Economic development of Russia's north-western regions and migration to the St. Petersburg agglomeration

Druzhinin, Pavel V.

Veröffentlichungsversion / Published Version
Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:
Druzhinin, P. V. (2023). Economic development of Russia's north-western regions and migration to the St. Petersburg agglomeration. *Baltic Region*, *15*(3), 100-116. https://doi.org/10.5922/2079-8555-2023-3-6

ECONOMIC GEOGRAPHY

ECONOMIC DEVELOPMENT OF RUSSIA'S NORTH-WESTERN REGIONS AND MIGRATION TO THE ST. PETERSBURG AGGLOMERATION

P. V. Druzhinin

Institute of Economics Karelian Research Centre
of the Russian Academy of Sciences,
50 Al. Nevsky Prospect, Petrozavodsk, 185030, Russia

Received 31 March 2023
Accepted 13 June 2023
doi: 10.5922/2079-8555-2023-3-6
Druzhinin, P. V. 2023

This article aims to analyse the development of Russia's North-Western Federal District (NWFD) regions between 1998 and 2021, based on data from Rosstat. It focuses on how the territories responded to migration to the St. Petersburg agglomeration in the early 21st century and compares their progress with the cores of the St. Petersburg, Moscow, and Helsinki agglomerations. For building the models, regions with similar development dynamics were divided into four sectors: St. Petersburg, the Leningrad region, three less advanced northern areas, and the more successful NWFD territories. Before the 2008—2009 crisis, St. Petersburg and the Leningrad region outperformed the other north-western areas. However, the crisis led to a sharp decline in economic growth rates across the federal district, with manufacturing, agriculture, and forestry replacing the service sector as the main drivers. St. Petersburg's development slowed down, and it became less efficient compared to the Leningrad region and the other five territories, which excelled in manufacturing, agriculture, and forestry. Despite migration to the St. Petersburg agglomeration and an associated increase in employment, the city did not gain a significant advantage over the other NWFD regions due to insufficient investment and hindrance in the development of new economic sectors. Migration to the St. Petersburg agglomeration primarily involved younger people but did not significantly impact traditional industries, such as manufacturing, agriculture, and forestry, which remained at the core of NWFD regions' economic success. St. Petersburg's higher economic efficiency compared to Moscow and Helsinki was a result of greater investments in manufacturing.

Keywords:
St. Petersburg, migration, agglomeration, labour productivity, region, investments

Introduction

Russia's population is not growing, yet its concentration in major cities, primarily Moscow, St. Petersburg, and regional hubs, is on the rise. This trend is prevalent in both developing and developed nations. Urban agglomerations offer

To cite this article: Druzhinin, P. V. 2023, Economic development of Russia's north-western regions and migration to the St. Petersburg agglomeration, *Baltic region*, vol. 15, № 3, p. 100—116. doi: 10.5922/2079-8555-2023-3-6.

a notable advantage in terms of heightened innovation activity. These agglomerations foster new areas of activity that, in conjunction with conventional ones, stimulate a demand for enhanced skills and knowledge, thereby establishing a comparative advantage for cities [1]. The expansion of agglomerations is also linked to the rapid expansion of financial services, transportation, commerce, real estate transactions, construction, and warehousing [2; 3]. Notably, transport plays a pivotal role in agglomeration development, and the infrastructure required for transport comes with substantial and ever-increasing costs [4]. Larger cities generally exhibit improved economic productivity, except in polycentric urban configurations where their growth reportedly has minimal impact on productivity [5]. Simultaneously, agglomeration development hinges upon connections with nearby major centers, key transportation routes, and cargo flow [6]. Importantly, it should be noted that most urban agglomerations in Russia are advancing at a slower pace compared to those in developed countries.

Agglomeration effects are not always positive — high population densities in developing countries cause environmental degradation, problems with health care and education [7]. For developed countries, mathematical simulations have demonstrated that liberalization of commerce causes the least efficient entrepreneurs to concentrate in agglomerations. This explains the growth of poor neighborhoods in agglomerations in developed countries [8].

A more favourable development trend is observed in the Nordic countries, where agglomerations are relatively small and the level of innovation activity is higher. Knowledge-intensive industries in these countries are concentrated in urban agglomerations, particularly Helsinki [2; 9].

The share of intangible products with low logistics costs, mostly related to information and communication technologies (ICT), is growing in Nordic economies. In Finland, game software development companies tend to concentrate in university cities, as staff communication and inter-firm contacts are essential for them. In Helsinki, knowledge-based firms are usually located closer to the urban core and to universities, whereas the most narrowly focused clusters may be found in relatively peripheral locations [10; 11].

The 2008—2009 financial crisis had a severe impact on the development of Russian regions. It also had a tangible effect on the Finnish economy, slowing down its development and intensifying migration. In Finland, population growth has been minor, and agglomerations have mostly grown through migration. The population has migrated from the north and east towards the south, and to a lesser extent, to the Baltic Sea coast and university cities. The most attractive agglomerations have been those of Helsinki and Turku, which saw an acceleration of in-migration after the 2008—2009 financial crisis [12; 13].

St. Petersburg has consistently held the status of a central city for science and education. It boasts a robust level of innovation activity, comparable to that of Helsinki. In the Soviet era, St. Petersburg (formerly Leningrad) emerged as an educational, technological, and industrial hub. It played a pivotal role in advanc-

ing education and technology in its surrounding regions by dispatching its graduates to work in other areas. The progress of St. Petersburg, in turn, contributed to the progress of adjacent regions [14; 15].

