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Heterogeneous economic resilience and the great recession's world trade collapse*

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Abstract. This special section aims to fill a gap in the regional resilience literature and to stimulate future spatial studies of resilience to include the international dimension in empirical analyses. It demonstrates the do-ability and relevance by the natural experience of the global trade collapse that allows us to separate the effect of collapse upon event and *ex post* recovery because no *ex ante* resilience measures were taken. This is a great methodological advantage with respect to the literature on natural disasters and financial crises that is confronted with the difficulty of identifying resilience because of *ex ante* measures (prevention or inherent resilience measures) and *ex post* measures (recovery or adaptive resilience measures).

JEL classification: F14, R11, R12

Key words: Resilience, great recession, trade collapse, global shock

1 Introduction

Global shocks affect regions differently. Some regions are hit particularly hard by a global shock, others to a smaller extent, and yet some other regions appear not to be affected at all. The recovery from a global shock also differs by region, such that it is by now a well-established stylized fact that regions differ in their shock sensitivity: some regions are more resilient than others. Why global economic shocks affect regions and their recovery differently is the topic of a growing body of literature, see for examples and recent surveys: (*i*) the 2010 special issue of the *Cambridge Journal of Regions, Economy, and Society* on 'The Resilient Region'; (*ii*) the 2014 special issue of *Raumforschung und Raumordnung* on 'Regional Economic Resilience: Policy Experiences and Issues in Europe'; and (*iii*) the 2016 special issue of *Regional Studies* on 'Resilience Revisited'. The motivation for this special section is that the international economic dimension of resilience and its

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characteristics, while frequently being recognized qualitatively in the literature, has hardly been taken up in empirical research.

Empirical researchers have recognized the importance of inter-regional and international linkages, but have so far paid little empirical attention to the international dimension. Modica and Reggianni (2015), for example, review the indicators used in a sample of the spatial economics resilience literature and report no factors related to foreign direct investment or international trade. Studies often refer explicitly to globalization, linkages, trade, and investment, but do not consider these as explanatory variables in the econometric analysis (an example is Davies 2011). Although the lack of attention for the international dimension in spatial economics in resilience research is remarkable, we should also point out that in environmental studies resilience is a neglected issue, as such studies tend to under-investigate openness. As an example, Figure 1 reports the inclusion of resilience factors in the meta-analysis of Lazzaroni and van Bergeijk (2014) that covers 64 primary studies published in 2000–2013 on the macroeconomic impact of natural disasters (a total of direct costs – damages directly due to the disaster, 1858 regressions and indirect costs – business interruptions and effects on the overall performance of the economy, 1991 regressions). Only 9 per cent (direct costs) and 40 per cent (indirect costs) of the primary studies consider openness as an explanatory variable.

A key question is of course: does the international dimension matter? A first answer is that many studies that do not empirically address the international dimension pay qualitative attention to globalization and international linkages A second answer is provided by the findings of regional science resilience studies that do take international aspects into account (Groot et al. 2011; Crescenzi et al. 2016) as they consistently report the significance of current account imbalances for regional resilience.

This special section aims to fill this gap in the literature, to motivate that the international dimension is important, and to argue and show that the great trade collapse of 2008/9 offers a unique natural experiment for resilience research, and would like to stimulate future spatial studies of resilience to include the international dimension in the empirical analysis.

