

# Integrated Assessment of Economic Security in a Resource Region

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**Abstract**—The article provides a comparative analysis of existing approaches to assessing regional economic security and proposes an original procedure for integrated assessment of economic security in resource regions. It includes an assessment of economic security thresholds based on Russia's strategic development priorities in comparison to the level of developed countries, as well as trend and multivariate statistical analyses that help to identify crucial imbalances that threaten economic development in a region. The assessment is based on data from Krasnoyarsk krai. We have identified several economic security paradoxes, namely, an imbalanced development of human assets and the environment, the industrial sector and hi-tech business, as well as disequilibrium in financial security, which are forcing the region to transform from an advanced industrial territory with a diversified economy into a "national storehouse" that has predominantly mining mono-enterprises and to end up in the trap of technological inferiority.

**Keywords:** economic security, Krasnoyarsk krai, economic policy, resource-based economy

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## INTRODUCTION

In addition to state, social, information, environmental, transport, and energy security, economic security is a crucial part of national security. Foreign researchers associate it with market dynamics and peculiar features of human perception and behavior; it is defined as the extent to which the human society can be protected against hardships when facing crises and economic losses [15]. Conversely, the approach accepted in Russia is depersonalized, macroeconomical, and characterized by a certain confusion of meanings. According to S.V. Kazantsev, security in Russian literature is treated as a state, phenomenon, ability, measures or a system of such, condition or a set of such [5].

One of the first researchers to address economic security was Academician L.I. Abalkin, according to whom economic security is an economic state that makes it possible to promote an independent economic policy meeting national interests, as well as to control national resources [1]. This concept was further elaborated by V.K. Senchagov, who added the factor of sustainability: national interests must be protected and a socially oriented policy implemented even in light of unfavorable domestic and external processes [7]. They are *threats* defined as the sum of the conditions and factors creating the possibility of damaging national interests. Threats to economic security form with growing *imbalances* or contradictions

between the purposes and objectives of modern society and the available tools and practices of the market economy. These threats are qualitative on the global scale and include imbalances in the real and financial sectors, international commerce, imbalances of savings and investments, and a limited amount of unevenly allocated resources [8].

The integrated concept of economic security is found in works by researchers from the Institute of Economics and Industrial Engineering, Siberian Branch, Russian Academy of Sciences (IEIE SB RAS) [5, 10]. They have discovered a consistent relationship among security, threats, and immunity of national or regional economy as an object in terms of the category of situation and its definable characteristics. For instance, S.V. Kazantsev has elaborated a typology of threats and threatening objects, defined categorical relationships of threats and dangers (threat-causing situations), and interpreted security proper as the absence of danger or, in the presence of such, as a situation that allows full or partial protection of objects [5].

With the escalating crisis and foreign and domestic imbalances, the federal subjects are becoming a formative and sustaining source of stability for the country's economy. In this respect, it is crucial to assess regional economic security systems. On the one hand, they cannot be assessed autonomously, because many current imbalances (dangers) and disproportions of

development are determined by the role a region has historically played in the national economy. On the other hand, the assessment must be balanced and rely on analysis of a strong conglomerate of internal and external ties.

Despite the diverse range of meanings attributed to the concept of region, it is most frequently associated with an administrative territorial entity, which is conditioned not only by the historically formed steady ethnic, economic, social, and cultural ties of this object, but also by the existence of systemic purposes and development tasks and the union of management, financial, budgetary, and other systems. In the reproductive approach suggested by A.S. Novoselov [6], a region is a part of a country's economic domain, an open system that is involved in cooperation with other systems in the territorial and international differentiation of labor. It is characterized by the union of economic processes in the social reproduction cycle and distinguished by peculiar natural geographical, social, resource, cultural, and infrastructural factors. In our opinion, regional economic security should be treated as *the balanced condition of a region's economic, natural, cultural, and environmental subsystems as part of the country's common economic space. In this condition, there are either no disproportions and threats to sustainable national and regional development or they are leveled by the system's self-regulation.* Consequently, the task of integrated assessment of a region's economic security is to identify the main disproportions in and threats to its sustainable development and to discover relations among crucial areas of regional economic security that reflect the dependences of economic indices on practical activities in various fields of the economy.

The level of regional economic security is assessed by different procedures, such as expert assessment (with qualitative parameters), trend method (the dynamic pattern of key factors is determined), multivariate statistical analysis (the reciprocal influence of factors is determined), and a system of indicators as measured against thresholds. The indicative method is the most popular procedure: first, it makes it possible to form an integrated idea of security in all fields of activity in a region; second, it makes it possible to identify growing imbalances (dangers) and occurrence of threats; third, makes it possible to change an approach to diagnostics in response to transformations in the internal and external environments, strategy and purposes, imbalances and threats; fourth, this method can be used together with expert assessment, the trend method, and multivariate statistical analysis to expand analytical capabilities.

#### FORMULATION OF THE PROBLEM

There are three dominant approaches to economic security assessment abroad: (1) construction of weighted indices of economic security based on the

risks or basic parameters of socioeconomic development [14, 15]; (2) comparison of a subject's assets or resources with the standard levels of their sufficiency to assure expanded reproduction and achieve other purposes [13]; (3) assessment of revenue and expenses by amount, sufficiency, and volatility [12].

The first Russian systems of economic security indicators were constructed by I.I. Abalkin [1], S.Yu. Glaz'ev [3], A.N. Ilarionov [4], and V.K. Senchagov [7]. These studies have been supplemented by researchers from the Institute of Economics, Ural Branch, Russian Academy of Sciences [9], who have elaborated procedures for analyzing regional security components (quality of life, geoecology) and analyzed areas of economic security assurance in light of regional policy formation. The researchers from the IIE SB RAS have proposed grading regions by immunity to basic internal and external threats using weighted and normalized indices and coefficients (demographic security, differentiation of macroeconomic factors, etc.) [5, 10]. The researchers from the Siberian Federal University have elaborated an approach to assessing regional economic security in light of a crisis [11].

