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Resilience of Russian Regions in the Context of the Pandemic and Sanctions

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Abstract. The article examines the resilience of the economies of 85 Russian Federation constituent entities (regions) to modern pandemic and sanctions shocks. The resilience is assessed on the basis of three indicators presented in comparable prices: the volume of industrial production, retail trade turnover and the volume of paid services to the population. For the period from January 2016 to September 2022, the moving (with a shift of one month) year-on-year growth rates of these indicators are calculated. On their basis, the average annual growth rates are computed within four established periods: pre-pandemic (January 2016 – February 2020), pandemic (March 2020 – April 2021), recovery (May 2021 – February 2022), sanctions (March 2022 – September 2022). For each indicator in each region, partial resilience indices in three periods (two shocks and intershock recovery) are determined using the method of R. Martin and R. Lagravinese, which is based on a comparison of changes in the average growth rates in the region and the country. The integral resilience index in each period is calculated by summing up partial resilience indices, normalized by the Z-score method.

The study showed the unequal impact of the pandemic and sanctions on industry, retail and services in the regions, which is explained by the different nature of the two shocks. Meanwhile, for most partial indicators and the integral resilience index, a fairly pronounced negative relationship was found between the resistance and recovery indices in adjacent periods, which indicates a tendency for the regions to return to their own development patterns after the impact of the shock. Given the obvious “trace” of the pandemic left by the beginning of the sanctions shock in 2022, the incompleteness of the latter does not yet allow us to assess its long-term consequences for the trajectories of regional development. The results obtained can be useful in managing the resilient development of regions under conditions of recurring shocks of various nature.

Keywords: region, pandemic, sanctions, resilience, index, industrial production volume, retail trade turnover, volume of paid services to the population.

Research area: economics.

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Резилиентность российских регионов в условиях пандемии и санкций

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Аннотация. В статье исследуется резилиентность экономик 85 субъектов Российской Федерации (регионов) к современным пандемическому и санкционному шокам. Резилиентность оценивается на основе трех показателей, представленных в сопоставимых ценах: объема промышленного производства, оборота розничной торговли и объема платных услуг населению. Рассчитываются скользящие (со сдвигом в один месяц) годовые темпы роста этих показателей за период с января 2016 по сентябрь 2022 гг. На их основе калькулируются среднегодовые темпы роста внутри четырех выделенных периодов: допандемического (январь 2016 – февраль 2020 гг.), пандемического (март 2020 – апрель 2021 гг.), восстановительного (май 2021 – февраль 2022 гг.), санкционного (март 2022 – сентябрь 2022 гг.). Частные показатели резилиентности для каждого региона в трех периодах (соответствующих воздействию двух шоков и межшоковому восстановлению) определяются по методу Р. Мартина и Р. Лагравинезе, в основе которого лежит сопоставление изменения средних темпов роста в регионе и в стране. Интегральный индекс резилиентности в каждом периоде рассчитывается путем суммирования частных индексов резилиентности, нормированных по методу Z-счета. Проведенное исследование показало неодинаковое влияние пандемии и санкций на промышленность, розничную торговлю и сферу услуг в регионах, что объясняется разной природой двух шоков. Между тем для большинства частных показателей и интегрального индекса резилиентности обнаружена достаточно выраженная отрицательная связь между индексами резистентности и восстановления в примыкающих периодах, что свидетельствует о тенденции возвращения регионов к собственным паттернам развития после воздействия шока. При очевидности «следа» пандемии к началу санкционного шока 2022 г. незаконченность последнего пока не позволяет оценить его долгосрочные последствия для региональных траекторий развития. Полученные результаты могут быть полезными при управлении резилиентным развитием регионов в условиях повторяющихся шоков разной природы.

Ключевые слова: регион, пандемия, санкции, резилиентность, индекс, объем промышленного производства, оборот розничной торговли, объем платных услуг населению.

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Introduction

In recent years, the Russian economy has experienced a series of successive shocks. After the negative impact of the 2020–21 pandemic, the Russian economy began to recover and even received a new impetus for development due to the spread of digital technologies, new organizational forms for the provision of services and the delivery of goods, and state support for a number of industries. However, this recovery was interrupted by the negative impact of the sanctions that followed the February 24 announcement of a special military operation in Ukraine. This caused another collapse in a number of indicators of the Russian economy, which was hindered by the demand for military products.

Russian regions responded differently to the pandemic and sanctions shocks, which is associated both with the different nature of these shocks and their unequal impact on the development of economic sectors. *The purpose of this study* is to assess and analyse the resilience of Russian regions under the impact of the pandemic shock, subsequent recovery, as well as a new sanctions shock and establish links between resistance and recovery in different periods. *The hypothesis of the study* is that Russian regions tend to return to the mastered development trajectories due to the rigidity of their sectorial, technological, and institutional structures. However, in a changing macroeconomic and institutional environment, a number of shocks may require reconfiguration of production and technological patterns of regions, which will affect their resilience to new shocks in the future.

Literature Review

The theory of resilience of economic systems began to develop after the crisis in the Asian financial markets in 1997–98 (Foster, 2007; Hill et al., 2008). Then the great recession of 2008–2010 revived and intensified research in this area (Fingleton et al., 2012; Martin, 2012; Lagravinese, 2015; Martin et al., 2016). Currently, interest in the resilience of economic systems has resumed due to the crisis caused by the spread of Covid 19.