2 What do we mean by resilience?

The concept of (regional) resilience both has an intuitive appeal, especially for policy-makers who are confronted with increasing numbers of man-made and natural disasters, and has

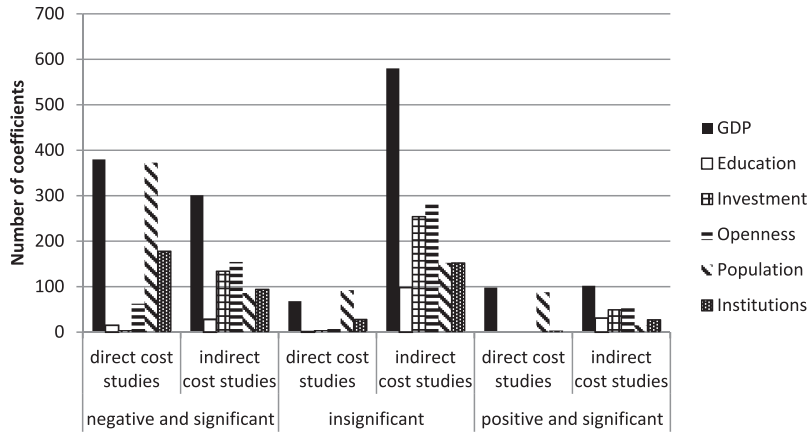

Fig. 1. Inclusion of resilience factors in 64 primary econometric studies on the macroeconomic impact of natural disasters by sign and significance ($p < 0.1$)
Source: Lazzaroni and van Bergeijk (2014, Table 7, p. 344).
Notes: A negative coefficient means: less damage, disruption and loss of performance.

stimulated academic debate.[1] The conceptualization of resilience, however, is not without problems. Martin and Sunley (2015) note not only that defining resilience is difficult, but also that a well-defined methodology to study resilience is lacking (see also Martin et al. 2016). Defining resilience is challenging as the concept can refer to different aspects. For example, does resilience imply that regions are not affected in the first place by a shock, or that they quickly return to the original (growth) path before the shock, or that they adapt to a new – possibly higher – trajectory than before the shock? Also, national economies constantly change, which raises the question of how to separate resilience from other reactions to a shock and how to separate shocks from changes that constantly occur in an economy. From a policy perspective, vulnerability, prevention, and mitigation are important aspects that determine the impact of and recovery from shocks and thus of resilience. As the concept of resilience is not fully transparent, a well-defined or accepted methodology to study resilience is also missing.

The fact that a concept is still difficult to define or apply, however, does not mean that it is useless. In the editorial of the special issue on resilience in *Regional Studies,* Bailey and Turok (2016, p. 557) not only observe the problems related to the concept of resilience as described above, but also that the research on resilience has:

> *made several important contributions to long-running regional research into the performance and adaptability of territories in the wake of damaging events and extreme pressure. A major concern has been how and why local communities and regional economies respond to major disturbances.*

We are convinced that a meaningful and rewarding empirical analysis in the field of resilience is possible and worthwhile, provided the researcher limits herself with respect to the research aim, selects an appropriate shock to study, and uses proper metrics. This is a truism, but it is worth keeping in mind because the major methodological problems in the literature are: (*i*) that the concept of resilience by bringing in new multi-disciplinary and evolutionary elements broadened the conceptual framework complexifying regional resilience beyond the limits of what can be meaningfully analysed empirically; (*ii*) that selected shocks had a relatively high frequency, implying that pre-shock trajectories aimed at prevention and reduction of vulnerability needed to be included; and (*iii*) that no consensus exists on what, how and when to measure.

We do not deny the usefulness of the evolving conceptualization of resilience in regional science, but we question the validity of the evolutionary approach where it argues that:

> *it is wrong to see resilience in terms of an ability, following an economic shock, to return to the previous equilibrium growth path.* Christopherson et al. (2010, p. 6)

Instead, we find Rose's (2004, 2007) definition of economic resilience a useful starting point for empirical research (as the contributions to this special section will demonstrate). Rose sees economic resilience as the ability to reduce losses from shocks. Economic resilience occurs at the micro level, (firms and individuals), at the meso level (groups, sectors and clusters) and at the macro level (regions, countries). Rose distinguishes static economic resilience (the ability to maintain functioning without repair and reconstruction) and dynamic economic resilience, which is the speed with which recovery occurs after the shock towards some desired state of affairs (often the desired state is interpreted as an equilibrium, but we note that this is not necessary). It is possible to increase resilience before a shock occurs by investment in education, training and reductions of vulnerability (for example by stockpiling and structural reforms, see Duval and Vogel (2008). Often this requires specific investments and this is only possible when

[1] See Hassink (2010) and Olsson et al. (2015) for critical reflections on the use of resilience as a concept.