According to Abalkin, there are three main aspects of using the indicators. (1) The dynamic aspect shows changes in indicator priorities and thresholds over time. (2) The integrated aspect makes it necessary to consider reciprocal influence, inconsistency, and reciprocal supplementation of indicators. (3) The target aspect shows the way the system of indicators is correlated with the current purposes and objectives of security assurance (survival, development, or advanced development), which are determined by economic cycle phases [1].

There are a lot of works that proposed grouping indicators by economic security segments (see, e.g., [1, 8–11]). Indicators have thresholds, which corresponds to the theory of threshold object values and allows distributing economic performance factors in two groups of crisis condition: escalation of threats (indicator thresholds approximated) and instability zone (indicator thresholds exceeded). The long-term action of these factors indicates potential areas of economic erosion.

Our approach to diagnosing regional economic security has the following features that make it different from the existing procedures: (1) it is an integrated procedure and combines the indicative method with the trend and multivariate statistical analyses; (2) it is intended to assess economic security of resource regions, where imbalances in development are determined by the monoindustrial structure of their economies, its low innovativeness, and degradation of human potential; (3) it structures security indicators by relevant priorities in the economic development of the Russian Federation and assures their connection to regional economic policy.

## INTEGRATED ASSESSMENT OF ECONOMIC SECURITY

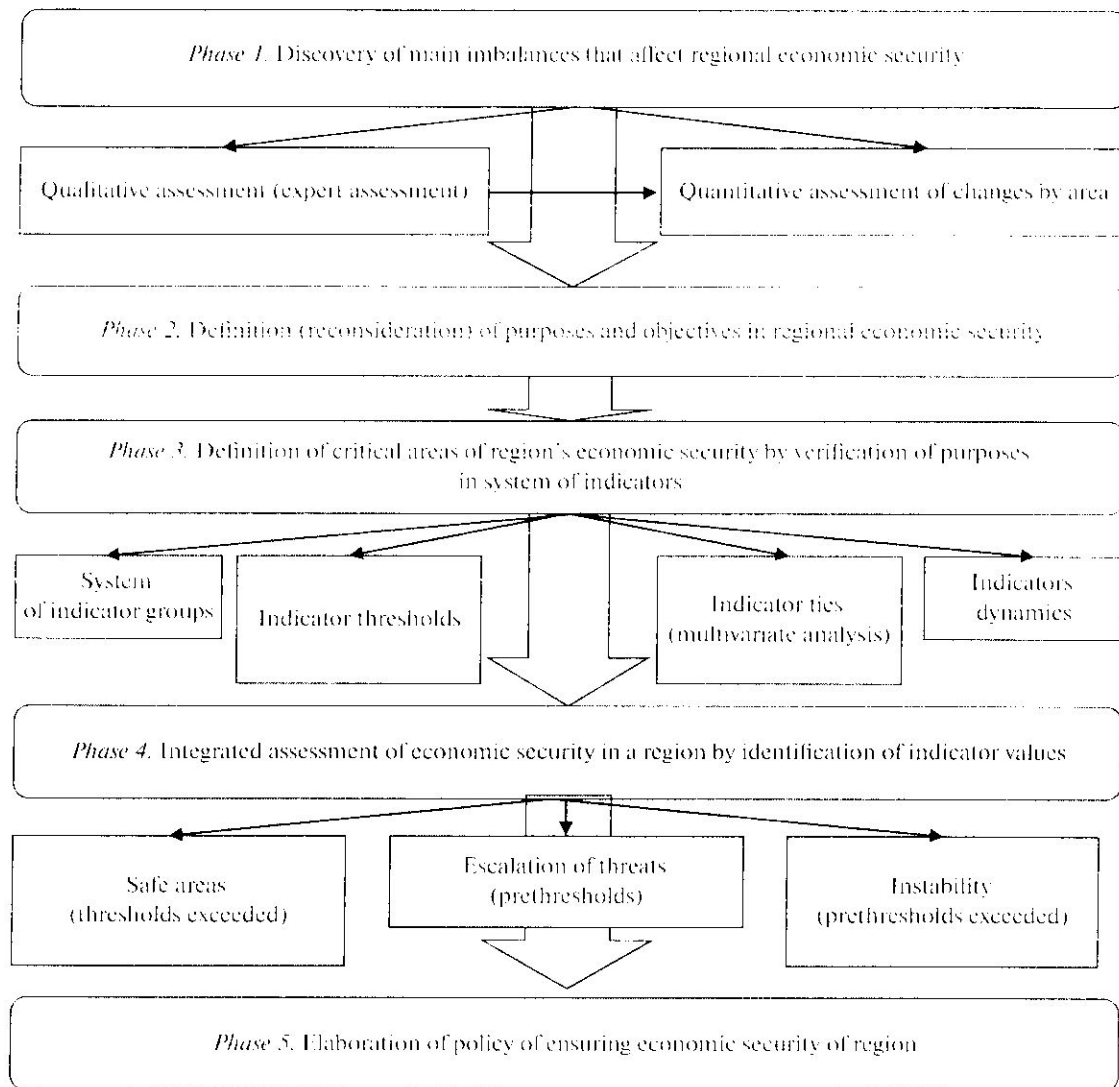


Fig. 1. System of evaluating regional economic security as basis of economic policy.

### METHODOLOGY OF THE STUDY

The system of indicative assessment of economic security of a resource region was constructed on four basic assessment principles (Fig. 1):

(1) *Dynamic principle*. The structure and composition of economic security indicators and their critical values (thresholds) can be reconsidered with changes in macroeconomic trends, strategic priorities, purposes, and objectives on the national or regional scale (phase 1).