One of the founders of this theory R. Martin (2012) considered resilient development as a

process consisting of four stages: 1) *resistance* of the economy to external shocks, measured by the depth and speed of its fall under their impact; 2) *recovery*, measured by the speed and extent of economic restoration after the shock; 3) *reorientation* – realignment and adaptation of firm, industry, technological and institutional structures of the economy to new conditions; 4) *renewal* – the transition of the economy to new steady development trajectories. In addition, R. Martin combined the theory of economic resilience with the concepts of path dependence and hysteresis in economics.

There are two main approaches to the study of resilience: 1) examining the scale of the economic downturn compared to the benchmark (usually interregional or country level) during the crisis period and recovery in the post-crisis period (Martin et al., 2016; Lagravinese, 2015); 2) examining the deviation of economy from a steady development trajectory during the shock and restoration of the previous balance after it (the so-called *engineering concept*) (Rose, 2004; Fingleton et al., 2012; Han and Goetz, 2015), or reaching a new equilibrium and a new steady development trajectory in the recovery period (the so-called *ecological concept*) (Holling, 1973; Reggiani et al., 2002; Simmie and Martin, 2010).

Researchers also investigate the relationship between resistance and recovery. They test hypothesis that the regions that have experienced the greatest decline bounce back faster after the crisis. However, studies in this area have not led to unequivocal results. For example, a negative relationship between regional resistance and recovery was confirmed for German regions during the Great Recession of 2008/2009 (Pudelko et al., 2018), and for Chinese resource-based cities in times of the Asian financial crisis and the global financial crisis (Tan et al., 2020). At the same time, for the Italian regions (Faggian et al., 2018), no unambiguous relationship was found between their resistance to the 2009–2010 recession and recovery of 2010.

A separate research task is to test the relationship between the resilience of economies to crises of various types. For example, Kim et al. (2022) compared the resilience of US states

during 2001 recession, 2008–2009 global crisis and Covid19 pandemic. They found that states that recovered quickly from the 2001 recession also coped better with the effects of the pandemic shock, while no such association was found between the 2008 crises and the Covid-19 pandemic shock. On the contrary, Gajewski (2022) found a significant relationship between the resilience of 380 Polish NUTS-4 regions during the great recession of 2008–2009 and the 2020 pandemic.

A number of modern studies are devoted to the resilience factors of economic systems in the context of the 2020–2021 pandemic. They focus on the impact of the sectorial structure of the economy and the degree of the economic diversity (Hu et al., 2022; Gajewski, 2022), the share of essential (sheltered) industries and industries with interpersonal interactions (Kim et al., 2022), the amount of government assistance (Arbolino, Di Caro, 2021), the mobility of resources (Di Pietro et al., 2021), the level of innovations and governance (Zhan et al., 2021) on the adaptation of economies to the Coronavirus. Grabner and Tsvetkova (2022) found a positive impact of the teleworking on employment stability in US cities during the pandemic.

A number of studies are devoted to the specifics of the response of the economies of Russian regions to the 2020 pandemic (Kolomak, 2020; Malkina, 2022; Chernova and Gridnev, 2023). At the same time, studies assessing the resilience of Russian regions to sanctions are still insufficient.

In this paper, we use the method of R. Martin and R. Lagravinese to assess the relative scale of the decline/recovery of Russian regions during the 2020–2021 Coronacrisis, the subsequent recovery, and a new sanctions shock after February 24, 2022. Next, we identify the links between the resistances of the Russian regions economies to different types of shocks, as well as the links between resistance and subsequent/previous recovery, and answer the question of whether regions are returning to their pre-crisis patterns after crises.

Data and Methods

The study was based on data from the Federal State Statistics Service of the Russian

Federation for the country as a whole and for 85 federal subjects (hereinafter referred to as regions). The research involved three indicators in real terms (at constant prices), presented monthly for January 2016 – September 2022:

- 1) Industrial production volume;
- 2) Retail turnover;
- 3) The volume of paid services to the population.

To exclude the seasonal component, the growth rates of indicators in each month were calculated against the same month of the previous year. Thus, time series of moving growth rates of indicators with a shift of 1 month were obtained.

The methodology for assessing the resilience of regions to the pandemic and sanctions included several stages.

First, the entire study period was divided into four sub-periods:

1) *pre-pandemic period*: from January 2016 to February 2020, N=1;

2) *pandemic shock period* – the period of the coronavirus crisis, that is, the negative impact of the pandemic on economic indicators (when the average regional growth rates of indicators were lower than their growth rates in February 2020): March 2020 – April 2021, N=2;

3) *recovery period* (between pandemic and sanctions shock): May 2021 – February 2022, N=3;

4) *sanctions shock period* – the period of Russia's special military operation in Ukraine, followed by the introduction of tough anti-Russian sanctions: March 2022 – September 2022 (the last month for which information is available at the moment of the study), N=4.

Next, the average growth rates of each k -th indicator ($k = 1, K$) for each i -th region ($i = 1, m$) in each N -th sub-period were calculated:

$$g_N^{ik} = \sqrt[T]{\prod_{t=1}^T (g_t^{ik} + 1)} - 1, \quad (1)$$

where t – month number in the corresponding year, T – total number of months in the period under review, g_t^{ik} – growth rate of the k -th indicator of the i -th region in the t -th month.

For the periods of pandemic (N=2), recovery (N=3), and sanctions (N=4), partial indices

of regional resilience were calculated according to the method of Martin et al. (2016) and Lagravinese (2015):

$$R_{Nik} = \frac{(g_N^{ik} - g_{N-1}^{ik}) - (g_N^{ck} - g_{N-1}^{ck})}{|g_N^{ck} - g_{N-1}^{ck}|}, \quad (2)$$

where g_N^{ck} – average growth rates of the k-th indicator in the N-th period in the country as a whole. If in the pandemic or sanctions period the decline in the regional economy is lower than the national average, then $R_{Nik} > 0$; if higher, then $R_{Nik} < 0$. Similarly, if in the recovery period the growth rate in the region’s economy is higher than the national average, $R_{Nik} > 0$; if lower, $R_{Nik} < 0$.