Since the 2000s, Russia has witnessed an acceleration in the concentration of its population in the largest urban agglomerations. This trend is attributed to higher wages, improved working conditions, and more comfortable living standards [16]. The centralization of power corresponds to a concentration of financial resources. This means that the higher the level of the urban centre, the greater the capacity it possesses to establish favourable conditions for its residents [17—19]. The headquarters of major corporations are predominantly situated in Moscow, St. Petersburg, and other major agglomerations. The outward migration of the younger and more dynamic population increases with the distance from the regional centre, which often serves as the region's education nucleus [18; 20]. Unlike the previous era of the USSR, where a considerable number of graduates from higher and secondary vocational education institutions would leave the regional capital for more remote areas in exchange for certain social advantages, the prevailing trend among today's graduates is to either stay put, often not fully utilizing their professional skills, or to relocate to even larger cities.

Another factor apparently promoting migration to St. Petersburg is that the real budgets of other regional centres in the North-western Federal District (NWFD) are decreasing, with minor growth in only two of them [21]. As a result, there is no tangible growth of population in the capital cities of other regions in the NWFD (except for the exclave Kaliningrad Region), and the in-migration from the region's municipalities merely offsets the out-migration from administrative centres to larger cities. The largest and most attractive city in the NWFD is St. Petersburg, which is a separate federal subject — a status providing more budgetary rights. The registration of PJSC Gazprom in St. Petersburg in 2021 resulted in a 2.5-fold growth in the profit of the city's economy and augmented its budget revenues. The population of the Helsinki subregion is also growing faster than in the ten neighbouring subregions, and the farther away from the capital, the more challenging the situation becomes in terms of population dynamics.

The active population migration to the St. Petersburg, Moscow, and Helsinki agglomerations was accompanied by an increase in investments, but then the development of the agglomeration core gradually slowed down while the development of suburban areas gained pace.

There is also a possibility of other agglomerations forming in the NWFD. An analysis of potential agglomerations was carried out for northern regions [22]. Four agglomerations comprising the administrative centers were identified in the northern regions of the NWFD [23].

Research on interactions inside the St. Petersburg agglomeration revealed not only effects but also problems [24]. St. Petersburg significantly influences the adjacent parts of the Leningrad Region, furthering the development in some of them but causing a degradation of others. A study of the areas adjoining St. Petersburg

showed noticeable population growth to have occurred only in the northern and northeastern districts [25; 26]. Inequality in development is also evident across the Northwestern Federal District (NWFD) regions. Specifically, the three Baltic regions are progressing more effectively, whereas development in the northern regions is advancing at a slower pace [27].

When analyzing the upsides and downsides of urban agglomeration, researchers rarely cover the entire region, usually just stating the fact that territories outside of the agglomeration experience degradation [28]. Therefore, it appears interesting to examine the development of the NWFD at large and its specific regions, as well as the effects of the migration to St. Petersburg and its environs, since most other NWFD regions are losing the most valuable resource — the youth, who tend to concentrate in the St. Petersburg agglomeration after completing their education, thus augmenting the city's potential.

The aim of this article is to conduct a comparative analysis of the development of the regions within the Northwestern Federal District (NWFD) during the early 21st century, considering the backdrop of population migration toward the St. Petersburg agglomeration and the resulting shifts in the number of employed individuals across other districts. Additionally, it is of interest to examine the economic progression of St. Petersburg, Moscow, and Helsinki both prior to and following the crisis of 2008—2009.

Methods

The data on the NWFD regions were subjected to analysis spanning the period from 1998 to 2021. Various parameters were then plotted to identify correlations and connections between them. Consequently, economic sectors were delineated by clustering regions with comparable development characteristics. Equations were subsequently formulated for these sectors, elucidating the influence of the crisis on primary regional developmental indicators and the effectiveness of resource utilization.

The analysis of the development of the North-Western Federal District (NWFD) regions reveals the existence of four distinct sectors, each showing significant variations in terms of socio-economic indicator dynamics. Given that the St. Petersburg agglomeration includes a part of the Leningrad Region, it should be regarded as a separate sector.[1] As demonstrated previously, the development of northern regions in European Russia is substantially different from the rest of the country [29]. This means that in addition to St. Petersburg and the Leningrad Region separate consideration should be given to the three slower developing northern regions (the Republic of Karelia, the Komi Republic, and the Murmansk

[1] The absence of a metric to match GRP at the municipality level made it impossible to divide the Leningrad Region into two parts, isolating the municipalities included in the St. Petersburg agglomeration, and thus to analyze the St. Petersburg agglomeration, not St. Petersburg, as a sector.

Region) and the remaining five more successful regions (Arkhangelsk, Vologda, Novgorod, Pskov, and Kaliningrad Regions). The Nenets Autonomous Okrug was studied as part of the Arkhangelsk Region.

The change in labour productivity in the NWFD over the study period was broken down into the contributions of the four sectors (first summand) and the structural changes (second summand):

$$\Delta y(t) = \sum_i \frac{L_i(t-1)}{L(t-1)} \times (y_i(t) - y_i(t-1)) + \sum_i y_i(t) \times \left(\frac{L_i(t)}{L(t)} - \frac{L_i(t-1)}{L(t-1)}\right), \quad (1)$$

where $y(t)$ is labour productivity; $\Delta y(t)$ is the increase in labour productivity; $L(t)$ is the number of the employed; i is the sector; t is the year. Labour productivity was derived from the ratio between the gross regional product (GRP) and the number of the employed. As applied to individual economic activities, it was calculated as the ratio of gross value added (GVA) to the number of employed individuals. As the official activity classification procedure was changed (first the adoption of OKVED, then OKVED2), calculations using formula (1) had to be done separately for the periods during which each methodology was used.