(2) *Target principle*. The system of indicators is based on strategic priorities, purposes, areas, and objectives of economic security assurance (phases 2 and 3) outlined in the National Security Strategy of the Russian Federation.

(3) *Integrated principle*. Economic security indicators are analyzed in a consistent manner: not only are they measured against their thresholds but also analyzed in the context of changes and in the structure of relations among indicators. The tools of trend and multivariate statistical analyses are used for this (phase 3).

(4) *Thresholds principle*. The actual values of indicators are measured against their thresholds (critical values), which makes it possible to identify current threats to the system of a region's economic security (phase 4).

The current structure of indicators of regional economic security (see Table 1) is based on the dynamic and target principles and constructed according to the

### *Paradoxes of Economic Security*

strategic priorities, purposes, and areas of assuring the national security of the Russian Federation. The 2006–2015 indicator values for Krasnoyarsk krai, chosen as a typical resource region for the practical testing of the proposed approach, were assessed using the data from Rosstat and Krasnoyarskstat; the thresholds were found using data from [2, 4], values recommended by national and international bodies, and estimated values of similar factors for developed market economies<sup>1</sup>, which makes it possible to assess the region's economy for actual competitiveness on the global scale.

In addition to measuring the average values of economic security indicators for the given period against their thresholds and according to the integrated principle, we conducted a trend analysis of asymmetry and excess to assess the kind, equability, and asymmetry of distribution.

In multivariate statistical analysis, we found for the selected 59 indicators paired correlation coefficients that make it possible to discover significant direct and inverse relations among the indicators, as well as the absence of relations among specific parameters the initial observation of which would give grounds for supposing the existence of such relations. The multivariate data analysis included calculation of partial correlation coefficients to assess the extent of linear dependence between any two indicators minus the impact of others and calculation of multiple correlation coefficients that showed the relation between the dependent indicator  $X_0$  and the remaining sum of independent indicators  $X_1, X_2, \dots, X_{58}$ . Statistical processing, correlation regression analysis, and clusterization of the data made it possible not only to identify imbalances (dangers) and areas of increasing threats, but also formulate several economic security paradoxes for resource regions, which manifested themselves in the type of relations among the key indicators.

There are four basic indicators of economic security that determine the state of a region's socioeconomic system: (1) life expectancy; (2) the ratio of the region's average per capita income to the average Russian per capita income; (3) the share of products made by sectors in the fifth and sixth technological paradigms in the total industrial output; (4) the ratio of GRP per capita to worldwide average GDP per capita. We have taken the basic indicators for dependent variables and constructed the linear equations of multiple regressions, which allowed us to define the indicators that most strongly influence these variables. It is necessary to understand this type of relations in order to develop a smart regional socioeconomic policy and determine the steps and actions that can have the target effect on the basic parameters.

<sup>1</sup> The primary statistics were borrowed from OECD DB (URL: <http://stats.oecd.org>).

The safe zone<sup>2</sup> (by average value) covers only 17 of the 59 studied indicators of Krasnoyarsk krai's economic security. The average values of the 17 indicators are boldfaced. They are largely conditioned by the region's industrial profile and regional presence of major corporations (physical industrial output index, investment level, unemployment rate) and linked with them via quality of life indicators (population income/expense ratio, level of own fiscal capacity, specific factors of decentralized financial resources).

The escalation of threats (indicator prethresholds or decreasing indicator values) has to do with imbalances in social welfare, industry, and the financial sector. The affordability of healthcare services has dropped below the security threshold.

There has been a critical decline in the share of investments in infrastructural sectors (construction and housing and utilities). 2014–2015 marked the first time since 1998 crisis that personal expenses in the region had exceeded personal income. In 2015, the average per capita income was a mere 89% of the average Russian. The purchasing power has also suffered a decline: whereas five years ago one-room apartments made only a third of all the new housing commissioned, in 2015 their share was already 50%. The share of population with income below minimum subsistence level exceeded 19%.

The quality structure of the economy has also aggravated. The share of manufacturing in industrial output has dropped by 22.5% over the last decade (Fig. 2) at the expense of the growing mining that fosters product exports with a low level of value added and secures implementation of budget revenues. The investments in economy have dropped to 21.9% of GRP and are sustained by investments in major corporate investment projects. In 2015 the physical industrial output index was 98.9% of the figure in 2014. The life quality is affected by the transformation of the status of Krasnoyarsk krai from a developed industrial region with a diversified economy to a *national storehouse* with the dominant role of mining mono-enterprises. The region's average per capita amount of hazardous substance emissions into the atmosphere is 66 times as high as the average figure for the Organization for Economic Cooperation and Development (OECD) members and the share of employees who work in harmful and hazardous labor conditions is 1.8 times as high as the same average figure for the OECD members. It is against this backdrop that the total population incidence of disease is growing, including socially critical diseases. The life environment has also been degrading: in 2015, around 45% of

<sup>2</sup> Here and below, a safe zone is understood as the economic standing in which the economic security index does not reach its thresholds, whether at the current level or at the average level for several periods.