Before aggregation, partial resilience indices were normalized using the Z-score method:

$$R_{Nik}^* = \frac{R_{Nik} - \mu_{Nk}}{\sigma_{Nk}}, \quad (3)$$

where $\mu_{Nk} = \frac{1}{m} \sum_{i=1}^m R_{Nik}$ – average regional value

of indices; $\sigma_{Nk} = \sqrt{\frac{1}{m} \sum_{i=1}^m (R_{Nik} - \mu_{Nk})^2}$ – inter-regional standard deviation of indices.

Finally, the integral resilience indices of regions in the pandemic, recovery, and sanctions periods were calculated as the sum of partial normalized resilience indices.

Results and their analysis

Tables 1, 2 and 3 present descriptive statistics of the average annual growth rates of

Table 1. Descriptive statistics of the average moving year-on year growth rates of industrial production volume in the four periods under study

	Pre-pandemic	Pandemic	Recovery	Sanctions
Mean	3.70	1.73	7.96	-0.77
StD	4.28	8.10	7.88	9.33
CV	1.16	4.68	0.99	-12.12
Min (region)	-11.07 (Kabardino-Balkar Republic)	-26.26 (Tyva Republic)	-12.71 (Altai Republic)	-32.64 (Sakhalin region)
Max (region)	18.81 (Astrakhan region)	24.93 (Altai Republic)	40.14 (Republic of North Ossetia – Alania)	34.27 (Tyva Republic)

Note. Hereinafter: Mean – average regional growth rate (%); StD – standard deviation of this rate (%); CV – its coefficient of variation; Min – minimum growth rate in the regions (%); Max – maximum growth rate in the regions (%).

Table 2. Descriptive statistics of the average moving year-on year growth rates of retail trade turnover in the four periods under study

	Pre-pandemic	Pandemic	Recovery	Sanctions
Mean	0.89	-1.50	7.00	-5.00
StD	1.91	3.09	5.35	5.15
CV	2.15	-2.06	0.76	-1.03
Min (region)	-3.50 (The Republic of Dagestan)	-9.98 (Sverdlovsk region)	-2.45 (Chukotka AO)	-22.27 (Republic of Adygea)
Max (region)	11.38 (City of Sevastopol)	6.13 (Leningrad region)	25.72 (Kabardino-Balkar Republic)	12.77 (Kabardino-Balkar Republic)

Table 3. Descriptive statistics of the average moving year-on year growth rates of volume of paid services to the population in the four periods under study

	Pre-pandemic	Pandemic	Recovery	Sanctions
Mean	1.03	-8.13	11.91	1.65
StD	2.24	4.63	7.68	4.67
CV	2.17	-0.57	0.64	2.83
Min (region)	-4.29 (Republic of Crimea)	-21.54 (City of Moscow)	-3.71 (The Republic of Ingushetia)	-12.37 (Republic of Crimea)
Max (region)	8.59 (Tyumen region)	1.94 (Altai Republic)	46.80 (City of Moscow)	23.35 (Novosibirsk region)

industrial production, retail trade turnover and the volume of paid services to the population in the pre-pandemic, pandemic, recovery and sanctions periods of the Russian economy.

The results show that the pandemic and sanctions negatively affected the average annual growth rates of all three indicators considered. During the pandemic, the volume of paid services to the population fell the most, which is mainly due to the introduction of restrictions on the mobility of the population and the closure of a number of service enterprises. Retail trade turnover in the regions also decreased on average. The average regional growth of industrial production slowed down, but remained weakly positive. The recovery (intershock) period was characterized by unprecedented growth in all three indicators, partly due to the low base effect.

The response of the three studied indicators to the 2022 sanctions turned out to be different from their response to the pandemic. Retail trade suffered the most, mainly due to the increase in consumer prices and the decline in real incomes of the population. The average regional growth rate in industry became negative. The sector of paid services to the population, on the contrary, showed the greatest resilience, which can be explained by the low elasticity of demand for certain services (for example, housing and communal services, which make up the bulk of household spending).

Both the pandemic and sanctions have led to a significant increase in inter-regional differences in the growth rates of indicators. During the pandemic and sanctions, the rela-

tive inter-regional differences in the growth rates of industrial production (measured by the coefficient of variation) also increased, while in retail they remained almost unchanged. For the volume of paid services to the population, relative interregional differences decreased during the pandemic period, and increased during the sanctions period. Of particular note is the absence of a significant dependence between the growth rates of the three sectors in all three periods under consideration.

The tables above show different spatial effects of the pandemic and sanctions.

Even in *the pre-pandemic period*, the development of regions was extremely uneven. The growth leaders in the industry were Astrakhan region (with an average annual growth rate of +18.8 %), Jewish Autonomous region (+17.3 %), the Republic of Crimea (+14.9 %), the city of Sevastopol (+12.5 %), the Republic of Tyva (+11.1 %). In regions with low GRP per capita, this growth was associated with significant federal assistance and active investment processes. Retail trade developed at the highest rates in the city of Sevastopol (+11.4 % annually), the Republic of Tyva (+4.9 %), Moscow region (+4.8 %), the Republic of Adygea (+4.5 %) and Leningrad region (+4.4 %). Among the leaders there are both lagging republics and developed agglomerations. The growth rates of paid services to the population were the largest in Tyumen region (+8.6 %), Chukotka Autonomous Okrug (+7.0 %), Yamalo-Nenets Autonomous Okrug (+6.9 %), Altai Republic (+6.4 %), Krasnodar Krai (+5.7 %). At the same time, negative growth rates of industrial production

were observed in 8 out of 85 regions of Russia, retail trade – in 24 regions, paid services to the population – in 23 regions.