Investment efficiency was estimated using fund elasticity, which is the percentage increase in production volumes (gross regional product, or GRP) provided by a 1 % increase in cumulative investment over four years. The change in fund elasticity ε_K was estimated from smoothed data for each of the four sectors:

$$\varepsilon_K = \frac{\delta_Y - \delta_L}{\delta_K - \delta_L}, \quad (2)$$

where ε_K is the elasticity; $\delta_Y = \frac{\dot{Y}}{Y}$, $\delta_K = \frac{\dot{K}}{K}$, $\delta_L = \frac{\dot{L}}{L}$, are logarithmic derivatives; $Y(t)$ is the GRP; $K(t)$ is cumulative investments. The ultimate finding was the dynamics of the efficiency of investments into each sector.

However, even after data smoothing, the pattern of fund elasticity in the 2010s exhibited pronounced fluctuations. Therefore, to more accurately determine the trends of ε_K VES production functions (Heady—Dillon) had to be built for each sector and for the NWFD as a whole:

$$Y(t) = A \times K^{\alpha}(t) \times L^{\beta}(t) \times \exp(a \times K(t) + b \times L(t)), \quad (3)$$

where A, a, b, α, β are constants. Equation (3) helps detect trends in fund elasticity change and refine the calculations by formula (2).

Data and analysis

The study was based on regional data published by the Federal State Statistics Service (Rosstat) on gross regional product (GRP) dynamics, employment,

investments, population size, structure of the economy, and other indices in 1998—2021. Other inputs were data from Rosstat territorial units and Statistics Finland.

The technique for computing the indices under analysis (GRP and the number of employed individuals) has undergone two substantial revisions by Rosstat. However, as data for the same year calculated by different techniques were available, it was possible to plot the time series for regions and then also for sectors. Value indicators were converted to comparable prices. Analysis of the plots showed that they were significantly different before and after the crisis of 2008—2009. Therefore, two sub-periods were distinguished: 1998—2008 and 2009—2021.

The St. Petersburg agglomeration had been growing mainly due to the inflow of population from other NWFD regions, first of all the nearest and northern ones, and only migration from the exclave Kaliningrad Region was minor. Migration out of the federal district (mainly to the Central FD) did not exceed a third of the interregional migration. It has been previously demonstrated that population migration tends to be more active in northern parts of European Russia [29]. As compared to Moscow, which has expanded territorially, the migration gain in St. Petersburg was not so great. For example, in 2020, it was six times as much in the surrounding Leningrad region and twice as much in the Kaliningrad region. The migration gain of the working-age population in these two regions was higher than the NWFD average in 2019—2020. There are fast-growing cities in the Vsevolozhsky District of the Leningrad region whose residents mainly work in St. Petersburg (Murino, Yanino, Kudrovo, Sertolovo, Bugry, Novoye Devyatkino).

The growth of regional economies in the NWFD in 1998—2008 came along with an increase in employment (except for the three northern regions). After the crisis of 2008—2009, employment started declining not only in northern regions but also in the quintet of other regions, and the Leningrad region joined in the decline starting in 2015 (Fig. 1). The region's positive migration balance coupled with a reduction in employment is evidence that most of the migrants work in St. Petersburg while living in its surroundings. Employment growth in St. Petersburg halted in 2015, as opposed to Moscow, where it continues. Accordingly, the share of St. Petersburg in the total employment in the NWFD increased by a mere 5 percentage points — to 45.3% in 2021 — owing to a decline in northern regions and the five other regions of the federal district. In the first sub-period, the share of St. Petersburg remained unchanged whereas the share of the fast-growing Leningrad region increased, slightly contributing to economic growth acceleration in the NWFD at large. Finland showed a similar pattern. Prior to the crisis, employment had been growing in all subregions around Helsinki, the growth rate in the nearest subregions being even faster than in Helsinki. After the crisis had ended, employment growth in Helsinki recovered in just a year, whereas in other subregions (except for the nearest Porvoo) employment has not been growing since then.

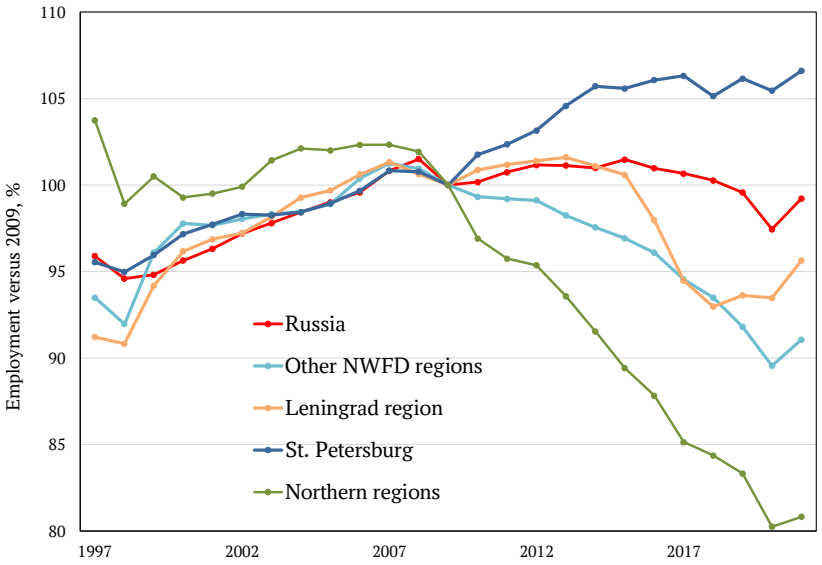

Fig. 1. Employment trends in four economic sectors of the NWFD versus Russia at large (2009 taken for 100%), %

Source: calculated by the author from Rosstat data.