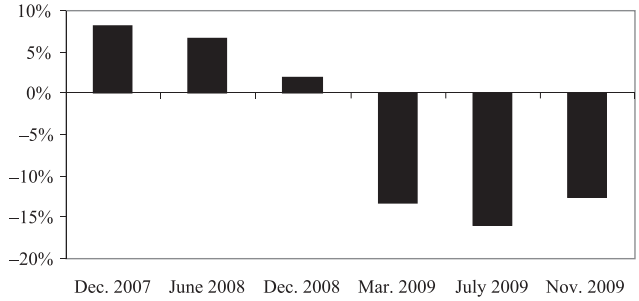

Fig. 2. OECD Predictions for the 2009 world trade growth rate
Source: van Bergeijk (2010, Figure 1.2, p. 5).

disasters occur with some frequency (floods in the Netherlands – our home country – are an example) or can be foreseen otherwise (global warming is an example). This brings us to the kind of shock that is being studied.

3 The great trade collapse

This special section focuses on the great trade collapse that occurred in 2008/9. The relevance of resilience is illustrated by this global shock. The reasons to focus on this shock are: (*i*) its unexpected character; (*ii*) the limitations to meet the trade shock with national or regional policy instruments; (*iii*) the pattern of trade evolution, especially its slowdown after full recovery; and (*iv*) the heterogeneity of impact that suggests differences in resilience between countries or regions. In short, the great trade collapse is a natural experiment that provides a unique testing ground for investigating resilience to global shocks.

First, we note that over the period 1880–2010 global trade contracted in some 12 per cent of the years, while the overall trend of global trade (with the exception of the 1930s) was positive. Moreover, a shock of this size had not been seen since the 1930s (van Bergeijk 2010; Irwin 2012).[2] Indeed, the 2008/9 trade collapse occurred as a complete surprise, as illustrated by Figure 2 which summarizes how the OECD changed its prediction for 2009 from +8 per cent to –16 per cent. This is an unprecedented 24 percentage points revision (other national and international institutions did not do a better job). It is therefore safe to assume that no pre-crisis investments in resilience had been made and by implication this natural experiment thus helps us to focus on the pure shock itself and post-shock effects.

Second, we note that hardly any national instruments were available to avoid or respond to the collapse of international trade. Unlike financial and economic crises, where automatic stabilizers are in place and fiscal and monetary policies can be used, no direct coping mechanism existed for the global trade shock. Hence, for the initial phase this particular case provides a much clearer and more direct picture of shock impact per se. During the upturn, existing instruments were scaled up, such as trade credit (following a G20 decision in April 2009) and export promotion services (Konings et al. 2016) but arguably the contribution of policy instruments was minor. Probably the most important policy contribution was the avoidance of the policy error of the 1930s to resort to protectionism.

Third, we point out that the World Trade Collapse and its aftermath provide a post shock pattern that differs from the financial and economic crises and natural disasters that have been

[2] Recent studies in regional science on resilience typically study the financial crisis shock. Financial crises have a higher frequency and are often seen as an unavoidable characteristic of capitalism.