During the pandemic, 4 out of 5 former growth leaders in industrial production turned into decline leaders. However, industrial growth rates were positive in 50 out of 85 regions. Among the growth leaders were the Republic of North Ossetia-Alania (+31 p.p.), the Republic of Altai (+23.9 p.p.), the Kabardino-Balkar Republic (+19.8 p.p.), the city of Moscow (+ 17.6 p.p.), Penza region (+15.8 p.p.). It should be noted that the two mentioned Caucasian republics and the city of Moscow showed negative growth rates before the pandemic. In general, a fairly pronounced negative relationship was found between the pre-pandemic growth rates and the loss in rates during the pandemic with a correlation of $R = -0.57$.

Retail trade in the regions reacted to the pandemic shock differently than industry. The largest losses in retail trade were in Sverdlovsk region (-9.2 p.p.), where the pre-pandemic growth in retail was also negative. It was followed by the previously relatively prosperous Nizhny Novgorod region (-9.1 p.p.) and the former growth leader the city of Sevastopol (-7.7 p.p.). Twenty-eight of 85 Russian regions experienced positive growth in retail turnover during the pandemic. The largest gains in trade were in the Chelyabinsk region (+6.8 p.p.), which was among the five most lagging regions before the pandemic. However, in retail, unlike in industry, there was no pronounced negative correlation between pre-pandemic and pandemic growth rates.

The paid services to the population, on the contrary, demonstrated a great similarity with the industry in terms of responding to the pandemic shock. The drop leader during the pandemic was the city of Moscow (-24.8 p.p.), which previously ranked 9th in terms of growth in paid services to the population. It was followed by Chukotka Autonomous Okrug (-24.7 p.p., previously ranked 2nd in terms of growth in the sector), Yamalo-Nenets Autonomous Okrug (-19.8 p.p., 3rd ranked) and Tyumen region (-19.4 p.p., 1st ranked). The pandemic led to an increase in paid services to the population in only two regions: the Republic of Crimea (+3.9 p.p.; before

the pandemic, the region had the lowest negative growth rates in the service sector) and the Republic of Adygea (+0.6 p.p.; before the pandemic ranked 52nd in terms of growth). In general, the relationship between the pre-pandemic growth rates of paid services to the population and their change during the pandemic was moderately negative, $R = -0.42$.

During the post-pandemic (recovery) period, that is, between the two shocks, regional economies tended to return to their previous development trajectories. In this period, the number of regions with positive industrial production growth rates increased from 50 to 78. The number of regions where industrial growth rates increased compared to the pandemic period was 63. As can be seen from Figure 1a, there is a moderate and quite robust negative relationship between the change in the growth rate of industrial production during the pandemic and the change in its growth rate during the recovery period.

Something similar was observed in retail trade. In the recovery period, only in three regions (Chukotka Autonomous Okrug, the Republic of Karelia and the Khabarovsk Krai) the growth rates of retail trade were negative, and they decreased compared to the pandemic period. For the Far Eastern regions, the phenomenal growth in a number of indicators during the pandemic was associated with rising metal prices and an increase in cross-border trade. In most regions, the increase in trade was of a compensatory nature during the recovery period, when the deferred demand of the population was realized. This was especially pronounced in the city of Sevastopol, Nizhny Novgorod and Tula regions. Meanwhile, some regions were among the leaders in terms of trade growth both during and after the pandemic, for example, the Kabardino-Balkar Republic. Due to different patterns of regions, only a weak relationship is found between resistance and recovery in retail trade (Fig. 1b).

In the recovery period, paid services to the population showed trends similar to those in industrial production. The regions hardest hit by the pandemic saw the most growth. The city of Moscow became the leader in the growth of paid services to the population,