Unexpectedly, investments into the economy of St. Petersburg and the mining-oriented northern regions before the crisis were growing slower than in the quintet of other regions (Fig. 2). In the first sub-period, investments in the Kaliningrad and Arkhangelsk regions increased almost 10-fold (carbohydrate deposits were developed in the Nenets Autonomous District and the Kaliningrad region had a special economic zone and was an implementation area of an ad hoc federal program). After the crisis of 2008—2009, investments continued increasing only in the Leningrad region and for a while in the northern regions. Investments into the St. Petersburg economy resumed growth after the crisis only in 2013, but it was unstable and insignificant. Overall, annual investments into the NWFD economy in 2019—2021 were smaller than in 2008. The contribution of the Leningrad region to the investment structure grew substantially at the expense of St. Petersburg, likely because some industries were translocated from the city to the region, but not so much as from Moscow. Investments into the economies of northern regions and five other NWFD regions have since 2004 been in most cases greater than investments into the St. Petersburg economy. The situation in the Central Federal District (CFD) was different — investments into Moscow's economy have been increasing rapidly, by far exceeding the investments into all other CFD regions collectively and promoting employment growth in the capital [30]. Investments into the economy of Helsinki remained almost unaffected by the crisis, unlike in most of its surrounding subregions. Where before the crisis Helsinki's share among 11 subregions had been almost invariable, after the crisis it started growing.

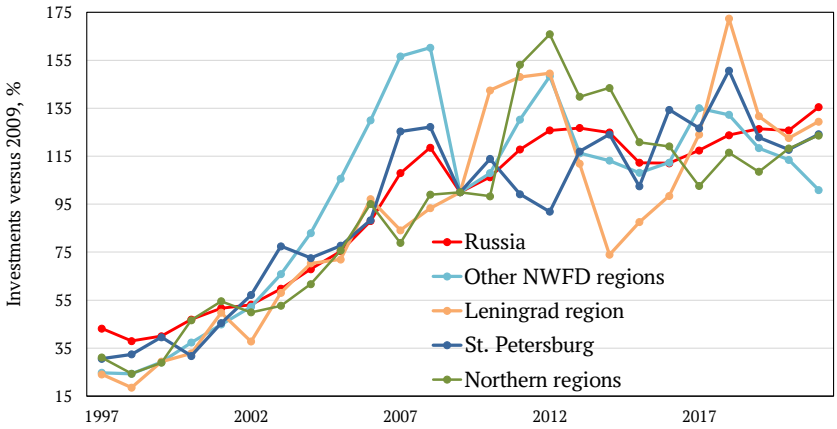

Fig. 2. Investment trends in four economic sectors
of the NWFD versus Russia at large (2009 taken for 100%), %

Source: calculated by the author from Rosstat data.

The investment appeal of Moscow is evidenced by the fact that investments per person employed in its economy are twice that of St. Petersburg or Russia on average. Before 2009, specific investments had been on the rise in all four sectors of the NWFD, roughly matching the Russian average. The growth was faster only in the Leningrad region. After the crisis, specific investments in Russia, St. Petersburg and other NWFD regions stopped increasing, with St. Petersburg falling behind the other three sectors in specific investments. In northern regions they were growing rapidly in the early 2010s but then dropped to the same level as in other regions. In the Leningrad region specific investments continued growing, eventually matching Moscow's level. If St. Petersburg and the Leningrad region are considered together, their investments per employee are at about the same level as in the NWFD on average. The greatest specific investments averaged over the study period were found in the Leningrad region (St. Petersburg suburban area is developing actively), in the Komi Republic and the Arkhangelsk region owing to oil and gas development projects, while the lowest levels of specific investments were demonstrated by the Pskov, Novgorod and Kaliningrad regions and the Republic of Karelia, a substantial part of the investments there coming from the government budget. In some years, more than a half of investments in the Kaliningrad and Novgorod regions were budget investments, chiefly from the federal budget.

The proportion of investments from the regional budget in Moscow is almost twice as much as in St. Petersburg and 2.5 times as high as the Russian average, but a vast majority of the funds have to be invested in developing the transport infrastructure of the expanded capital. At the same time, the share of investments

in manufacturing in St. Petersburg and the Leningrad region is several times greater than in Moscow, influencing the development efficiency of these regions (Table 1).

Table 1

Share of investments in manufacturing in investments in fixed capital of regions, %

Region	2018	2019	2020	2021
St. Petersburg	14.6	14.1	12.2	15.8
Leningrad region	15	18.6	25.1	32.2
Moscow	4.1	3.7	4.3	4.5
Moscow region	14.8	13.5	13	13.9

Source: calculated by the author using Rosstat data.

The higher average salaries in St. Petersburg are a major driver of migration to the agglomeration. The average salary in St. Petersburg grew relative to the national level until 2018 and currently exceeds it by more than 1.3-fold . However, salaries in St. Petersburg are still significantly lower than in Moscow.

In the mid-1990s, salaries in the northern regions were twice the Russian average. However, they have since decreased to slightly above the national average and lower than in St. Petersburg, which is a reason for out-migration. According to the census of 2020, the population of northern regions dropped by 16—18 % since the 2002 census. In the quintet of other regions salaries have also gone down to about 80 % of the Russian average, although in the late 1990s they were higher than in St. Petersburg and Russia in general. The decline was especially pronounced in the Vologda region — from 182 % of the Russian average in 1997 to 79 % in 2021. Average salaries in the Leningrad region used to be in parity with the Russian average but have decreased tangibly in the past three years, causing the region's residents to seek jobs in St. Petersburg.

The depopulation-affected northern regions of the NWFD had been growing slowly before the crisis, after which the growth almost came to a halt (Fig. 3). Two of the regions, the Republics of Komi and Karelia, were still below the 2007 GRP level in 2019—2021. Growth rates similar to that of St. Petersburg were demonstrated by the Arkhangelsk, Kaliningrad, and Novgorod regions. It is worth noting that economic growth in the Novgorod region was slower in the first sub-period than in the other two regions. However, in the second sub-period, growth slowed down in the Arkhangelsk region, which had previously experienced an economic boom due to oil and gas projects. Saint Petersburg and the Leningrad region were developing rapidly in the first sub-period, after which their development slumped down, so that St. Petersburg even lagged behind the Novgorod region in GRP growth rates. Nonetheless, the economic growth of

St. Petersburg was faster than in the rest of NWFD regions taken together and faster than in Moscow. After PJSC Gazprom became registered in St. Petersburg in 2021, the city's performance indicators grew notably.

