

The Transformation of the Spatial Structure of an Economy in the Crisis and Post-Crisis Periods

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Abstract—This article is a review of global and Russian research on features and patterns of the development of regions of a country in crisis and post-crisis periods. It is shown that the theoretical foundation of studies on this issue is the concept of regional resilience, as developed in global research since the 2010s. The features of the resilience concept are analyzed and compared with regional growth theories and economic security studies. Factors that influence the resilience of regions of a country to economic crises are summarized: they include features of a region’s settlement system (the ratio of the urban to rural populations) and its position in the national settlement system (location in relation to large urban agglomerations), the structure of the region’s economy (level of diversification, specific features of specialization and employment structure), innovation potential and quality of human capital, cohesion of the local community, and quality of public administration. It is noted that differences in regional resilience levels are consistent; in particular, the features of regional spatial development observed during the current crisis (associated with the COVID-19 pandemic) follow previously established patterns. Negative consequences of crises, specifically, regional divergence and reduced inclusiveness of economic growth, are also described. Issues of transforming the state spatial development policy during crisis periods, as well as opportunities for managing regional resilience, are discussed.

Keywords: regional resilience, settlement system, economic structure, human capital, governance quality, regional policy

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INTRODUCTION

In 2020, both the global and Russian economies were faced with a new economic crisis caused by the COVID-19 pandemic, which became an additional challenge for state spatial development policies, since crisis phenomena inevitably manifest in different ways across regions. Despite the long history of research on regional differentiation in terms of trends of regional socioeconomic development, the number of generalizing studies on specifically crisis periods is small in both Russian and global research literature.¹

The main objective of this article is to summarize the results of the past decade of global and Russian research on the features and patterns of the development of regions of a country in crisis and post-crisis periods. The timeframe is defined based on the fact that the 2009 crisis was the first global crisis that happened under (relatively) current conditions, i.e., at the modern level of technological development, globalization, and informatization.

¹ Studies on the development of Russian regions in the 1990s are not relevant, because that was a very particular situation of transition from a centrally planned economy to a market economy.

This review of research results seeks answers to the following questions: how do the rates of economic decline/growth of different types of regions during the acute phase of a crisis and during the final period of that crisis and is there a correlation with an increase or a decrease in interregional imbalances; what factors determine the economic trends of individual regions in crisis and post-crisis periods; can a crisis stimulate positive transformations in regional economies; and how does the state spatial development policy transform during crises.

THE CONCEPT OF REGIONAL RESILIENCE

The phenomenon named *regional resilience* (RR) has been the subject of actively developing global research since the 2009 crisis. Similarly, to many other issues of spatial development, the concept of RR is a subject of regional economics and economic geography. It is generally acknowledged that a comprehensive concept of RR has not been developed as yet. There are articles devoted entirely to analyzing approaches to understanding RR (Martin and Sunley, 2015; Modica and Reggani, 2014). In broad terms, RR

refers to the ability of regions to withstand various kinds of shocks, which besides economic shocks can include any other shocks: natural (natural disasters), industrial (accidents), biological (epidemics), etc. Shock resilience can be defined as “the ability ... to anticipate, resist, absorb, respond to, adapt to, and recover from a disturbance” (Zhikharevich et al., 2020, p. 6).

Analysis of RR during general economic crises is of particular interest. In a simplified way, the responses of regions to shocks are estimated by the depth of the economic downturn (or the lack thereof) and the time needed to achieve the previous (pre-crisis) development level. This kind of analysis uses the traditional set of statistical indicators (GDP, unemployment rate, etc.). In-depth RR analysis requires an assessment of changes in the structure and trajectory of a region's economy (Giacometti et al., 2018; Klimanov et al., 2018).

The Russian research literature has relatively few studies related to RR. One possible reason for this is the fact that in Russian research a similar direction has begun to develop within the topic of regional economic security. The English-language literature, on the contrary, does not have many publications on economic security. *Economic security* is another term that does not have an unambiguous definition; it is currently in the process of conceptualization (Problemy ..., 2019). In our understanding, the issue of economic security, similarly to the issue of RR, refers to resilient regional development; however, the first concept places much greater focus on permanent (rather than short-term) threats to resilient development, as well as on economic independence.

Another disputed issue is whether RR is a fundamentally new theoretical concept (an example of the opposing view is (Hassink, 2010)). In fact, as we will show below, the factors generally accepted as RR influences are not new to regional studies, and the concept of RR shares its research object of territorial development factors with the concept of regional growth. However, there are also some fundamental differences between the two concepts. Regional growth theories are primarily aimed at identifying medium- and long-term trends in regional development, with a greater focus on the correlation of development trends of different regions (e.g., the relationship between the center and the periphery or the competition between regions for mobile factors of production). Within RR concepts, each region is compared with its previous state, rather than with other regions (which does not preclude analysis of regions as open systems).