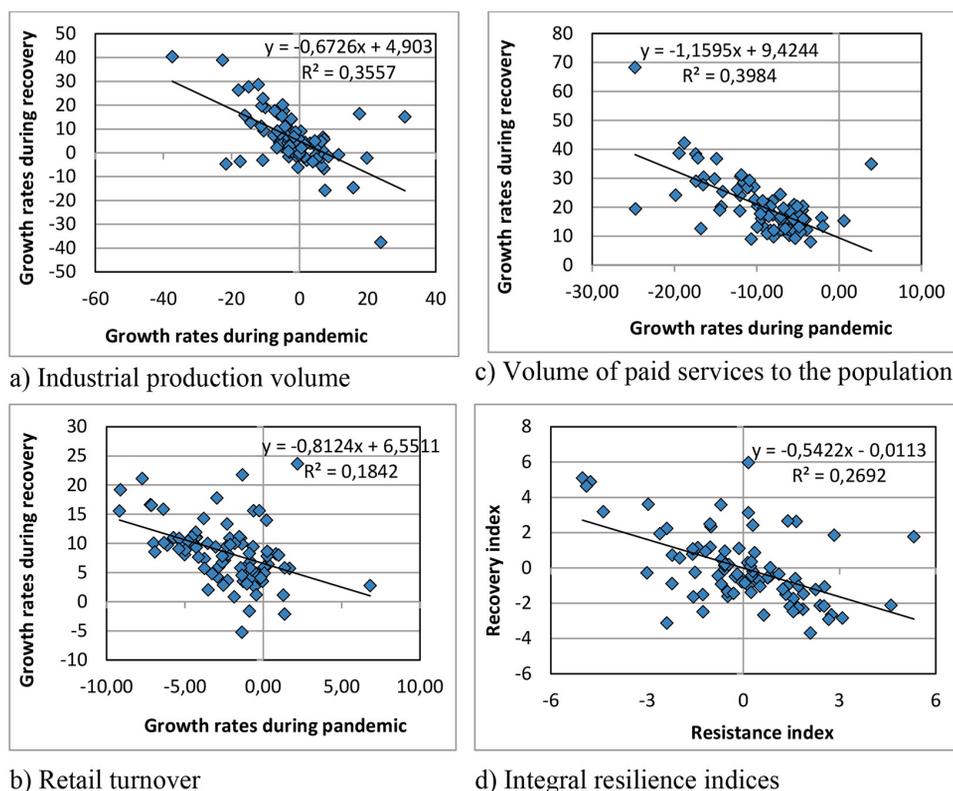


Fig. 1. Relationship between regions' growth rates / resilience in the pandemic and recovery periods

while it showed the largest drop during the pandemic (-24.8 p.p. and +68.3 p.p.). Only the Republic of Ingushetia and Magadan region maintained a negative growth in paid services to the population, although in both regions the situation has improved compared to the pandemic. Figure 1c shows a fairly pronounced negative relationship between the growth rates of the service sector in the pandemic and recovery periods.

Integral resilience indices calculated on the basis of partial resilience indices show a negative, albeit weak, relationship between resistance and recovery (Fig. 1d). This confirms the hypothesis about the tendency for the regions to return to their former patterns of development after shock.

The sanctions shock caused a new collapse in production indicators in the Russian regions. According to the data for 7 months (March-September 2022), industrial production fell in 49

Russian regions. The growth rates of industrial production slowed down compared to the recovery period in 71 regions. The largest decline was observed in Primorsky Krai (-30.9 p.p.), Kaluga region (-29.9 p.p.), Ulyanovsk region (-29 p.p.), the city of Moscow (-28.9 p.p.), as well as in the Republic of North Ossetia-Alania (-28.4 p.p.). A number of lagging republics in southern Russia (Tyva, Buryatia, Altai, Ingushetia, Chechnya) still look the most successful during the sanctions period. In general, there is no connection between the recovery growth rates in industrial production and their decline in the period of tougher sanctions (Fig. 2a).

Retail trade showed negative growth in 71 out of 85 regions. Retail turnover increased only in two regions: Chukotka Autonomous Okrug (which had the lowest negative growth in the intershock period) and the Republic of Dagestan. An unprecedented drop in retail trade was noted in the Republic of Adygea

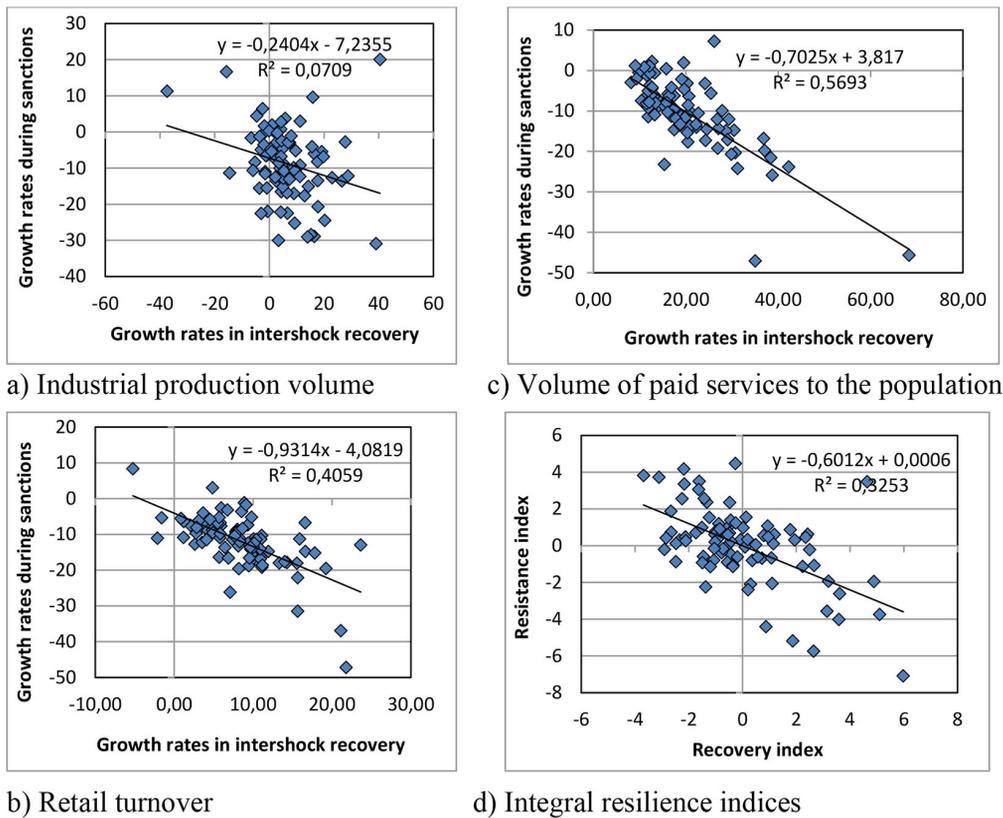


Fig. 2. Relationship between regions' growth rates / resilience in the recovery and sanctions periods

(-47.2 p.p.), Sevastopol (-36.9 p.p.), St. Petersburg (-31.5 p.p.), Moscow region (-26.1 p.p.), Krasnodar Krai (-22.1 p.p.). In contrast to industry, for retail trade, there is a medium strength relationship between growth rates in the intershock (recovery) period and the period of escalation of sanctions (Fig. 2b).