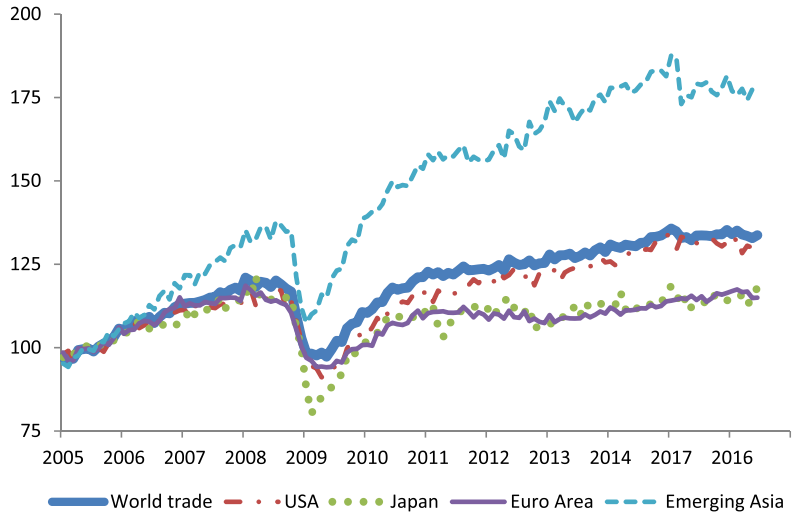

Fig. 3. Volume of Trade, selected regions and countries; index (2005 = 100)
Source: Based on monthly data from CPB Netherlands Bureau for Economic Policy Analysis (CPB, date accessed September 15, 2016); trade volume for a country or region is average of export and import index.

studied in regional science studies of resilience. Indeed, using monthly trade data from the World Trade Monitor of the Netherlands Bureau for Economic Analysis CPB (CPB 2013), Figure 3 suggest that an additional element needs to be introduced into the typology on stylized responses of regional economies to major shocks developed by Simmie and Martin (2009, Figure 1; see also Martin 2012, Figures 1 to 3). For Emerging Asia the resilience pattern comprises of a shock followed by a recovery to trend level (so above the pre-crisis peak level) and then a phase of slowdown. For world trade, recovery occurs to previous peak and then the growth rate of trade decreases again. The latter has recently been termed the Global Trade Slowdown. The issue whether this is a 'new normal' and if so why are issues for ongoing debate (Hoekman 2015; World Bank 2015; Constantinescu et al. 2016; IMF 2016; Haugh et al. 2016; van Bergeijk 2017; van Marrewijk 2017).

Fourth, we note that Figure 3 also illustrates big differences in both trade impact and trade recovery even for large countries and global regions. The CPB identifies eight major regions (four advanced regions and four emerging regions). The pre-crisis global peak in world trade according to CPB data was in January 2008 with a virtual stagnation until July; in Augustus 2008 the decline of the world trade volume set in. The global trade trough was in May 2009 (a decline of 19%); the timing of the trough in May 2009 is similar for the USA and EU; Emerging Asia hit bottom a bit earlier in January and Japan in February 2009.[3] Global recovery to the pre-crisis trade volume took until November 2010. Importantly, Figure 3 illustrates the extent of heterogeneity in recovery. Emerging Asia recovered in December 2009, the USA in July 2011 and in Europe and Japan trade volumes are still below pre-crisis peak levels. Compared to the pre-crisis peak level Emerging Asia in June 2016 exceeded the pre-crisis peak level by 28 per cent, the USA by 11 per cent and Europe and Japan were still 3 per cent below the 2008 trade level.

Figures 4 and 5 further illustrate this heterogeneity for the duration of the trade collapse (peak to trough in months) and the trade recovery (trough to previous peak), respectively. Our analysis is based at the volume of trade flows (average of exports and imports, using the

[3] See Sensier et al. (2016) on the need to date regional cycles rather than just assuming that the shock occurs everywhere at the same time.

