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Manuscript

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**ASSESSING THE RELATIONSHIP BETWEEN INDICATORS OF ECONOMIC
DEVELOPMENT AND INCOME INEQUALITY ACROSS RUSSIAN REGIONS**

Specialty 5.2.3 «Regional and Sectoral Economics»

ABSTRACT

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Relevance of the research. In recent decades, many countries have experienced a rise in income inequality. Consequently, this issue has become the subject of extensive economic research. Such attention to income inequality and its determinants is not surprising, as increasing inequality may be associated with a range of socio-economic consequences affecting both the economy and broader societal domains. Among the most adverse consequences of widening income disparities, researchers highlight higher crime rates, declining educational outcomes, deteriorating population health, erosion of democratic institutions, reduced civic engagement, and other negative trends.

According to [Novokmet et al., 2018], income inequality in Russia has increased more significantly than in other former communist countries of Eastern Europe, while official statistics substantially underestimate the gap between the rich and the poor. As noted in [Dorofeev, 2020], the current level of inequality in Russia is considerable and comparable to estimates characteristic of the pre-revolutionary period. Another important aspect of the income inequality issue in Russia is the Presidential Decree on the National Development Goals of the Russian Federation up to 2030 and for the period up to 2036, which sets a target of reducing the Gini coefficient to 0.37 by 2030 and to 0.33 by 2036 (Clause 2, Subclause “1”)¹.

Identifying the determinants of income inequality across Russian regions is an important research objective. Influencing these determinants may serve as an important instrument for addressing rising income inequality at both the regional and national levels. Furthermore, the analysis of factors affecting income inequality is directly linked to the priorities of public policy in the Russian Federation.

It is important to note that income inequality is shaped by a wide range of factors, including unobservable ones. At the same time, several determinants remain insufficiently explored in the literature, particularly in Russian studies, despite their potentially significant association with intraregional income inequality. Within the framework of this study, the following factors are examined:

- natural resource orientation of the economy;
- level of economic complexity;
- intensity of online trade.

The export of natural resources constitutes one of the key components of national income formation in Russia. At the same time, resource abundance may weaken incentives for the development of other sectors of the economy. The literature on the “resource curse” suggests that adverse effects on economic development are driven not by resource endowment per se, but by its dominance in the economic structure. Similarly, the relationship between natural resources and income distribution may be explained by the consequences of economic dependence on resource extraction.

¹Presidential Decree on the National Development Goals of the Russian Federation up to 2030 and for the period up to 2036 (Accessed at: <http://www.kremlin.ru/events/president/news/73986>)

For a long time, the primary determinant of income inequality was considered to be the level of economic development, typically measured by GDP per capita. However, the mixed empirical evidence regarding the Kuznets curve indicates that GDP is not a sufficient predictor of income inequality. As a result, researchers have increasingly focused on alternative measures of economic development, including economic complexity, which is now widely regarded as an important factor associated with income inequality.

The relationship between various indicators of digitalization and income inequality has only recently become the subject of academic research. In this study, online trade is considered an observable component of economic digitalization. The development of the digital economy makes it essential to examine its impact on socio-economic processes, as the diffusion of digital technologies affects not only productivity and market structures but also the mechanisms of income formation across different population groups. Assessing how specific aspects of digitalization are associated with changes in income distribution represents an important research and policy task. In this context, the use of online trade intensity as a proxy for digitalization makes it possible to capture ongoing structural changes in regional economies in Russia and to evaluate the extent to which the development of e-commerce is associated with the dynamics of income inequality.

State of research on the topic. The theoretical and empirical foundation of the study is based on the existing literature on the determinants of income inequality.

The literature examining the relationship between natural resources and income inequality is extensive. In this study, particular attention is given to contributions that specifically analyze the resource orientation of production (i.e., the relative importance of natural resources) as a determinant of income inequality, including works by Aguirre, Akpa, Alvarado, Asongu, Atrián, Balouki Mikala, Berisha, Busse, Buccellato, Goderis, Gylfason, Gröning, Gupta, Dachraoui, Jemidjolou, Dizaji, Davis, Yogo, Zoega, Işık, Karmidzhani, Kim, Clance, Krieger, Larrea-Silva, Li, Leamer, Lin, López-Sánchez, Liu, Mallaye, Maul, Mehlum, Mickiewicz, Moene, Mollavelioğlu, Malone, Nademi, Nkemgha, Nounamo, Njangang, Papyrakis, Parceró, Ponce, Popova, Rodríguez, Ross, Sebri, Soyhan, Tadadjeu, Tékam, Tillaguango, Timba, Torvik, Farzanegan, Fum, Habibpour, Hartwell, Hodler, Horvath, Horvathova, Howie, Chen, Chisadza, Schott, EngoneMve, Yunga, and Yang.