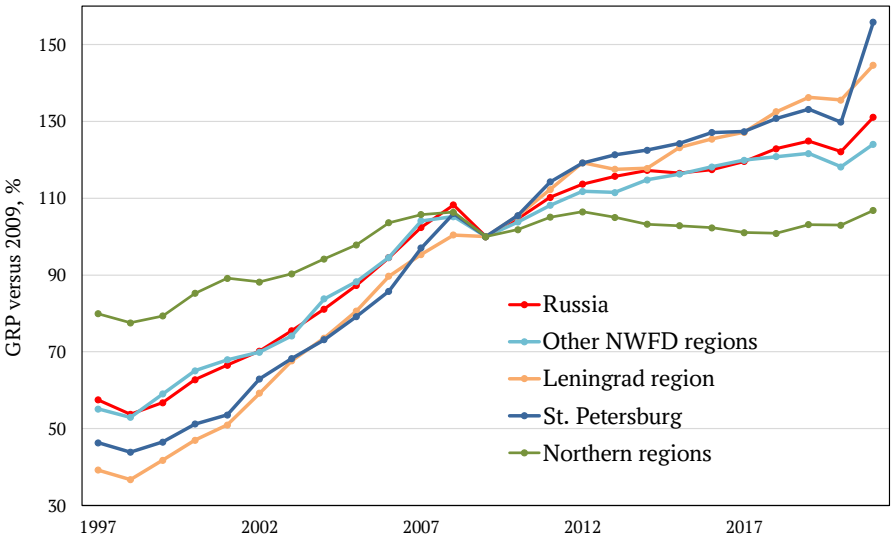

Fig. 3. GRP trends in four economic sectors
of the NWFD versus Russia at large (2009 taken for 100 %), %

Source: calculated by the author from Rosstat data.

In the first sub-period labour productivity was growing rapidly in the Leningrad region and somewhat slower in St. Petersburg, the Arkhangelsk and the Kaliningrad regions. In northern regions, the development was much slower (Fig. 4). In the second sub-period (especially after 2012) the development of all regions (except for the Murmansk region, whose economy saw a sharp increase in investments after 2011) slowed down. Labour productivity in St. Petersburg was growing slower than in the sector of five other NWFD regions, the reason being a slower increase in investments. The fastest growth in labour productivity was happening in the Leningrad and Novgorod regions. However, even if St. Petersburg and the Leningrad region are taken collectively, they lagged behind the quintet of regions and were at about the same level as northern regions in labour productivity growth rates before 2021. A thing to note is that labour productivity growth in NWFD regions on average in the second sub-period was approximately three times slower than in the first one. At the same time, labour productivity in Moscow, in contrast to St. Petersburg, has not grown significantly after the crisis of 2008—2009, still remaining below the 2007 level. Similarly, labour productivity in Helsinki has not been growing after the crisis, in spite of the continuing concentration of investments and employment in the metropolitan area.

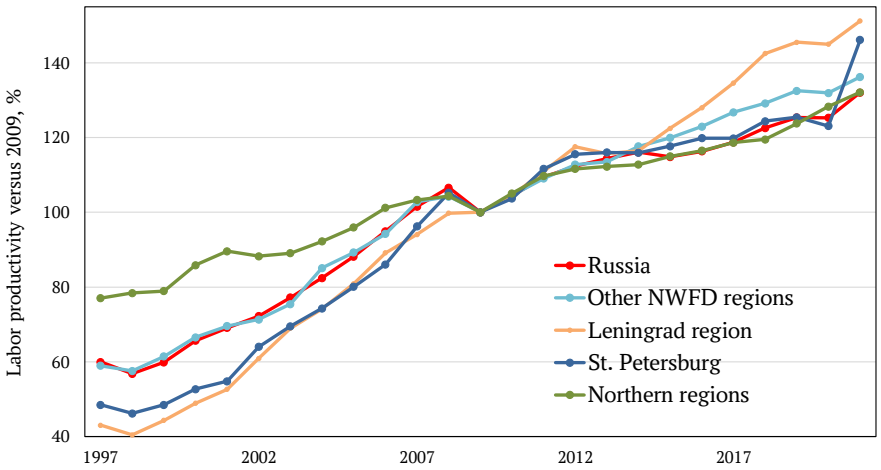

Fig. 4. Labour productivity trends in four economic sectors of the NWFD versus Russia at large (2009 taken for 100 %), %

Source: calculated by the author from Rosstat data.

Results of calculations

Calculations by formula (1) showed that the effect of structural changes on labour productivity in the NWFD has been minor (below 1 %) — negative before 2008 and positive after the crisis. Prior to the crisis, more than a half of the labour productivity growth was due to St. Petersburg and a quarter of the growth was provided by the group of five regions. The contribution of the northern regions and the Leningrad region was minor. The development of St. Petersburg slowed down after the crisis and the faster advancing Leningrad region and the group of five regions provided over 60 % of the total increase in labour productivity in the NWFD while St. Petersburg contributed a little over a quarter. As to the CFD, calculations showed that Moscow had almost no effect on labour productivity dynamics in this district in the second sub-period.

Based on the calculations from formulas (2) and (3), the economies of St. Petersburg and the Leningrad region exhibited the most efficient growth before the crisis. However, there was a slight decline in the fund elasticity within the region. The elasticity in the other two sectors was almost twice as low but with some increase happening in northern regions and a downward trend in the quintet of regions. In the second sub-period, elasticity was the highest in the quintet of regions, lagging far behind in the other three sectors (elasticity levels in the Leningrad region and St. Petersburg fluctuated, while in northern regions they fell to nearly zero). The efficiency of investments in Moscow and Helsinki after the crisis of 2008—2009 has been near zero.