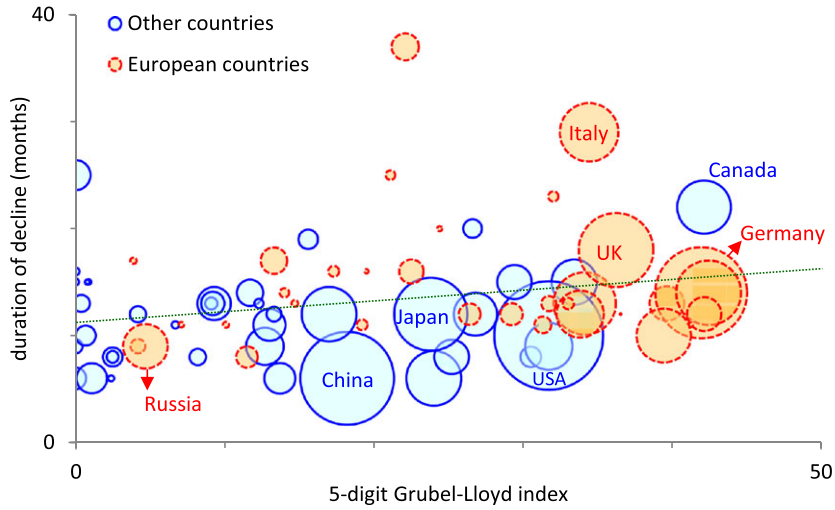

Fig. 4. Grubel-Lloyd index and the duration of the decline in months
Source: Authors's calculations.
Notes: Size of bubble proportional to trade in 2008; 72 countries included; dotted line is a simple regression line for all countries.

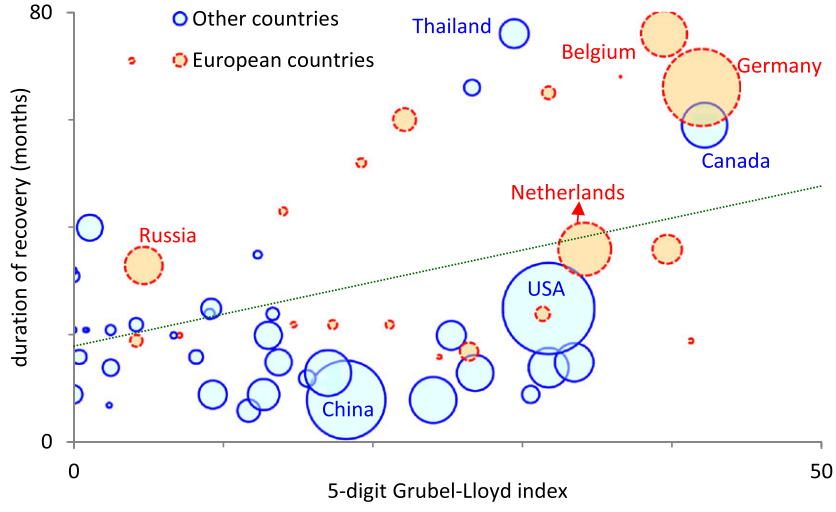

Fig. 5. Grubel-Lloyd index and the duration of the recovery in months
Source: Author's calculations.
Notes: Size of bubble proportional to trade in 2008; 56 countries included; dotted line is a simple regression line for all countries.

CPB data) at the country level for centered 5-month moving averages. On the horizontal axis we plot the Grubel-Loyd index (Brülhart 2008), which measures intra-industry trade and can be used as an indirect indicator for global value chains.

The mean duration of the decline is 13.2 months and the median is 12 months. This ranges from 6 months in China, South Korea, and Brazil to more than 2 years in Estonia, Italy, and Ireland. The mean duration of the recovery is 28.3 months and the median is 21 months, ranging from a minimum of 6 months for Indonesia to more than 6 years for Belgium and Malaysia.