## INTEGRATED ASSESSMENT OF ECONOMIC SECURITY

**Table 1.** Indicators of regional economic security in accordance with the strategic priorities of Russia's national security and their average values for Krasnoyarsk krai

Purpose	Area	Indicator	Threshold	Average value for decade	
<i>Strategic priority: improved life quality</i>					
Human development:	Demographic determinants	Life expectancy, years	<75.00	67.83	
		Aggregate birth rate	<2.15	1.63	
		Mortality rate	≤10.00	13.23	
		Natural population increase as related to migration increase	>1.00	0.82	
		Replacement rate, number of kids per 1 000 people above employable age	>1000	890	
	Labor market	Unemployment rate according to ILO technique, %	<7.00	<b>6.87</b>	
		Share of people with higher education involved in economy, %	>45.00	25.56	
	Human environment quality	Total morbidity rate, number of initially identified disease cases per 1000 people	<750.00	808.43	
		Hazardous substance emissions per capita, t	>0.015	0.990	
		Share of socially critical diseases in total amount of diseases, %	≤8.00	<b>5.34</b>	
		Share of employees who work in harmful and hazardous labor conditions (in industry), %	<30.00	52.93	
	Development of social services	Gross education coverage of population, %	>95.00	68.93	
		Number of physicians per 10 000 people	>48.60	<b>50.68</b>	
		Share of investments in social welfare sectors in total investments, %	>10.00	2.84	
		Share of main production assets of social welfare sectors in the total cost of main production assets, %	≥10.00	5.15	
	Satisfaction of material, social, and spiritual needs	Housing affordability	Housing area per resident, m <sup>2</sup>	≥45.00	22.45
			Share of one-room apartments in total amount of new housing put into commission, %	<40.00	<b>38.72</b>
			Share of households in need of improved housing conditions, %	<10.00	<b>3.46</b>
Ratio of average market housing cost to average annual family income, years			<12.00	<b>5.09</b>	
Average interest rate on mortgage loan, % p.a.			<4.00	13.55	
Infrastructural sectors	Share of unsatisfactory and dilapidated housing, %	≤5.00	<b>4.36</b>		
	Total share of water supply, sewerage, and heat supply networks in need of replacement, %	<5.00	42.00		
	Availability of all kinds of transport calculated according to Engel's law (coefficient)	>2.00	0.40		
	Share of investments in infrastructural sectors in total investments, %	>15.00	<b>15.36</b>		
Reduction of social inequality	Inequality in wealth	Share of foodstuff expenses in total expenses of average household, %	<65.00	<b>26.28</b>	
		Ratio of the average income of the 10% richest to the 10% poorest inhabitants	<8.00	16.64	
		Personal income/expense ratio	≥1.00	<b>1.09</b>	
		Share of population with income below minimum subsistence level, %	≤7.00	17.15	
		Ratio of region's average per capita income to average Russian per capita income (coefficient)	≥1.00	0.96	
		Gini coefficient	<0.34	0.42	

Table 1. (Contd.)

<i>Strategic priority: economic growth</i>					
Economic development	Development of industrial and technological facilities	Wear rate of main production assets, %	<40.00	42.94	
		Main production assets commissioning/decommissioning ratio in industry (index)	>3.00	<b>18.48</b>	
	Development of prioritized economic sectors	Share of manufacturing in industrial output, %	>70.00	69.68	
		Share of machinery industry in industrial output, %	≥20.00	5.08	
		Share of investments in GRP, %	>25.00	23.86	
	Business climate improvement	Ratio of newly registered enterprises to enterprises closed down (coefficient)	≥1.00	<b>1.37</b>	
		Share of small enterprises and microenterprises (with < 100 employees) in the total number of enterprises, %	>50.00	49.69	
		Ratio of labor productivity of large and medium-sized businesses to labor productivity of small businesses and microenterprises (index)	≥1.00	0.74	
	Transition to a new level of technological development	Development of scientific capabilities and technology transfer	Number of employees involved in research and developments, people per 1000 employees	>7.9	7.5
Share of expenses on R&D in GRP, %			≥3.00	0.78	
Number of awarded patents per 10000 people			≥6.26	1.71	
Intensification of business innovation activities		Share of organizations with active innovation policy, %	>20.00	10.52	
		Share of expenses on technological innovations in revenues, %	>5.00	3.05	
		Share of innovative products in shipped products (in industry), %	>15.00	2.43	
		Share of products made by sectors in fifth and sixth technological paradigms in total industrial output, %	>20.00	0.79	
		Technological exports/imports ratio in balance of payments, %	>100.00	14.23	
Provision of leadership by macroeconomic factors		Financial security and stability of financial system	Consumer price index	≤120.0	<b>108.4</b>
			Share of regional credit institutions in total lending to economy, %	≥15.00	6.16
	Banking saturation index		≥1.0	0.7	
	Share of overdue loans in total loans, %		<10.00	<b>3.68</b>	
	Average cost of loan resources for nonfinancial organizations, %		<5.00	12.01	
	Financial security and stability of financial system	Ratio of growth rate of region's consolidated public debt to GRP growth rate (index)	<1.00	2.13	
		Ratio of deficit in consolidated regional budget to own budgetary revenues, %	≤15.00	<b>5.96</b>	
		Share of taxes and fees transferred to consolidated regional budget in total tax revenues collected in region, %	>50.00	<b>67.32</b>	
		Ratio of sum of taxes and transfers to federal budget to amount of financial aid transferred from federal to regional budget, %	≤200	270	
	Economic growth ratios	Ratio of GRP per capita to worldwide average GDP per capita, %	≥100.00	87.25	
		Physical industrial output index	≥102.00	<b>106.76</b>	
		Export/import ratio, %	≈100.00	518.66	
		Labor productivity in economy (ratio of GRP to number of employees), USD 1000	>49.31	23.05	