Economic complexity as a determinant of income inequality has been studied relatively recently; therefore, it is possible to identify a comprehensive set of contributions in this field, including works by Aristarán, Bound, Beyene, Berman, Behnia, Blancheton, Vu, Guevara, Gómez-Zaldívar, Gholizadeh, Hidalgo, Le Caous, Lee, Machin, Osorio-Caballero, Saucedo-Acosta, Sepehrdoust, Soltani, Tavassoli, Tartar, Khanzadi, Jara-Figueroa, Hartmann, Hoang, Huarng, Chhorn, and Chu. Evidence for Russia remains limited; however, a notable contribution is provided by Gvozdeva, Kazakova, Lyubimov,

Lysyuk, and Nesterova, who constructed economic complexity indices for Russian regions for 2013 and 2015.

Empirical studies examining the intensity of online trade as a determinant of income inequality are very limited. Therefore, this study also draws on the broader literature exploring the relationship between income inequality and other indicators of digitalization. Key contributions in this area include works by Ardiansyah, Bauer, Van Reenen, Haas, Zinni, Zika, Kaltenberg, Cornelli, Maier, Michaels, Mishra, Mönnig, Munandar, Natraj, Richmond, Triplett, Foster-McGregor, and Frost. The Russian literature on this topic is also limited. A direct empirical assessment of the impact of broadband Internet penetration on income inequality in Russia is provided by Imasheva and Kramin.

The purpose and objectives of the research. The purpose of this study is to assess the relationship between the resource orientation of the economy, economic complexity, and the intensity of online trade and the level of income inequality across Russian regions. To achieve this purpose, the study addresses the following research objectives:

- to identify the main channels and describe the mechanisms linking the resource orientation of the economy, economic complexity, and the intensity of online trade to income inequality;
- to systematize the approaches and findings of previous studies examining the resource orientation of the economy, economic complexity, and the intensity of online trade as determinants of income inequality;
- to examine, using econometric methods, trends in the convergence of income inequality across Russian regions;
- to evaluate, using econometric methods, the presence and direction of the relationship between the resource orientation of the economy and income inequality across Russian regions;
- to evaluate, using econometric methods, the presence and direction of the relationship between economic complexity and income inequality across Russian regions;
- to evaluate, using econometric methods, the presence and direction of the relationship between the intensity of online trade and income inequality across Russian regions.

Research object and subject. The object of the study is income inequality across Russian regions. The subject of the study is the analysis of the resource orientation of the economy, economic complexity, and online trade as factors of intraregional income inequality in Russia.

The theoretical and methodological framework of the research is based on the works of Russian and international scholars addressing the determinants of income inequality.

Research methods. The study employs a combination of general scientific and specialized methods, including analysis and synthesis, as well as systemic and comparative approaches, alongside

methods of economic and statistical analysis and econometric modeling. The empirical analysis is primarily based on panel data techniques with fixed effects, as well as σ - and β -convergence tests.

Information base of the research. The study relies on official statistical data provided by the Federal State Statistics Service of Russia (Rosstat). The primary data sources include the annual statistical publications “Regions of Russia. Socio-Economic Indicators”, as well as Rosstat sections on “Retail Trade and Public Catering” and “Inequality and Poverty”, and EMISS.

Scientific novelty and key findings

1. Based on a review of the theoretical literature on income inequality, the study identifies the key channels linking the resource orientation of production, economic complexity, and the intensity of online trade (as an observable manifestation of digitalization) to the level of income inequality. The mechanisms underlying these relationships are described for each factor and channel. The analysis provides a foundation for specifying the econometric models used to empirically test the relevance of these factors for intraregional income inequality in Russia (in accordance with items 1.3, 1.8, 1.9, and 8.5 of the official specialty classification 5.2.3).

2. The application of the econometric framework developed in this study to test σ -convergence and both absolute and conditional β -convergence of income inequality, using regional data for Russia over the period 1995–2020, makes it possible to identify the main convergence trends. The results indicate that, over the analyzed period, Russian regions have become increasingly similar in terms of the degree of income inequality (in accordance with items 1.3, 1.6, 1.9, and 8.5 of the official specialty classification 5.2.3).

3. Using the proposed econometric approach, a statistically significant nonlinear relationship is identified between the resource orientation of production and the level of income inequality across Russian regions for the period 2005–2021. A threshold level of approximately 45% in the share of extractive industries in regional gross value added is estimated, beyond which the relationship between resource orientation and income inequality changes sign and becomes positive. A group of regions with resource specialization above the estimated threshold is identified. The findings suggest that this relationship operates primarily through the channel of economic development, interpreted within the framework of the Kuznets hypothesis, while alternative channels do not receive empirical support (in accordance with items 1.3, 1.6, 1.8, 1.9, and 8.5 of the official specialty classification 5.2.3).