As has been noted previously, the population trends and economic structure of NWFD regions depend on the distance to Moscow and St. Petersburg [20; 31]. Calculations show that the dependence for GRPs in the NWFD in the sec-

ond sub-period alone was the following: the greater the distance, the slower the region's economic growth ($R^2 = 0.58$). This relationship was the most vivid in 2010—2014. Labour productivity growth after the crisis of 2008—2009 was also slower in the more remote regions. In this case, calculations of the dependence on the distance to St. Petersburg excluded the Kaliningrad region, which is an exclave. Applying this analysis to 10 subregions around Helsinki, we find that before the crisis GRP and labour productivity trends were more positive in the ones nearest to the capital, but this relationship vanished after the crisis.

Discussion

After the crisis of 2008—2009, the development of the Russian economy slumped down and some regions, in particular the Komi and Karelian Republics, have not recovered to their GRP level of 2007 even now. Where before the crisis labour productivity growth in St. Petersburg had been only a little slower than in the Leningrad region and much faster than in the other two sectors, after the crisis it fell behind all regions except for the Komi Republic. Furthermore, the industry of the NWFD was developing at a slower rate than in Russia on average, its shares in both the district's GRPs and in total employment were declining, the steepest decline in the share of industrial employment happening in St. Petersburg and the Leningrad region [32].

After the crisis, manufacturing, extracting industries, ICT, agriculture and forestry in Russia started growing at a faster pace than the Russian economy at large. Accordingly, development since 2009 has been more successful in regions with a higher share of manufacturing, agriculture and forestry, and least successful in regions with a high and low share of services. The high share of services in many poorly developed regions that are not attractive for investments is predicated on the substantial share of budget-funded sectors. Coupled with minor growth of real salaries, which constitute a weighty proportion of the GRP, this hinders labour productivity growth. The stagnation of real income results in a slower labour productivity growth in some advanced regions with a high share of consumer services. A low share of services is found also in many mining-oriented regions, which feature slow labour productivity growth in the mining industry. The ICT sector is developing successfully, but its share is rather small even in the more advanced regions, and an increase in the share of ICT does not entail a noticeable rise in the efficiency of the region's economy in general.

Regions of the NWFD, especially southerner ones, place much focus on manufacturing, its share being notably higher than in Russia on average. The share of high-tech and advanced medium-tech industries is also high; e.g., it was around 50 % in the Novgorod and Kaliningrad regions, and about 35 % in St. Petersburg. Only in the three northern regions it ranged from 1.5 to 7 %. Investments in these industries have the highest efficiency, but in reality, not much has so far been

invested. The rapid labour productivity augmentation in the Novgorod region in the second sub-period was most likely a consequence of high innovation activity and a large share of high-tech industries.

Two Russian metropolitan cities have been developing differently after the crisis. A comparison of economic development indicators for Moscow and St. Petersburg showed that the significance of Moscow for the development of Russia's economy decreased in the 2010s, whereas the contribution of St. Petersburg has been growing [33]. Moscow's economic development efficiency has been very low after the crisis of 2008—2009. While consuming increasing amounts of resources, the city managed to surpass the 2008 level of GRP and labour productivity only in 2021. The economy of St. Petersburg has been growing, perhaps not so fast as before, but faster than the Russian average, while the increase in employment and investments has been minor.

The average annual GRP growth rate plummeted after the crisis in all regions included in the three agglomerations mentioned above (Table 2), with the heaviest reduction in Moscow. Labour productivity growth rates suffered an even greater reduction. The situation outside of Moscow, St. Petersburg and Helsinki was better. Before the crisis, labour productivity growth in Helsinki had outpaced the national average in Finland. However, following the crisis, there was a slight decline in this indicator within the city, whereas across Finland as a whole, productivity continued to grow, albeit at a reduced rate of approximately 0.7 % per year.

Table 2

Mean annual GRP and labour productivity growth rates before and after the crisis of 2008-2009, %

Region	GRP		Labour productivity	
	2000—2008	2009—2021	2000—2008	2009—2021
St. Petersburg	9.5	3.8	9.0	1.9
Leningrad region	9.9	3.1	9.3	3.5
Moscow	8.5	1.9	6.2	1.1
Moscow region	9.0	4.1	6.3	3.6
Helsinki	3.2	1.9	1.5	–0.06

Source: calculated by the author from data published by Rosstat and Statistics Finland.

The growth of St. Petersburg's GRP after the crisis was provided by the development of transport, ICT, real estate operations, professional activities, and health care, but because of the decline in manufacturing, construction and, lately, in commerce the growth has been rather limited. Hence, the GRP structure has been changing the share of real estate operations, professional and scientific activities, public administration in GVA is growing, whereas the share of manufacturing, commerce, and construction in GVA is decreasing.

Labour productivity growth in the economy of St. Petersburg has been due to the input of real estate operations, professional and scientific activities, health

care and, until 2016, transport and commerce. The inhibiting factor was a labour productivity decrease in manufacturing and construction. The positive effect of structural changes proved to be small (owing to an increase in the shares of transport, ICT, and real estate operations in employment) because of a decrease in the share of professional and scientific activities, where labour productivity is high, and a labour productivity decline in commerce, which has a high share in employment.

Almost no growth is happening in labour productivity in Moscow's economy because of its close correlation with the city's mounting problems. Ever more investments are needed for the development of transport, urban infrastructure, construction of new and maintenance of old residential buildings. Furthermore, employment has been growing the most significantly in construction, transport, and communications, where labour productivity is low.