In our view, the concept of RR can be considered an independent research direction, due to its high practical significance, if nothing else: developing measures aimed at mitigating and overcoming consequences of crises based on an understanding of differ-

ences between regions in terms of resilience is an independent governance problem. Perhaps, RR should be considered as one of the elements of economic security that requires special management.

TYPES OF REGIONS BY RESILIENCE

Empirical RR studies are usually based on comparing the development trends of regions with country-wide trends. Regions are generally divided into four groups (types):

- regions that experienced no economic downturn during a crisis (usually a crisis year);
- regions that managed to return to their personal pre-crisis levels by the time the national economy as a whole has returned to its overall pre-crisis level (i.e., by the post-crisis period),
- regions that experience economic growth, but have not yet reached their pre-crisis development levels by the end of the post-crisis period;
- regions in which the economic downturn persists.

Below, these groups will be referred to as resistant, recovered, not recovered but in upturn, and not recovered and no upturn regions respectively. Sometimes the first two groups are combined into a single group of resilient regions, and the second two groups are combined into a group of non-resilient regions (Klimanov et al., 2019).

In studies on the consequences of the 2009 crisis in the EU, the division of regions into resilience types was superimposed over other regional typologies of the EU. For the purposes of the discussion around the spatial development strategy of Russia, the typologies of greatest interest are those that describe the settlement system (Table 1).

Large cities and urban agglomerations often belong to the category of recovered regions, i.e., those that experienced an economic downturn, but quickly returned to their previous positions (as stated, for example, in (Capello et al., 2015)). This is largely due to the fact that the crises themselves began in large cities: the 2009 crisis began with problems in the real estate market, which is significantly more developed in key cities; the spread of COVID-19 primarily affected larger cities due to the intensity of international contacts and high population density. The greatest resilience level was typical for regions with an “intermediate” ratio of urban to rural population located near significant urban centers (the positive role of commuting has also been noted in (Brakman et al., 2015)), as well as so-called second-tier cities (discussed, for example, in (Territorial ..., 2014)). A predominantly rural population and in particular remote location from significant urban centers are factors that predispose to the non-resilient groups. Of course, a region's settlement system type does not unambiguously predict its RR type; in reality the situ-

Table 1. The differentiation of EU NUTS 3 regions by relative resilience during the 2009 crisis

Region's settlement system type	Region's resilience type			
	resistant	recovered	not recovered: upturn	not recovered: no upturn
<i>Type by rural/urban population</i>				
Predominantly urban	1.06	1.41	1.02	0.65
Intermediate, close to a city	1.32	0.99	0.96	0.88
Intermediate remote	0.00	0.67	1.34	1.45
Predominantly rural, close to a city	0.98	0.97	0.99	1.04
Predominantly rural remote	0.11	0.36	1.06	1.86
<i>Type by metropolitan area</i>				
Capital city	1.15	1.51	0.84	0.68
Second-tier metropolitan	1.66	0.99	1.05	0.64
Small metropolitan	1.42	1.10	1.00	0.72
Non-metropolitan	0.73	0.92	1.01	1.19

Coefficient values above 1 indicate a relatively high proportion of territories of the corresponding type, values under 1 indicates a relatively low proportion.

Compiled from: (Economic ..., 2014).

ation is much more complicated (The Urban ..., 2013), due, among other issues, to the large number of RR factors, which we will consider further.

We were able to find only one Russian-language study that adheres to the division of regions into the above four RR types (Mikheeva, 2021); it provides an analysis of two crises, those in 2009 and 2015. The specifics of Russian statistics allow analysis only by federal subjects; therefore, dummy variables were used in regression equations for regions with large urban agglomerations. It was found that large urban agglomerations are typical for resistant or recovered regions, but do not guarantee resilience (similarly to the situation in the EU). The share of urban population was found to be an insignificant factor for Russian regions, which is also unsurprising: in the EU, the situation in located near cities predominantly rural regions is better than in "intermediate" peripheral ones.

REGIONAL RESILIENCE FACTORS

The problem of identifying RR factors has been considered in a number of studies, both empirical (based on constructing econometric models) and conceptual (a representative example is (Boschma, 2015)).