During the sanctions shock of 2022, the volume of paid services to the population decreased only in 25 regions, however, its growth rates reduced in the overwhelming majority (78 out of 85) of Russian regions. The service sector suffered the most in the Republic of Crimea (-47.0 p.p.), Moscow (-45.6 p.p.), Tyumen region (-25.9 p.p.), Khabarovsk Krai (-24.2 p.p.), Sverdlovsk region (-23.8 p.p.). The service sector turned out to be the most resistant to sanctions in the Novosibirsk Region (+7.2 p.p.). As in retail trade, the growth rate of the volume of paid services to

the population during the sanctions shock is inversely related to their growth rate during the recovery period (Fig. 2c).

Figure 2d shows a moderate negative relationship between the integral resilience of regions during the recovery period and their overall resistance to the sanctions shock. With the obvious dependence of the regions' resilience in adjacent periods (shock vs recovery), it should be noted that there is no connection between resilience to the pandemic and resilience to sanctions shocks. This can be explained by different causes and different maturity of the two shocks (the second one has not yet fully manifested itself).

The calculated integral resilience indices of Russian regions during the pandemic, recovery and sanctions are also presented on the geographical maps of the Russian Federation (Fig. 3, 4 and 5).

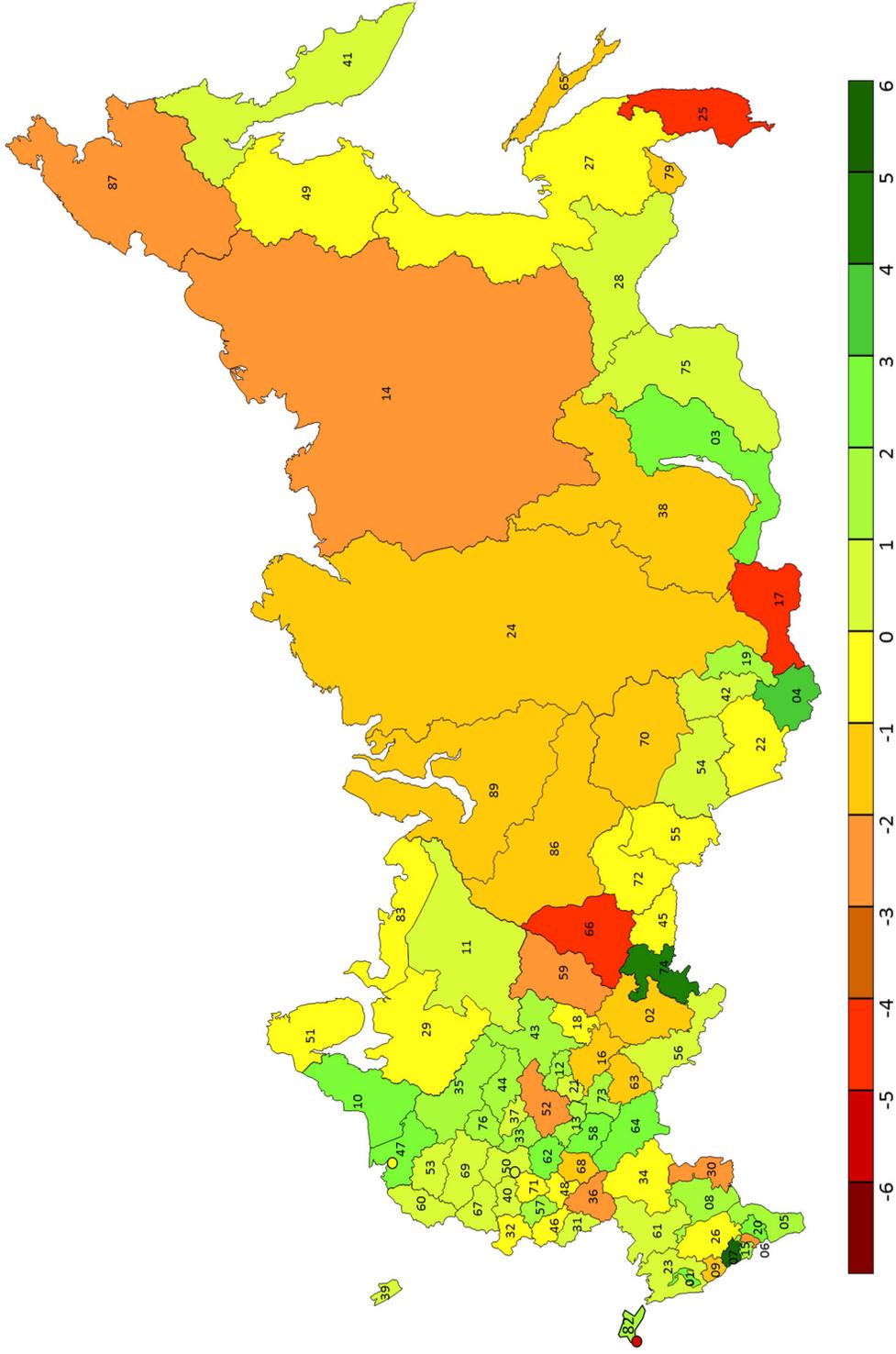


Fig. 3. Integral index of resistance of Russian regions during the pandemic Note. Hereinafter, regions are designated by their administrative codes