Despite the rapid population growth within the city, the economic growth rate of Helsinki is not surpassing that of its surrounding subregions. A significant portion of Helsinki's economy is comprised of sectors with lower-than-average labour productivity, including healthcare, commerce, administrative, professional, and scientific activities. Notably, the labour productivity in the information and communication technology (ICT) sector is approximately fifty percent higher than the economy-wide average. The share of this sector in the employment structure is 8.6 % and growing.

Even faster however is the increase in the share of administrative, professional, and scientific activities. After the crisis of 2008—2009, the share of employment in ICT stopped growing for five years. Like in most big cities, employment was decreasing also in manufacturing, where labour productivity is a third greater than the economy's average. As has been pointed out, employment growth in Uusimaa and in the Greater Helsinki area occurred in the public sector and in non-market services, which did not help in enhancing the region's economic efficiency either [13]. At the end of the day, as the rise in employment related to population growth mostly takes place in low-efficiency sectors, labour productivity growth in Helsinki is slower than in Finland on average and in most of the surrounding subregions.

Conclusions

The impact of St. Petersburg and Moscow, extends beyond the immediate surrounding region. The St. Petersburg agglomeration attracts migrants from all areas of the NWFD. In contrast to the Central Federal District (CFD), investments within the NWFD are more evenly distributed, rather than solely concentrating on St. Petersburg.

The increase in employment in St. Petersburg resulted in a higher GRP growth rate compared to other regions of the federal district prior to 2008. After the crisis of 2008—2009 however, labour productivity growth in the city has been slower than in the Leningrad region and lately also slower than in the quintet of other

NWFD regions, where the share of manufacturing is higher. The more than fourfold decrease in labour productivity growth rates in St. Petersburg after the crisis is explained by its decrease in manufacturing and construction.

Labour productivity growth in other NWFD regions and in northern regions slowed down not so significantly, now exceeding that of St. Petersburg. The labour productivity growth rate accelerated even more in the Leningrad region, which has the greatest specific investments. The loss of high-quality human capital slows down the development of new sectors in peripheral regions, but it does not affect traditional sectors. This results in higher labour productivity growth rates in traditional sectors.

The St. Petersburg, Moscow, and Helsinki agglomerations continued growing after the crisis of 2008—2009, but the economies of their cores were now growing at a much slower pace and labour productivity growth was slower than in the surrounding regions, which had higher shares of manufacturing and agriculture in the economic structure.

The research was supported by Russian Science Foundation grant № 23-28-00446 "The impact of agglomeration formation on the development of the region's economy as a whole".

References

1. Davis, D. R., Dingel, J. I. 2020, The comparative advantage of cities, *Journal of International Economics*, vol. 123, 103291, https://doi.org/10.1016/j.jinteco.2020.103291.

2. Chica, J., Duarte, C., 2014, Analysing the effects of knowledge economy externalities in metropolitan employment growth, *Proceedings of the 7th knowledge cities world summit: knowledge-based services (KCWS 2014),* p. 16—24.

3. Haryono, A., Muaziz, M., Jaelani, A. 2021, Analysis of Urban Agglomeration in Economic and Legal Perspectives, *Pena Justisia: Media Komunikasi dan Kajian Hukum,* vol. 20, № 1, https://doi.org/10.31941/pj.v20i1.1714.

4. Sonnenschein, T., Scheider, S., Zheng, S. 2022, The rebirth of urban subcenters: How subway expansion impacts the spatial structure and mix of amenities in European cities, *Environment and Planning B: Urban Analytics and City Science,* vol. 49, № 4, p. 1266—1282, https://doi.org/10.1177/23998083211056955.

5. Ouwehand, W., Van Oort, F., Cortinovis, N. 2022, Spatial structure and productivity in European regions, *Regional studies*, vol. 56, № 1, p. 48—62, https://doi.org/10.1080/00343404.2021.1950912.

6. He, L., Tao, J., Meng, P., Chen, D., Yan, M., Vasa, L. 2021, Analysis of socio-economic spatial structure of urban agglomeration in China based on spatial gradient and clustering, *Oeconomia Copernicana*, vol. 12, № 3, p. 789—819, https://doi.org/10.24136/oc.2021.026.

7. Ghafoor, N., Fayyaz, S., Mehr-Un-Nisa, Akbar, R. 2021, An empirical investigation of socio-economic impacts of agglomeration economies in major cities of Punjab, Pakistan, *Cogent Economics & Finance,* vol. 9, № 1, 1975915, https://doi.org/10.1080/23322039.2021.1975915.

8. Forslid, R., Okubo, T. 2021, Agglomeration of low-productive entrepreneurs to large regions: A simple model, *Spatial Economic Analysis,* vol. 16, № 4, p. 471—486, https://doi.org/10.1080/17421772.2021.1884280.

9. Pelkonen, A. 2005, State restructuring, urban competitiveness policies and technopole building in Finland: A critical view on the global state thesis, *European planning studies*, vol. 13, № 5, p. 685—705, https://doi.org/10.1080/09654310500139319.

10. Kaakinen, I. 2016, Economic Geography of Knowledge-Intensive Technology Clusters: Lessons from the Helsinki Metropolitan Area, *Journal of Urban Technology,* vol. 23, № 1, p. 95— 114, https://doi.org/10.1080/10630732.2015.1090196.

11. Victor, A., 2018, *Game Development and Agglomeration in Finland*, Bengaluru. IIITB, 25 p.

12. Kupiszewski, M. et al. 2000, *Internal migration and regional population dynamics in Europe: Finland case study*, Leeds, University Leeds.

13. Piekkola, H. 2018, Internationalization via export growth and specialization in Finnish regions, *Cogent Economics & Finance*, vol. 6, № 1, 1514574, https://doi.org/10.1080/23322039.2018.1514574.

14. Rybakov, F. F., Chebotarev, A. I., Shkonda, K. V., 2002, *Severo-Zapad Rossii: ternistyy put' k rynku* [North-West of Russia: a thorny path to the market], Saint Petersburg, OCEiM, 354 p. EDN: SJHVIL (in Russ.).