It is agreed that the most important factor that contributes to increasing RR is high diversification of the region's economy (Eriksson and Hane-Weijman, 2017; Giacometti et al., 2018; Martin et al., 2016; Territorial ..., 2014; Territorial ..., 2020). Crises affect different industries to different extents; therefore, the more diversified a region's economy is, the higher the probability that a downturn in the most affected industries will be compensated or at least mitigated by a relatively favorable situation in others. Obviously,

regions with larger population size are more likely to have a diversified economic structure compared to smaller ones, which is one of the reasons for the higher resilience of large urban agglomerations.

The economic specializations of regions also contribute to their resilience; however, unequivocally "good" or "bad" specializations cannot be defined. Thus, there is no obvious dependence of RR on the ratio of the manufacturing sector to the service sector. The latter is more susceptible to crisis phenomena but adapts to new conditions much faster (Diodato and Weterings, 2015), as clearly confirmed during the pandemic. The decrease in demand for goods during a crisis may be smaller compared to the decrease in demand for services but transforming production sectors is much more difficult (Giannakis and Bruggerman, 2017; Lagravinese, 2015).

Another difference that emerges during crises is that between the production of convenience goods and the production of durable goods. Specialization in the production of the latter type of goods can lead to a sharp downturn during a crisis, but post-crisis recovery is often rapid. The most widely discussed example of this type of industry is the automotive industry (Klier and Rubenstein, 2011; Territorial ..., 2020). Production of durable goods is usually more complex compared to convenience goods and is more often located in economically developed regions. At the same time, such regions benefit from their specialization in rapidly developing high-tech industries with high labor productivity, which are more favorable in crisis periods (Brakman et al., 2015; Cuadrado-Roura and Maroto, 2016). During the COVID-19 crisis, pharmaceutical industry became an industry of this kind.

Employment features are also of great importance due to the different scales of crisis-related downsizing for different categories of employees. The more stable employment occurs in the public sector of the economy rather than the private sector (Lagravinese, 2015; Territorial ..., 2014), in the headquarters of large companies rather than in regional branches (Kolko and Neumark, 2010), and in permanent positions rather than on temporary contracts (Brakman et al., 2015).

Another RR factor that is generally recognized alongside economic diversification is a region's innovation potential (Boschma, 2015; Bristow and Healy, 2018; Giacometti et al., 2018; Territorial ..., 2014), which is associated both with the structure of the economy and with another group of RR factors, that is, human capital. Moreover, while structural features of the economy have more influence on the depth of the downturn (or its absence) during the crisis proper, the innovation potential and quality of human capital are more significant in terms of quickly overcoming the crisis. A high development level of these factors helps regions rapidly adapt to new conditions (Giannakis and Bruggeman, 2017).

Researchers also investigate the attitude of the local community towards overcoming the crisis. A region's prospects of overcoming crises are worse if the population is aligned towards moving to more prosperous regions and better if the local community is cohesive and determined to find a way out of the crisis (Bristow and Healy, 2014; Giacometti et al., 2018; Huggins and Thomson, 2015; Territorial ..., 2014). This collective response to crisis challenges can take very diverse forms (Kousis and Paschou, 2017). Based on these facts, it is assumed that predominance of locally-owned businesses in a region may contribute to increasing RR; however, researchers have not been able to confirm this factor's statistical significance (Kolko and Neumark, 2010).

Another significant RR factor is the quality of public administration. During a crisis, this factor is determined by the ability of the authorities to promptly make competent decisions, the level of coordination between public authorities of different hierarchical levels, and the consistency of their efforts (Giacometti et al., 2018). Ideally, the best arrangement would be a social contract between the population, business, and public authorities (the "buy local" campaign is an example of this (Territorial ..., 2014)).

An important pattern that has been established is that regional differentiation by resilience is stable across different crises (Di Caro and Fratesi, 2018; Eriksson and Hane-Weijman, 2017).

Factors of regional differentiation in terms of regional development trends during crises are discussed in Russian literature as well, but often only the acute phase of the crisis is considered (Khramova and Ryazantsev, 2021; Minakir, 2020; Zemtsov and Mikhailov, 2021; Zubarevich, 2015; Zubarevich and

Safronov, 2020). The patterns observed in Russia are generally similar to those described in global research: the differentiation of regions was largely the same during the 2009 and 2015 crises (Mikheeva, 2021); the trends of regional development in crisis years are largely predicated on industry patterns (Klimanov et al., 2019; Minakir, 2020; Mikheeva, 2019; Zubarevich and Safronov, 2020); and the state economic policy contributes to RR to some extent (Khramov and Ryazantsev, 2021; Zemtsov and Mikhailov, 2021; Zubarevich, 2015). One difference is the absence of a clear dependence of the resilience of Russian regions on their level of innovation-driven development, which is presumably explained by the lower significance of the innovation sector in the Russian economy as a whole (Mikheeva, 2021).