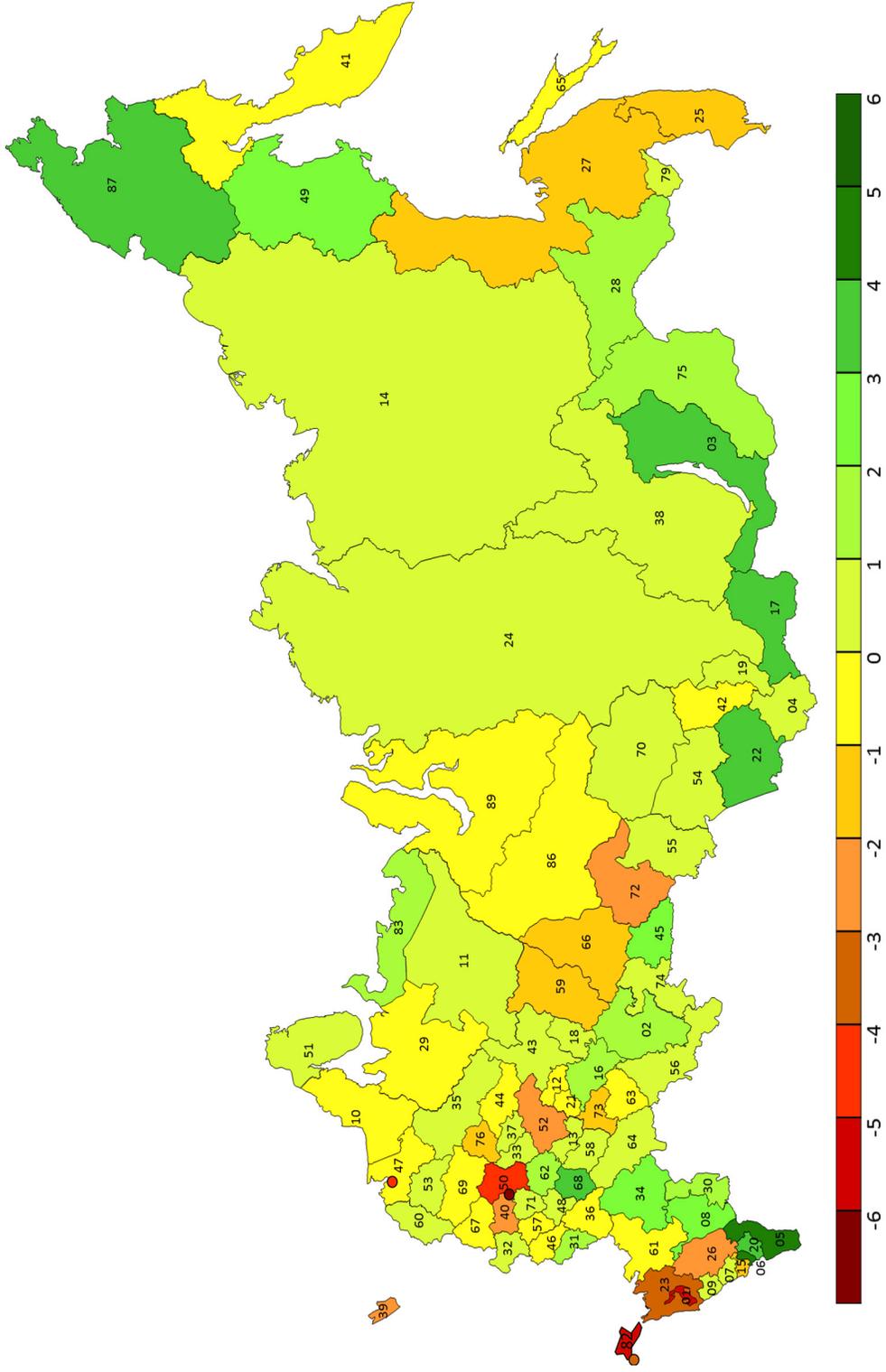


Fig. 5. Integral index of resistance of Russian regions during the 2022 sanctions

Conclusion

The study is devoted to the assessment and analysis of the Russian regions resilience to two shocks: the pandemic shock of 2020–21 and the sanctions shock, the beginning of which dates back to March 2022. Resilience was assessed on the basis of moving (with one month shift) year-on-year growth rates of industrial production, retail trade turnover, and the volume of paid services to the population. All three indicators were used at comparable prices and excluded the effect of inflation. With the help of dividing the period under review into four sub-periods: pre-pandemic, pandemic, recovery and sanctions, the dynamics of the growth rates of indicators and interregional differences in industry, trade and the service sector under different conditions were estimated. Based on the methodology of R. Martin and R. Lagravinense, partial indices of regional resilience in three sectors were calculated for the periods of pandemic and sanctions shocks and recovery (intershock period). With few exceptions, significant negative relationships was found

between resilience during periods of shocks and recovery, which indicates a tendency for regions to return to their previous patterns of development after the impact of shocks. Integral indices of regional resilience in three periods were calculated by normalizing partial resilience indices using the Z-score method and their simple aggregation. Integral resilience indices also confirmed the previously found relationship between the growth of regions during the recovery period and the recession during the shock period, and vice versa. A convincing evidence for the concept of path dependence was found, which can be explained by the rigidity of the sectorial, technological and institutional structures of regional economies. At the same time, a significant deviation of regional indicators from the pre-pandemic level in a number of regions by the beginning of the sanctions in 2022 indicates the remaining trace of the pandemic and their possible entry into new development trajectories. Determining the long-term effects of the two shocks using more advanced methods is left to the future.