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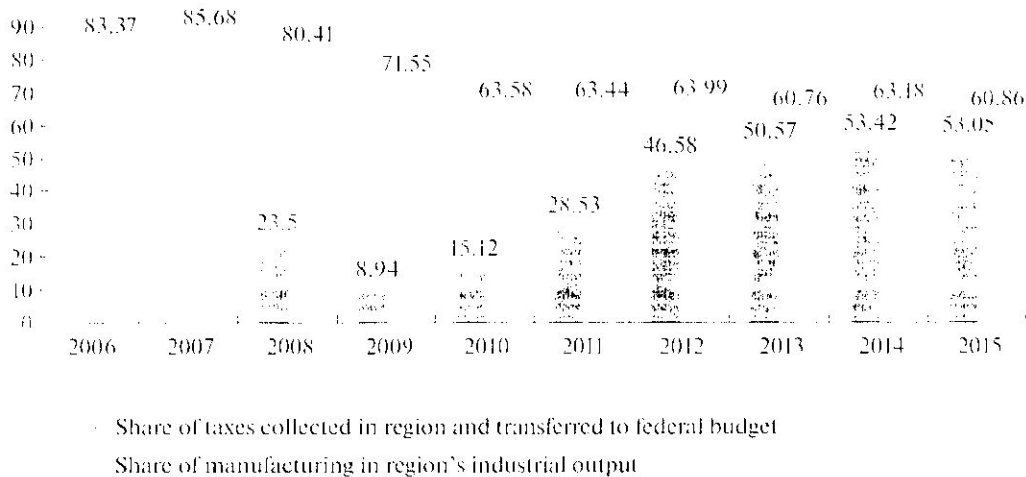


Fig. 2. Trends in individual economic security indicators of Krasnoyarsk krai, %.

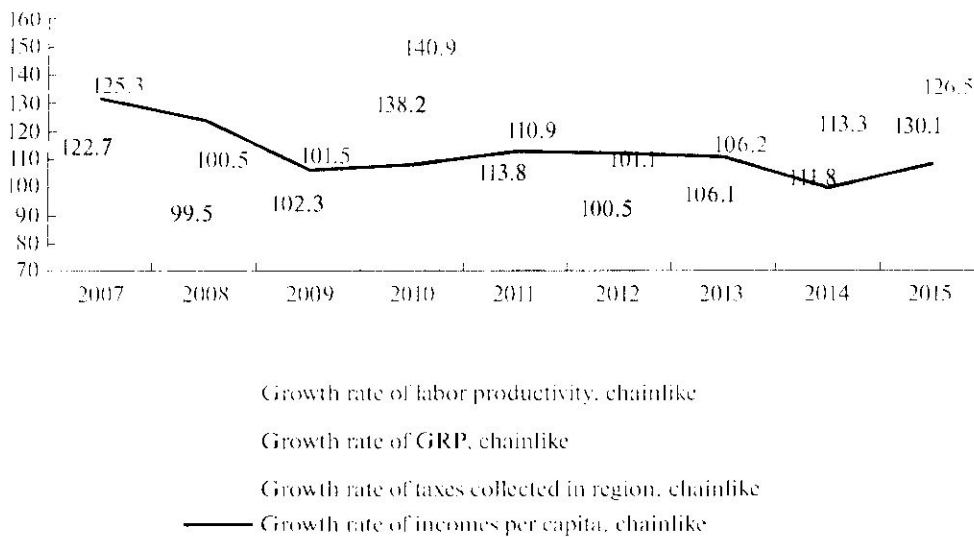


Fig. 3. Growth rates of individual economic security indicators of Krasnoyarsk krai, %.

all the region's public utility networks were completely worn out and needed replacement.

In addition, Krasnoyarsk krai's chances of eliminating the imbalances on its own are rapidly waning: the sharpest decline in indicators has been observed in the field of financial security. In 2015 54% of all the tax revenues collected in the region were transferred to the federal budget (cf. with 23.5% in 2008), which was six times higher than the transfers from the federal budget to the consolidated budget of Krasnoyarsk krai (see Figs. 2, 3). Because of the imbalanced budgetary policy implemented by the federal government, the region's nonconsolidated public debt has increased by 51.64 times over the last 9 years.

Thus, Krasnoyarsk krai is a typical resource region oriented at sustaining the financial support of national security. However, it does not always maintain its economic system at a high-quality level or ensure decent living standards for its residents. The growing imbalances in the economy of such regions will sooner or later destabilize the national economy. It is important, therefore, to have a smart economic policy with a proper balance between the national and the regional needs. To elaborate and implement this policy, it is necessary not only to understand the origin of the imbalances, but also be aware of the key influences on the degradation of the basic parameters of sustainable development of regional economic systems. The mul-

tivariate statistical analysis applied as part of the integrated principle helps to identify the distribution of critical and uncritical parameters, which explicates the results of linear or multiple regression equations and indicates the relations of the basic economic security indicators with other influencing factors.

For instance, life expectancy as a basic socially important factor is most closely related to the environment, including education level, housing affordability, income of the region's residents and their propensity for savings, and transport availability. The impact of the general economic situation also matters: people live longer in a diversified economy with a high share of small businesses and microbusinesses, as well as with intense innovation activities and predominantly advanced technological paradigms. However, life expectancy is not much affected by such seemingly important parameters as morbidity pattern, affordability of healthcare services, and environmental pollution, which can be explained by the deferred influence of these factors.

The second basic indicator of quality of life is the ratio of the region's average disposable per capita income to the average Russian. It illustrates the unfair essence of the national income distribution system. The average per capita income of Krasnoyarsk krai residents, including not only salaries but also pensions, social security benefits, and rental and entrepreneurial income, was below Russia's average level in the entire considered period (except for 2007 and 2008) and tended to drop down even further. This is a paradox, because the krai as a resource region is a donor territory for Russia's economic system and is found among the country's top ten regions with the highest GRP. It would have had the fastest growing GRP in the crisis period, with 113 and 126% in 2014 and 2015, respectively. The region's labor productivity has been growing at roughly the same rate (see Fig. 3).