THE SPECIFIC FEATURES OF THE COVID-19 CRISIS

While it would be premature to describe the final results of the COVID-19 crisis, the first conclusions can already be drawn. The main one is that despite the atypical cause of the crisis (from the economic point of view, the causes are the restrictions on economic activity and state border closures), many patterns of regional development in 2020 were typical for the acute phase of any crisis.

It is obvious that of the positions of the regions were largely determined by opportunities to transition to remote work and develop online-format business activities. These opportunities, in turn, depend on the structure of the economy (they are better in regions with a high proportion of complex services), innovation potential (the preparedness of the population and business to transition to new work formats), and the level of digital infrastructure development. As a result, similarly to previous crises, the situations were more favorable in regions with higher economic development levels and more qualified human resources, and the traditional contrasts along the urban–rural line (EU ..., 2020; OECD ..., 2021; Territorial ..., 2020) were again present. Thus, even in the OECD in 2020 the average difference between regions of one country in terms of the share of workers that can switch to remote work was 15 percentage points (in some countries the difference reached 20 percentage points) and the difference between the capital region and the other regions was 8 percentage points (OECD ..., 2020).

The fact that larger cities were by no means the most affected by the crisis quickly became obvious in Russia as well. As early as in the first months of the crisis, it became clear that the ability of these cities to quickly adapt to new conditions could outweigh the larger impact that the pandemic had on them (Kolo-mak, 2020).

Similarly, to the previous crises, the traditional differences between the production of convenience goods

and durable goods arose during the COVID crisis as well (Territorial ..., 2020).

The atypical features of the COVID-19 crisis are the negative impacts of closed borders on border regions, especially European ones, and the vulnerability of regions that heavily depend on participating in international value chains, associated with disruptions of supplies from countries in lockdown (Territorial ..., 2020).

A CRISIS AS A SOURCE OF POSITIVE CHANGE?

When discussing the consequences of economic crises, in addition to the associated problems, many experts also bring up the opening of a “window of opportunity” (Aganbegyan, 2020), referring to the crisis-created impetus to either abandon obsolete and no longer useful practices or more actively introduce new solutions. It is obvious that crisis-related positive changes do exist: in Russia, the 1998 crisis and the 2014 sanctions stimulated import substitution and the COVID-19 pandemic accelerated the development of information technologies. Changes for the better have occurred in the Russian economic policy as well: during the 2009 crisis, federal monotown support was introduced (previously, federal authorities had been minimally involved with municipalities) and investor support measures were intensified. The COVID-19 crisis forced some decentralization in administrative decision-making (Aganbegyan, 2020), although it has not yet been supported by budget decisions.

However, the negative consequences of crises, that is, economic downturns and reduced investment, outweigh their positive effects. In terms of spatial development, one significantly negative consequence is the shift from regional convergence to divergence. It has been widely discussed in global research that the 2009 crisis negated many years of efforts to equalize the development of European regions both in general across Europe and in individual countries (Cuadrado-Roura and Maroto, 2016; Dijkstra et al., 2015); this divergence did not stop in the 2010s and the 2020 crisis is likely to exacerbate it further (Capello and Caragliu, 2021). Increases in interregional differentiation of growth rates in crisis conditions have also been mentioned in Russian studies (Kolomak, 2020; Mikheeva, 2019; Khramova and Ryazantsev, 2021).

The main reason for regional divergence during crisis periods is the fact that crisis-provoked economic modernization occurs primarily in economically developed regions, which have better conditions for such modernization. For example, an analysis of the introduction of distance education in Russian universities during the pandemic has shown that higher-status universities (located in economically developed regions) were much better prepared to start using new

technologies than lower-status ones (Koksharov, 2021).

Another important negative consequence of crises is reduced inclusiveness of economic growth in certain regions (increased income stratification, etc.), observed both globally (The Urban ..., 2013) and in Russia (Barinova and Zemtsov, 2019). The COVID crisis is likely to have that consequence as well.

REGIONAL POLICY DURING CRISES

The pattern of aggravation of interregional differentiation problems in times of crises suggests that the importance of state regulation of spatial development should increase accordingly, but in reality the situation is ambiguous. First of all, the development of government spending is not unidirectional: with the onset of a crisis, it usually increases significantly, creating a “scissors effect” between income and expenditure, and after the acute phase of the crisis ends, government spending is reduced in order to stabilize the country’s budget system (Davis et al., 2010; Territorial ..., 2014). The scale of regional policy is also reduced: in the EU, its budgets for 2011 were cut in 8 out of 15 countries, remained at the same level in 5, and increased in only 2 countries (OECD ..., 2011).