A further 16 countries have not yet recovered; namely three countries in Asia (Iran, Japan and United Arab Emirates) and 13 countries in Europe (Austria, Croatia, Cyprus, Denmark, Finland, France, Italy, Norway, Portugal, Spain, Sweden, Ukraine and UK). This offers a first indication of the relevance and utility of considering the international aspect of resilience. In Figure 4 (downturn) we find a much smaller effect of the Grubel-Lloyd index than in Figure 5 (upturn): intra-industry trade slows down the recovery (longer period) but does not seem to be the driver of the collapse.[4]

These partial correlations need further investigation but suggest caution to blame value chains as the culprit for the trade collapse as was done by the World Trade Organization, which noted:

> *the magnitude of recent declines relates to the increasing presence of global supply chains in total trade ... goods cross many frontiers during the production process and components in the final product are counted every time they cross a frontier ... this effect, whose magnitude can only be guessed at in the absence of systematic information.* (WTO 2009, p. 2)

Indeed, the current debate on value chains is inconclusive or needs at least more nuance (Gawande et al. 2015), Altomonte et al. (2012) note for France that along a global supply chain shocks as well as recoveries can be magnified due to 'inventory' effects (the so-called bullwhip effect),[5] Wagner and Gelübcke (2014) conclude for Germany that the hypothesis that foreign multinationals are more volatile following a negative shock is not supported by their empirical research, while Behrens et al. (2013) conclude that value chains played a minor role in Belgium (van den Berg and Jaarsma this special section, take an intermediate position for The Netherlands). It is, however, not the inconclusiveness of the debate that is interesting: it is the heterogeneity of country experiences in Europe that suggests ample scope for finding out more about (regional) resilience. This is the answer to the question 'Why do the global economic shocks affect regions and their recovery differently?' that we seek to address.

4 Contributions to the special section

This brings us to the central question of this special section of *Papers in Regional Research*: to what extent does regional heterogeneity and location play a role in the trade collapse and the trade recovery after the Great Recession? On 30 October 2014 this journal, in co-operation with the academic institutions of the authors, organized a conference 'Heterogeneous resilience: what can we learn from the regional impact of shocks?' The conference was hosted by the International Institute of Social Studies of Erasmus University in The Hague with a range of speakers from Europe and Asia participating. This special section of *Papers in Regional Science* consists of three articles presented in The Hague and this introduction.[6]

The special section consists of one global study using macro level trade data and two detailed country studies for Finland and the Netherlands using micro-data.[7] The contributions all pay considerable attention to measurement issues and the collection and construction of

[4] van Bergeijk (2012) in an analysis of the decline phase of the recession for 42 countries finds no significant effect on either the size or the speed of import decline and argues that value chains may actually provide a form of resilience regarding global trade shocks.

[5] Altomonte et al. (2012) focus on the ownership structure of French firms and find that the magnifying effects of supply chains is larger for within firm trade than for arms's length trade.

[6] The papers of the conference went through the standard referee procedure of this journal.

[7] These countries are small and advanced economies in Northern Europe with potentially high resilience (Briguglio et al. 2009, rank Finland 7 and the Netherlands 13 out of 86 countries in the pre-shock period), but there are also important differences. Finland did not experience significant problems due to the financial and economic crisis so this case provides a 'natural experiment' in which the trade shock that was important for Finland is dominant. The Netherlands experienced both a trade shock and a financial shock leading to the collapse of two major banks.

reliable data from primary studies. The global study by Brakman and van Marrewijk (2017) focuses on the difference of the traditional measure of gross trade data to the recently available value added trade data that after careful analysis appear to be more informative about the real economy. The value added trade data are better able to explain a country's economic resilience in terms of changes in unemployment after the global shock. This study also adds to the literature on resilience in an important way because in contrast to the majority of regional resilience studies it is not limited to the advanced economies as it also studies countries from the global South (Brazil, India, Indonesia and China). The country studies zoom in on regions within nations by looking at micro (that is: firm level) data and analyse the extent to which economic resilience is determined by firm-level characteristics and to what extent it is determined by location-specific (regional) characteristics. The firm-level studies by Tamminen (2017) and van den Berg and Jaarsma (2017) also make an important methodological contribution by showing that univariate and bivariate descriptive statistics suggest different levels of resilience, that is, trade for different regions, but that careful decomposition demonstrates that firm-specific and sector-specific factors completely dominate regional effects. Their point is not that regions do not matter; their point is that resilience for the great trade collapse of firms in Finland and the Netherlands is driven by firm- and sector-specific factors rather than location-specific factors while bivariate and univariate descriptive statistics suggest otherwise. We are convinced that the rigor and detail of micro data studies is important in the emerging field of the importance of entrepreneurial activity for resilience that presently is mainly based on non-replicable case studies and qualitative data and analysis such as document analysis and structured interviews (for example Williams et al. 2013, Williams and Vorley 2014) although indexes for business resilience are being constructed (Rose and Krausmann 2013). The country studies use quantitative data allowing for panel-analysis that takes a great many variables into account.