However, Krasnoyarsk krai is characterized by a very asymmetrical contribution of its macrodistricts in the region's labor productivity: this asymmetry is not balanced against the distribution of personal income by the same groups of districts. For instance, the stable growth of labor productivity is ensured mainly by industrially developed districts: in 2014 the average labor productivity in Krasnoyarsk, Noril'sk, and the Turukhansk municipal district was RUR 1.6 mln, 5 mln, and more than 20 mln, respectively. In the other districts, however, this parameter ranged from RUR 330000 to 1030000 (see Fig. 4). At the same time, labor remuneration by the macrodistricts does not always show the contribution of the employed population in the creation of social product: for instance, labor productivity in the Severo-Yeniseiskii municipal district, where gold mining enterprises are concentrated, changed position from the maximum (in 2007) to the minimum range (2014), whereas salaries in the district were in the maximum range

throughout 2007–2014 (see Fig. 5). Similarly, the gainfully employed population of the Taimyr Dolgano-Nenetskii and Evenkiiskii municipal districts, which are characterized by minimum labor productivity, falls within the maximum range at the expense of guarantees and compensations paid out to the inhabitants of the Extreme North.

Correlation analysis has confirmed the unreasonableness of the policy's territorial distribution of income promoted by the business community and public authorities. The region's average per capita income does not correlate with its labor productivity ( $-0.17$ ), physical industrial output index ( $-0.02$ ), and gross regional product ( $0.05$ ). That is, the income level does not depend on the labor input: the entire *surplus income* of the resource regions is distributed across the country with different degrees of uniformity. The significant correlation of the average per capita income with a ratio of the average income of the 10% richest to the 10% poorest inhabitants ( $0.89$ ) and Gini coefficient ( $0.90$ ) highlights the fact that in the resource territories, personal income is statistically leveled with personal income in the country's other regions by the increasing inequality in wealth and social differentiation by income. The average per capita income is little affected by the current structure of the economy, where priority is given to mining. Growth in per capita income can currently be triggered only by the rising tide of hi-tech manufacturing (machinery industry).

Both basic economic security indicators considered above and the influence of disproportionate structures on these indicators confirm the assumption that, nowadays, a typical Russian resource region develops not for the benefit of its residents but for the benefit of corporations. This is confirmed by significant correlations of two basic economic security indicators: gross regional product and total labor productivity. Their growth in Krasnoyarsk krai depends more on transport availability, investments, small business development, labor productivity of large businesses, the employment rate, financial market development (by the affordability index of banking services), and people's education level. In addition, labor productivity and GRP show significant negative correlations with the share of the manufacturing (which explains its stagnation), foreign trade technological balance, and living standards (the general drop in income is the impetus for growth in labor productivity).

Despite their declared priorities of contributing to the region's sustainable development, the actual policy of large corporations aims at maximizing the current economic benefits, which negatively affects many of the region's systems.

First, the regional financial institutions are pushed out by the federal banking networks, the loans granted by which largely determine GRP growth (the coefficient of the paired correlation of GRP with the share of regional banks in the total lending is negative and



