurement of resilience capacity and economic vulnerability by testing them on a real case. Previous research has focussed only on the regional product or the regional number of jobs. In this context, two further research questions arise: a) What new insights are provided by the economic vulnerability approach based on the rate of unemployment (emphasis on workers including their mobility) compared with the conventional consideration of employment (focus on the number of jobs in a region)?; and b) is the regional level the appropriate spatial level for measuring economic resilience and vulnerability? Given the intrinsic element of connectivity embedded in the resilience and vulnerability concepts, it seems worthwhile including for policymakers, to analyse resilience and vulnerability at a sub-regional level, in, for example, districts and/or provinces.

On the basis of the above considerations, this empirical study aims to investigate the relationship between the two approaches, resilience capacity (RCI) and vulnerability, in the context of Slovakia after the crisis. Section 2 provides the main definitions of economic resilience and vulnerability which have emerged from the scientific literature. Section 3 then describes the data and explains the methodology used in the empirical analysis. Section 4 presents the results concerning RCI, in confrontation with the dynamics of vulnerability indicators in Slovakia. Finally, Section 5 makes a retrospective analysis of the research questions on the economic resilience/vulnerability of the urban-rural areas, West-East distinctness, and mobility.

2. Economic resilience and vulnerability

In the context of the economic crisis, the concepts of economic resilience and vulnerability have gained increasing attention (Christopherson, Michie, & Tyler, 2010). The linking of economies and the interdependence of regions/local areas, in addition to having positive effects, has also highlighted the increased sensitivity to spatial economic fluctuations (Kraft et al., 2011). Economic resilience can be measured as the degree of impact of the recessionary shock on the spatial economy, by considering the rise/decline of employment growth rates (Lagravinese, 2015; Martin, 2012). Adaptability is a different kind of measure linked to system properties such as how rapidly companies are able to switch to other activities, or how easily the employees can adjust to change. Economic vulnerability, which can be regarded as the susceptibility of a system to external shock (Seeliger & Turok, 2013), can be measured as unemployment increases (Champion & Townsend, 2012; Lee, 2013). The rise in unemployment reflects the economic vulnerability of a region/area assessed in terms of a higher number of workless local inhabitants.

Many regional scientists (e.g. Christopherson et al., 2010; Foster, 2007; Hassink, 2010; Hill et al., 2008; Newman, Beatley, et al., 2009; Vogel et al., 2007) believe that economic resilience can help to explain the essential question of why some regions can recover from external shocks in a relatively short time, and why others remain in economic decline. The standard way to quantify the economic resilience of regions is by measuring either regional productivity or regional employment (Martin, 2012). The common disadvantage of both indicators is their inability to prevent the influence of the job mobility factor. In addition, as previously indicated, resilience can be analysed more deeply, by considering its associated variables at a sub-regional level.

¹ <http://br.berkeley.edu/rci/>

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