4. The empirical implementation of the proposed methodology for assessing economic complexity as a determinant of income inequality reveals a statistically significant positive relationship between economic complexity, measured by the Economic Complexity Index (ECI), and income inequality across Russian regions for 2013 and 2015. These results complement existing regional-level studies. The estimated effects are comparable in magnitude to those of other factors considered,

supporting the relevance of incorporating economic complexity into analyses of regional economic dynamics and policy design (in accordance with items 1.3, 1.6, 1.8, 1.9, and 8.5 of the official specialty classification 5.2.3).

5. The econometric approach developed to assess the intensity of online trade as a determinant of income inequality reveals a statistically significant positive relationship between per capita online sales—used as a proxy for online trade intensity as an observable component of digitalization—and income inequality across Russian regions for the period 2014–2021. The findings contribute to the limited empirical evidence based on regional data in this area. The main channel underlying this relationship is human capital, proxied by the share of employed individuals with higher education (in accordance with items 1.3, 1.6, 1.9, and 8.5 of the official specialty classification 5.2.3).

The theoretical contribution of the research lies in the systematization and classification of existing research on the resource orientation of production, economic complexity, and the intensity of online trade as factors associated with income inequality, as well as in the development of econometric specifications for analyzing these relationships using regional data for Russia. The approaches proposed in this study provide a foundation for further research aimed at a more detailed examination of the complex interactions among different groups of factors and at refining the channels associated with the dynamics of intraregional income inequality.

The identified positive association between the resource orientation of the economy and income inequality in regions with a high share of the extractive sector may reflect structural characteristics of such economies. Under conditions of strong resource specialization, financial and labor resources may become increasingly concentrated in the extractive sector, which may be associated with greater income differentiation between workers employed in resource-based and non-resource sectors.

The observed positive relationship between economic complexity and income inequality across Russian regions can be explained by several complementary mechanisms. First, the development of technologically sophisticated industries is typically accompanied by increased demand for highly skilled labor, which may contribute to widening wage differentials. Second, migration may also play an important role: more mobile, highly skilled workers tend to concentrate in regions with more complex economic structures, whereas regions with lower economic complexity are more likely to exhibit a more homogeneous distribution of employment in terms of income levels. Taken together, these mechanisms are consistent with the observed positive relationship between economic complexity and income inequality.

The identified positive association between the intensity of online trade and income inequality is also of theoretical interest, as it is consistent with the concept of skill-biased technological change (SBTC). A higher intensity of e-commerce may be associated with increased demand for workers

possessing advanced digital and managerial skills, which, in the context of heterogeneous regional labor markets, may be linked to greater income differentiation. Although this result does not imply a clear causal interpretation, it suggests a potential relationship between the expansion of online trade and changes in the structure of income distribution, highlighting the importance of further research on the role of digitalization in shaping income inequality.

The practical contribution of the research lies in the fact that the obtained results enhance the scope for a more informed consideration of selected determinants of intraregional income inequality—namely, the resource orientation of the economy, economic complexity, and the intensity of online trade—in analytical studies of regional development. The estimated relative importance of these factors, in comparison with traditional determinants, allows for a more refined interpretation of observed interregional differences in income distribution. An additional applied contribution is provided by the comparative analysis of regions based on the selected characteristics, which may serve as a supplementary tool for monitoring structural features of regional economies. Such comparisons make it possible to more comprehensively account for factors associated with the dynamics of income inequality, given the limitations of available statistical data and the applied methodological framework. The results of the study may also be used in the preparation of analytical materials in the field of regional socio-economic policy, as well as in further research on the determinants of income inequality in Russian regions.

Approbation of results. The main findings and conclusions of the dissertation have been presented at international and national academic conferences and research seminars, where they received positive evaluation from the academic community.

Publications. The main results of the study have been published in five works by the author, with a total volume of approximately 6.4 author's sheets. Among them, three articles were published in journals corresponding to specialty 5.2.3 "Regional and Sectoral Economics," including two articles indexed in the Scopus database and one article published in a journal recommended by the Higher Attestation Commission of the Ministry of Science and Higher Education of the Russian Federation.

Structure and scope of the research. The research objectives and aims determined the structure and content of the dissertation. The dissertation comprises 117 pages and includes an introduction, five chapters, a conclusion, a list of references containing 153 sources, and an appendix. The dissertation contains 8 figures and 25 tables, as well as 3 additional tables in the appendix.