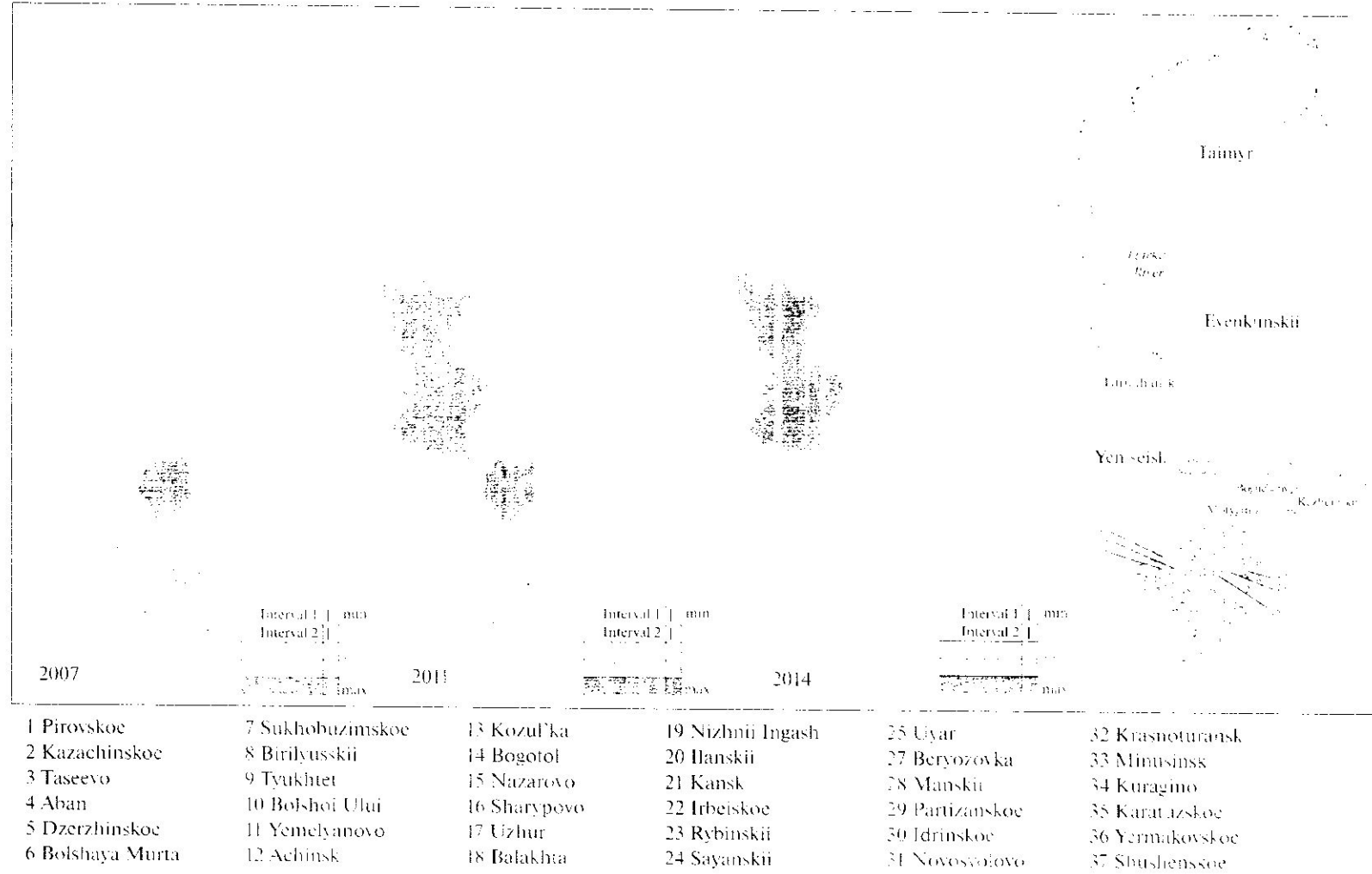


Fig. 4. Distribution of labor productivity by municipal districts of Krasnoyarsk krai (quantiles).

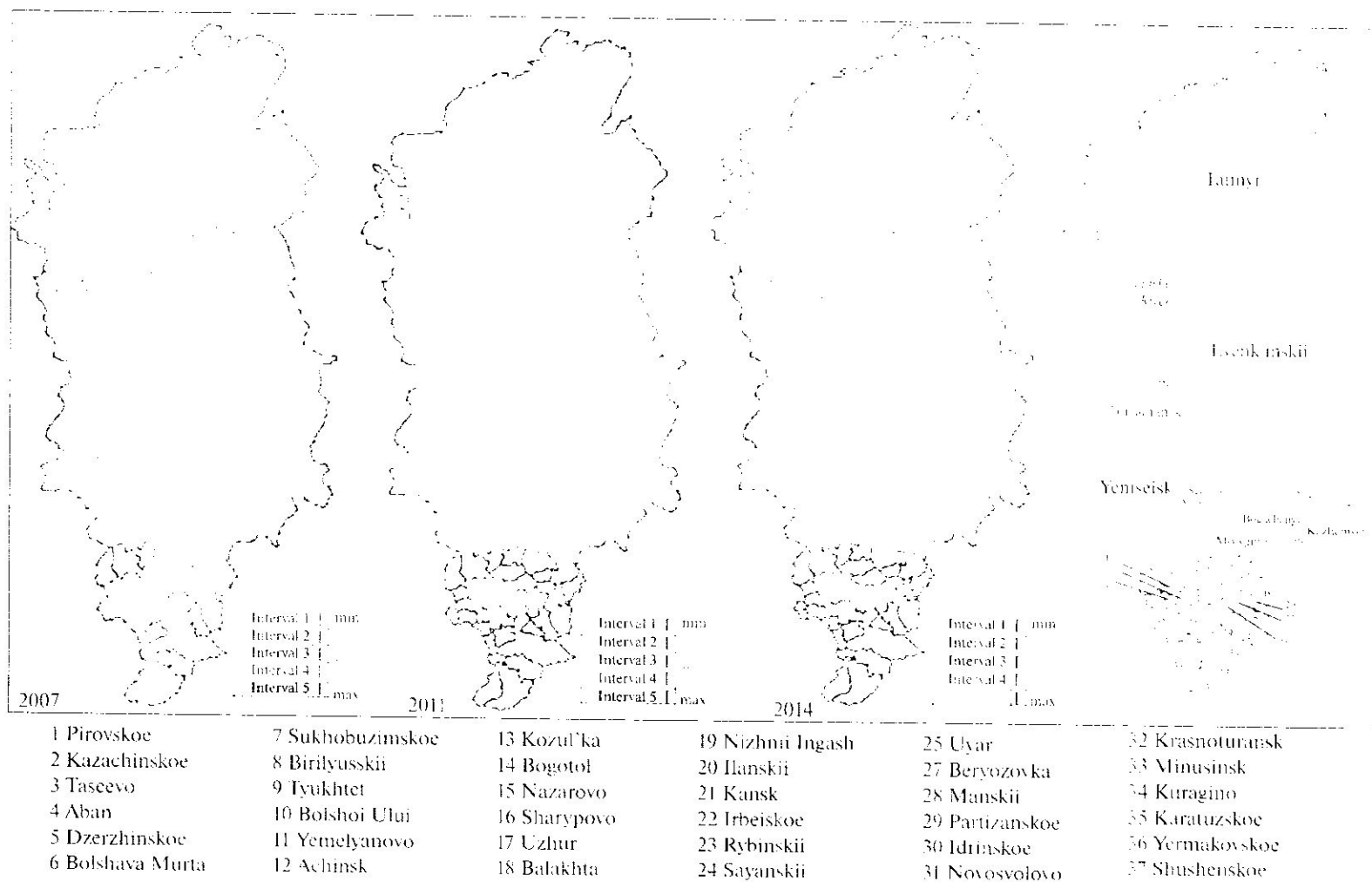


Fig. 5. Distribution of average nominal monthly accrued salary of corporate employees by municipalities of Krasnoyarsk krai (quantiles).

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significant:  $-0.85$ ). The share of regional financial institutions in the lending market dropped from 12.4% in 2006 to 4.7% in 2015.

Secondly, the rising entrepreneurial activity is conditioned by provision of services to corporations; in this respect, the economy of Krasnoyarsk krai is based on redistributing natural resource rent. Although the share of small businesses in such traditional fields of small business as the service industry and consumer market is 80%, it occupies the minimum share of employment in the region's economy (from 32% in the financial and real estate sectors to 3% in the mining).