References

- Arbolino, R., Di Caro, P. Can the EU funds promote regional resilience at time of Covid-19? Insights from the Great Recession. In: *Journal of Policy Modelling*, 2021, 43(1), 109–126. DOI: 10.1016/j.jpolmod.2020.10.001.
- Chernova, O.A., Gridnev, D.S. Resilience of Russian regions in the face of COVID-19. In: *Regional Statistics*, 2023, 13(1), 1–18. Online First. DOI: 10.15196/RS 130104.
- Di Pietro, F., Lecca, P., Salotti, S. Regional economic resilience in the European Union: a numerical general equilibrium analysis. In: *Spatial Economic Analysis*, 2021, 16(3), 287–312. DOI: 10.1080/17421772.2020.1846768.
- Faggian, A., Gemmiti, R., Jaquet, T., Santini, I. Regional economic resilience: The experience of the Italian local labor systems. In: *The Annals of Regional Science*, 2018, 60(2), 393–410. DOI: 10.1007/s00168-017-0822-9.
- Fingleton, B., Garretsen, H., Martin, R. Recessionary shocks and regional employment: evidence on the resilience of U.K. regions. In: *Journal of Regional Science*, 2012, 52(1), 109–133. DOI: 10.1111/j.1467-9787.2011.00755.x.
- Foster, K.A. A Case Study Approach to Understanding Regional Resilience / *Institute of Urban and Regional Development, University of California, Berkeley*, 2007. Working Paper 2007–08.
- Gajewski, P. Regional resilience to the Covid-19 shock in Polish regions: how is it different from resilience to the 2008 Global Financial Crisis? In: *Regional Studies, Regional Science*, 2022, 9(1), 672–684, DOI: 10.1080/21681376.2022.2137426.
- Grabner, S.M., Tsvetkova, A. Urban labour market resilience during the Covid-19 pandemic: what is the promise of teleworking? In *Regional Studies*. 2022. DOI: 10.1080/00343404.2022.2042470.
- Han, Y., Goetz, S.J. The Economic Resilience of U.S. Counties during the Great Recession. In: *Review of Regional Studies*, 2015, 45(2), 131–149. DOI: 10.52324/001c.8059.

Hill, E. W., Wial, H., Wolman, H. Exploring Regional Economic Resilience / *Institute of Urban and Regional Development, Berkeley*, 2015. Working Paper 2008–04.

Holling, C. S. Resilience and stability of ecological systems. In: *Annual Review of Ecology and Systematics*, 1973, 4, 1–23.

Hu, X., Li, L., Dong, K. What matters for regional economic resilience amid COVID-19? Evidence from cities in Northeast China. In *Cities*, 2022, 120, 103440. DOI: 10.1016/j.cities.2021.103440.

Kim, A., Lim, J., Colletta, A. How regional economic structure matters in the era of COVID-19: resilience capacity of U.S. states. In: *Annals of Regional Science*. 2022. DOI: 10.1007/s00168–022–01134-w.

Kolomak, E. Economic effects of pandemic-related restrictions in Russia and their spatial heterogeneity. In: *R-Economy*, 2020, 6(3), 154–161. DOI: 10.15826/recon.2020.6.3.013.

Lagravinese, R. Economic crisis and rising gaps North-South: evidence from the Italian regions. In *Cambridge Journal of Regions, Economy and Society*, 2015, 8(2), 331–342. DOI: 10.1093/cjres/rsv006.

Malkina, M. Ustojchivost' ekonomik rossijskih regionov k pandemii 2020 [Resilience of the Russian Regional Economies to the 2020 Pandemic]. In: *Prostranstvennaya ekonomika [Spatial Economics]*, 2022, 1, 101–124. DOI: 10.14530/se.2022.1.101–124.

Martin, R. Regional economic resilience, hysteresis and recessionary shocks. In: *Journal of Economic Geography*, 2012, 1, 1–32. DOI: 10.1093/jeg/lbr019.

Martin, R., Sunley, P., Gardiner, B., Tyler, P. How regions react to recess resilience and the role of economic structure. In: *Regional Studies*, 2016, 50(4), 561–585. DOI: 10.1080/00343404.2015.1136410.

Pudelko, F., Hundt, C., Holtermann, L. Gauging two sides of regional economic resilience in Western Germany – Why sensitivity and recovery should not be lumped together. In: *Review of Regional Research*, 2018, 38, 141–189. DOI: 10.1007/s10037–018–0124–4.

Reggiani, A., De Graaf, T., Nijkamp, P. Resilience: an evolutionary approach to spatial economic systems. In: *Networks and Spatial Economics*, 2002, 2, 211–229. DOI: 10.1023/A:1015377515690.

Rose, A. Defining and measuring economic resilience to disasters. In: *Disaster Prevention and Management*, 2004, 13(4), 307–314. DOI: 10.1108/09653560410556528.

Simmie, J., Martin, R. The economic resilience of regions: towards an evolutionary approach. In: *Cambridge Journal of Regions, Economy and Society*, 2010, 3(1), 27–43. DOI:10.1093/cjres/rsp029.

Tan, J., Lo, K., Qiu, F., Zhang, X., Zhao, H. Regional economic resilience of resource-based cities and influential factors during economic crises in China. In: *Growth and Change*, 2020, 51, 362–381. DOI: 10.1111/grow.12352.

Zhang, Y., Chen, Z., Tang, B., Sun, H. Analysis of Spatio-Temporal Characteristics of Urban Economic Resilience and Influencing Factors in Guangdong-Hong Kong-Macao Greater Bay Area. *Front. In: Public Health*, 2022, 10, 922096. DOI: 10.3389/fpubh.2022.922096.