15. Bulycheva, N. V. et al. 2022, *Sankt-Peterburgskaya aglomeratsiya: stadii formirovaniya i perspektivy razvitiya* [St. Petersburg agglomeration: stages of formation and development prospects], Saint Petersburg, IPRES, 219 p. EDN: UJKKCI (in Russ.).

16. Leksin, V. N. 2009, Cities of Power: Administrative Centres of Russia*, Universe of Russia,* №1, p. 3—33. EDN: NDSVFT (in Russ.).

17. Leyzekovich, E. E. 2008, The course of population concentration in the central parts of the subjects of the Russian Federation after 1990, *Transformatsiya rossiiskogo prostranstva: sotsial'no-ekonomicheskie i prirodno-resursnye faktory (polimasshabnyi analiz), Material mezhdunarodnoi konferentsii* [*The transformation of the Russian space: socio-economic and natural resource factors (multi-scale analysis)*, Materials of the international conference], Moscow, MARS, p. 173—181. EDN: TJWXOI (in Russ.).

18. Mkrtchyan, N., Karachurnia, L. 2014, The Baltics and Russian North-West: the core and the periphery in the 2000s, *Baltic region*, № 2, p. 48—62, https://doi.org/10.5922/2079-8555-2014-2-4.

19. Zubarevich, N. V. 2017. Russia's agglomerations development: trends, resources and governing, *Social Sciences and Contemporary World,* № 6, p. 5—21. EDN: ZRMYDX (in Russ.).

20. Druzhinin, P. V., Zimin, D. 2019, Influence of external shocks on the spatial structure of the population of the border Territories, St. Petersburg University Journal of Economic Studies, vol. 35, № 3, p. 397—418, https://doi.org/1010.21638/spbu05.2019.304 (in Russ.).

21. Pechenskaya, M. A. 2020, Contemporary problems of budget development of regional centers, *Actual Problems of Economics and Law*, vol. 14, № 1, p. 40—56, https://doi.org/10.21202/1993-047X.14.2020.1.40-56 (in Russ.).

22. Voroshilov, N. V. 2021, Development of Urban Agglomerations in the European North of Russia*, Federalism*, vol. 26, № 4, p. 54—74, https://doi.org/10.21686/2073-1051-2021-4-54-74 (in Russ.).

23. Fauzer, V. V., Smirnov, A. V., Lytkina, T. S., Fauzer, G. N. 2021, Urban agglomerations in the settlement system of the north of Russia, *Economic and Social Changes: Facts, Trends, Forecast*, vol. 14, № 4, p. 77—96, https://doi.org/10.15838/esc.2021.4.76.5 (in Russ.).

24. Vlacyuk, L. I. 2019, Economic interactions of St. Petersburg and Leningrad region as a regional system "center — periphery", *Upravlencheskie nauki v sovremennom mire. Material mezhdunarodnoi konferentsii* [Management sciences in the modern world, Materials of the international conference], p. 524—526. EDN: XCXJDR (in Russ.).

25. Krasnova, M., Mezhevich, N., Stepanskii, G. 2019, Influence of agglomeration effect on the dynamics of suburbanization of adjacent territories on the example of St. Petersburg, *Vestnik of the Komi Republican Academy of State Service and Administration. Theory and practice of administration,* № 23 (28), p. 30—34. EDN: PWKCQJ (in Russ.).

26. Olifir, D. I. 2023, Spatial differentiation of socio-economic development of the St. Petersburg agglomeration, *Studies on Russian Economic Development,* vol. 34. № 1, p. 65—77, https://doi.org/10.47711/0868-6351-196-65-77 (in Russ.).

27. Fedorov, G. M. 2022, The economy of Russian Baltic regions: development level and dynamics, structure and international trade partners, *Baltic region*, vol. 14, № 4, p. 20—38, https://doi.org/10.5922/2079-8555-2022-4-2.

28. Shmidt, A. B., Antonyuk, V. S., Francini, A. 2016, Urban Agglomerations in Regional Development: Theoretical, Methodological and Applied Aspects, *Economy of Region*, vol. 16, № 3, p. 776—789, https://doi.org/10.17059/2016-3-14 (in Russ.).

29. Druzhinin, P. V. 2020, Features of population distribution in Russia and Finland: impact of geographical factors and universities, *Region: Economics and Sociology*, № 3, p. 165—189, https://doi.org/10.15372/REG20200307 (in Russ.).

30. Druzhinin, P. V. 2022, The Resource Concentration in Moscow: Impact on the Economy of the Central Federal District, *Prostranstvennaya Ekonomika = Spatial Economics*, vol. 18, № 3, p. 115—140, https://doi.org/10.14530/se.2022.3.115-140 (in Russ.).

31. Kolesnikov, N. G., Tolstoguzov, O. V. 2016, Structural changes in the economy of the Russian Northwest: spatial dimension, *Baltic region,* vol. 8, № 2, p. 20—32, https://doi.org/10.5922/2079-8555-2016-2-2.

32. Sidorov, M. A. 2019, Trends in the development of the NWFD industry, *Vektor ekonomiki* [The vector of the economy], № 6 (36), p. 78 (in Russ.). EDN: HZJIUU.

33. Kuznetsova, O. V. 2018, Concentration of Economic Activity in Moscow and Saint Petersburg: Trends, Factors, Implications for the Cities, *Problems of Territory's Development*, № 5 (97), p. 26–40, https://doi.org/10.15838/ptd.2018.5.97.2 (in Russ.).

The author

Prof. Pavel V. Druzhinin, Institute of Economics Karelian Research Centre of the Russian Academy of Sciences, Russia.

E-mail: pdruzhinin@mail.ru

https://orcid.org/0000-0001-5303-0455