Third, the regional economy is critically dependent on imported technologies and thus already unable to develop on its own technological basis. The region's GRP growth does not correlate with the development of sectors of advanced technological paradigms ( $-0.46$ ), nor does it correlate with the territory's scientific capabilities (minor positive correlations are observed with the innovation activity of organizations (0.02), number of awarded patents (0.24), and expenses on technological innovations (0.21)). Moreover, the development of advanced economic sectors in the krai show very negative correlations with the number of researchers ( $-0.67$ ), expenses on R&D and technological innovations ( $-0.55$ ), and is positively correlated with technology imports (0.74). The paradox is that the rising tide of advanced technological paradigms in resource regions does not correspond to the current priorities of increasing short-term financial indicators. Proceeding from the significant correlations, this rise requires reduced investments in mining, improved quality structure of main assets in manufacturing, a decline in housing costs (mortgage loan interest rates included), development of all kinds of technological transfer, prioritized focus on local financial institutions, and structural demographic improvements by reducing migration inflow and share of elderly people. The development of the sectors of the fifth and sixth technological paradigms is currently sustained by large businesses (the negative correlation with the share of small enterprises is  $-0.79$ ) via technology import. This process makes it less and less necessary to commercialize the region's own scientific developments, leads to human capital assets stagnation, and, ultimately, in the words of Glaz'ev, to the region's *ending up in the trap of technological inferiority* [2, p. 20].

Krasnoyarsk krai still provides decent education and has become an exporter of HQ human assets to other regions and countries: 18% of graduates of the region's universities find jobs outside the region. The growth of the share of educated population is determined primarily by such factors as the region's fiscal capacity, entrepreneurial activity of small businesses, state of housing facilities, housing affordability, and financial market development. The quality of human

assets shows the most significant correlations with the development of the region's own R&D base, including the number of researchers (0.79) and expenses on R&D and technological innovations (0.92). There is a negative correlation with technology imports ( $-0.79$ ). That is, a region where educated people decide to settle must not only be able to ensure a high quality of living but also guaranteed employment in knowledge-intensive sectors. Unfortunately, resource regions show a positive correlation between the share of residents with higher education and the unemployment rate: in the current pattern of market requirements, there is only a decreased demand for highly educated people. Paired correlation coefficients show the ratio of human asset quality to reproduction parameters: population increase must instead be ensured by a surplus of births over deaths than by migration increase; children must prevail over elderly people in the pattern of demographic load on the able-bodied population.

## CONCLUSIONS

The proposed integrated approach to diagnosing regional economic security is based on using the indicative method together with trend and multivariate statistical analysis. It has allowed us to discover significant relations among the basic indicators that determine the standing of a region's socioeconomic system and the corresponding influencing factors, and define the main economic security imbalances in resource regions like Krasnoyarsk krai.

The main discovered economic security imbalances have to do with the violation of sustainable development principles and are conditioned by the industrial pattern of a typical resource region and its income-generating ability. The imbalances are concentrated in the fields of social welfare, industry, and finances. The disproportions of development are manifested in the degradation of the quality structure of economy and reduction in economic diversity against the backdrop of environmental conditions, degrading level and quality of life, and gradual drain of HQ human assets from the region. At the same time, the region suffers from the degradation of its scientific and innovative capabilities against the backdrop of the growing internal asymmetry of socioeconomic development across the krai's municipal districts.

One of the tasks of ensuring economic security on the national scale is to level imbalances among different types of regions, including resource and agricultural regions and regions, where financial flows are concentrated. Not only do these imbalances aggravate during crises but they also generate new disproportions and threats that are largely related to uneven fiscal capacity and distribution of average per capita income, withdrawal of regions' own tax revenues, inequalities in wealth, and environmental effects of industrial expansion aimed at overcoming the crisis. During a long-time economic recession, resource

regions carry the burden of sustaining the country financially and lose opportunities to turn to a new industrial type of society based on knowledge and technology. This is caused by the preservation of production patterns based on mining and exporting mineral resources and products with low value added. The ever growing needs to balance the consolidated budget of the Russian Federation continue to curtail the funds these regions necessary for their own development. One of the problems that resource regions face in the technological transition is to form conditions for retaining and developing their human assets<sup>3</sup>. This process depends on prospects for creating high-tech production, demand for skilled human resources, living environment, level and quality of life. The state policy alone is not enough to form even the basic range of conditions for human potential improvement. Therefore, coordinated joint efforts of the business community and public authorities are necessary.

In this respect, it is necessary to elaborate a single and balanced public policy of integrated improvement of regional economic security in light of various development paths and problems of different types of regions. An important task of economic policy for resource regions will be to encourage regional authorities and corporations to invest in human assets development<sup>4</sup> and create efficient impetuses for transferring knowledge and technologies to industry.

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<sup>3</sup> A significant positive correlation of GRP is the one with the economic share of people with higher education (0.52). This factor is correlated with the GRP growth to the same extent as transport availability (0.55), share of small and medium-sized businesses (0.53), industrial output index (0.52), and only a little inferior to correlation with investments (0.62). The linear regression equation also highlights the high significance (impact) of education as the quality indicator of human assets for current GRP values.

<sup>4</sup> It is estimated that the share of the educated population is largely determined by the demographic situation (birth and death rates, expected life expectancy), housing affordability (the positive correlation with the share of single room apartments is 0.79), housing quality (the positive correlation with per capita housing area is 0.87), opportunities for own business development (the positive correlation with the share of small businesses is 0.78), the region's fiscal capacity (the positive correlation with the share of taxes collected in the region and paid to the krai's consolidated budget is 0.82), investments in research (the positive correlations with the amount of research staff, expenses on R&D, and number of awarded patents are 0.79, 0.92, and 0.85, respectively). Most of these indices are ensured by state and corporate policies.

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