It is important to note that globally, regional policy is understood as an independent policy direction of national authorities (with its own budget and tools) aimed at supporting the development of individual regions, but the line between regional policy and other measures of state regulation of the economy is very arbitrary. This has been clearly illustrated based on the example of the automotive industry in the United States (Klier and Rubenstein, 2011). The United States are a decentralized federalism, in which the existing federal support for regions is not considered to be regional policy. Klier and Rubenstein (2011) show that during the crisis, state assistance to the automotive industry was declared as a measure of support for the industry and the economy as a whole, but in reality it was implemented for the sake of regions.

In other words, during the acute phase of a crisis budget spending increases across various directions of the government’s socioeconomic policy and funds are directed to regions of various development levels. This is also true of Russia: it is impossible to obtain complete information on the distribution of federal funds by region.

MANAGING RESILIENCE

The inevitability of various kinds of shocks and crises incentivizes researchers to raise the question of possible strategies of managing regional resilience, that is, developing and implementing measures of mitigating crisis effects. Among the proposed RR management strategies, two approaches can be distin-

guished: increasing crisis preparedness and improving RR itself.

The first direction is obviously necessary: since completely avoiding all shocks is impossible, it is important to create a system of administration that is capable of responding to crisis challenges as quickly and effectively as possible. This requires established cooperation between authorities of different hierarchical levels, formation of strategic reserves, forecasts of various development scenarios, etc. (Giacometti et al., 2018; Zhikharevich et al., 2020). Many of these measures are also important for other administrative problems.

The issue of increasing RR is less unambiguous. Improving some RR factors, specifically, governance quality and human capital, definitely leads to positive results both in terms of RR and in terms of regional development in general. However, another major RR factor, economic diversification, does not always ensure economic growth, since specialization also has its advantages (Mikheeva, 2016). The economies of small regions (even more so individual settlements) and northern territories a priori cannot be highly diversified.

The COVID-19 crisis has brought special attention to RR risks associated with openness of regional economies and involvement in global value chains (although this issue had been discussed previously as well (see (Diodato and Weterings, 2015)). In the EU there have even been proposals to increase localization of production. In Russia questions about regional self-sufficiency have long been raised within the topic of economic security, particularly food security. Obviously, in this case the goal is an optimal balance between an open and an independent economy.

CONCLUSIONS

The first point to note when reviewing the results of the existing research on the considered topic is that the interregional differences observed in long-term regional socioeconomic development trends are different in nature from those observed in crisis periods. Researchers emphasize the fact that large urban agglomerations, with their higher economic development levels, are very vulnerable to crisis phenomena, but quick to recover. This leads to two important conclusions.

First, the state of affairs during a crisis, especially its acute phase, is not a reliable basis for predicting long-term spatial development trends. For example, the impact of the COVID-19 pandemic on large cities prompted publications on opportunities for peripheral territories (Cotella and Vitale Brovarone, 2020), but in-depth analysis shows that large urban agglomerations are unlikely to lose their leading role in the spatial structure of the economy (Florida et al., 2021).

Second, the study of specific features of regional development during a crisis truly is a distinct research area: RR concepts have significance independent of regional growth theories.

Both conclusions are confirmed by the fact that regional differentiation by resilience remains stable across different crises.

With regard to resilience management, two approaches can be distinguished: improving RR itself and creating an administrative system that is capable of promptly responding to emerging challenges. The latter requires variability in regional development scenarios, formation of financial reserves for mitigating crisis phenomena, and ensuring that public authorities can make decisions quickly, if necessary. The issue of improving RR is more complicated, since a number of measures aimed at that goal (economic diversification, reducing the economy's openness) may contradict the objectives of economic growth: balanced solutions are required. However, measures aimed at improving the quality of human capital are unambiguously necessary.

For the national spatial development policy, economic crises are an additional challenge, since they usually cause a shift from regional convergence to divergence, and the certain refreshing effect of crises is outweighed by their negative consequences. During a crisis, state support to the economy usually increases in scale (if such an increase is possible in terms of available resources), and the funds are inevitably directed predominantly towards solving acute social problems and to the most affected sectors of the economy. Whether such support is positioned as part of the state's regional policy or not is a matter of national traditions.

A conclusion from global research that is of interest to Russian authorities is the higher resilience of relatively intermediate territories and second-tier cities. In our opinion, this is another argument in favor of prioritizing territories at an average development level when making decisions at the federal level: the development potential of such territories is clearly underutilized (in comparison with the leading regions), but obviously exists (unlike many of the most problematic territories).

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