The global study by Brakman and van Marrewijk (2017) makes a methodological contribution regarding the kind of trade data that need to be considered when analysing international trade linkages that reflect underlying revealed comparative advantage and disadvantages. The theoretical basis for their focus is Brakman et al. (2015) who develop a theoretical link between regional specialization patterns (based on comparative advantage) and resilience. If specialization patterns are driven by international competition then a link between trade and resilience should be expected. Comparing gross trade data to value added data, the authors find that value-added data tends to be more informative about the real economy as it is better able to explain a country's resilience in terms of changes in unemployment after the Great Recession.

Tamminen (2017) focuses on the development of several indicators for profitability which acts an incentive to enter new markets, to innovate and is important for access to finance; during a major export-demand shock the confirmed associated reduction of profitability leads to downsizing, lay-offs and bankruptcy potentially spreading up the value chain and creating negative local spillover effects. Since export activities are located in the major cities regional effects are expected and show up in descriptive statistics, but not in the analysis of micro data where resilience is by and large caused by firm-specific and sector-specific variables. As said before, this is an important result that is robust for different measures of profitability, different regional specifications and alternative indicators of change in entrepreneurial activity such as market exits.

Analysing the speed and extent of the trade recovery for Dutch firms, van den Berg and Jaarsma (2017) show that firm characteristics are more important determinants of the resilience of trade to external demand shocks rather than locational factors, such as the province the firm is located in or the specialization of this province as measured by revealed comparative advantage. These results suggest that a one-size-fits-all of stimulating economic activity in a region will not work. Rather policies should be selective and aim at specific sectors, products or stages in the value chain.

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Resumen. Esta sección especial tiene como objetivo llenar un vacío en la literatura sobre la resiliencia regional y estimular los estudios espaciales futuros sobre la resiliencia, para que incluyan la dimensión internacional en los análisis empíricos. Demuestra la factibilidad y la relevancia por medio de la experiencia natural del colapso del comercio mundial, que nos permite separar el efecto del colapso tras el evento y la recuperación *ex-post* debido a que no se tomaron medidas de resiliencia *ex-ante*. Ésta es una gran ventaja metodológica con respecto a la literatura sobre los desastres naturales y las crisis financieras que aborda la dificultad de identificar la resiliencia, debido a medidas *ex-ante* (prevención o medidas inherentes de resiliencia) y medidas *ex-post* (recuperación o medidas de resiliencia adaptativa).

要約: このスペシャルセクションは、地域のレリジエンスに関する研究のギャップを埋めること、またレリジエンスの空間的研究における実証分析が将来的には国際的な規模になるよう促進することを目的とする。世界的な規模での貿易の衰退を実体験したことから、国際的な規模での実証分析の可能性と重要性が示されている。レリジエンスに関する政策が事前に実施されていなかったことから、この貿易の急激な衰退は、急減から生じるある事象に対する影響とその事後的レリジエンスとに分離できる。レリジエンスを識別することの難しさに直面する自然災害や金融危機に関する研究にとって、事前対策（予防策または本質的なレリジエンス政策）ならびに事後対策（回復または適応的なレリジエンス政策）があるため、これは方法論的には有利である。