COMPARATIVE ANALYSIS OF ESTIMATES OF ECONOMIC COMPLEXITY OF REGIONS BY SECTORS AND TYPES OF ECONOMIC ACTIVITY

**Aleksei A. GUSEV, Mikhail Yu. AFANAS'EV**

**Aleksei A. GUSEV**

Central Economics and Mathematics Institute, RAS (CEMI RAS), Moscow, Russian Federation gusevalexeyal@yandex.ru ORCID: <https://orcid.org/0000-0002-0551-6001>

**Mikhail Yu. AFANAS'EV**

Central Economics and Mathematics Institute, RAS, (CEMI RAS) Moscow, Russian Federation mi.afan@yandex.ru <https://orcid.org/0000-0001-6928-8821>

abstract

The Economic Complexity Index (ECI) (Hidalgo, Hausmann, 2009) measures the complexity of a region's production structure by combining information about the diversity of the economy (number of strong sectors) and the prevalence of strong sectors (number of regions where a sector is strong). The idea behind ECI is that developed regional economies are varied (diversified) and produce products of strong sectors, which on average have low prevalence because only a few regional economies have developed the sector to strong levels. The characteristics of the complexity of the production structures of the regions can be considered as an indicator of the level of human and social capital of the regional economy, since the ability of the region to produce products of strong sectors with high complexity ratings depends on the accumulated knowledge and the ability of people to form social and professional networks in order to collect, accumulate and use in producing new knowledge (Hidalgo, 2015).

The report proposes an approach to assessing the economic complexity of Russian regions by 24 types of economic activity (TEA). The approach is based on the standard method for assessing the economic complexity of regions and allows obtaining estimates of the economic complexity of TEA. A comparative analysis of estimates of economic complexity for 82 sectors and 24 TEA for 79 regions was carried out according to data for 2019. The correlation is 0.77. In the absence of three extractive regions (Orenburg, Tyumen and Sakhalin regions), the correlation of estimates of the economic complexity of regions by sector and by TEA becomes 0.82. Thus, estimates of the economic complexity of regions remain highly stable when moving from data on tax revenues when assessed by sectors to data on production volumes when assessed by TEA. An assessment of the economic complexity of regions according to 24 TEA can be useful in solving management problems aimed at increasing the economic complexity of the region.

Indices of economic complexity of sectors are constructed at different thresholds for the RCA measure of revealed comparative advantage.

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| --- | --- | --- |
| RCA threshold = 0.5 | RCA threshold = 1 | RCA threshold = 1.5 |
|  |  |  |

Fig. 1. 0-1 region-sector matrix with rows ordered by ECI and columns ordered by PCI for various RCA thresholds

Figure 1 presents 0-1 matrices describing the structure of regional economies for various values ​​of the RCA threshold. Rows of matrices correspond to regions, columns correspond to sectors of the economy. The dark cell of the matrix means that the corresponding element of the matrix is ​​1. That is, the sector is strong in the economy of the region. Otherwise, the matrix element is equal to zero and the sector is not strong. The terms of each matrix are ordered from bottom to top in ascending order of the economic complexity of the ECI regions. The columns are ordered from left to right in ascending order of the economic complexity of the PCI sectors. In applied research, the threshold value of 1 is used by default, as it allows for simple interpretation.

Let us consider the matrix structure at the RCA threshold equal to 1 (in the center of Fig. 1). The upper rows of the matrix contain significantly more ones than the lower rows. Accordingly, regions with higher economic complexity scores are more diversified than regions with low scores. Sectors with relatively high PCI economic complexity scores are strong predominantly in regions with relatively high ECI economic complexity scores. Accordingly, the lower right corner of the matrix is ​​weakly filled with ones. Sectors with relatively low PCI economic complexity scores are strong in regions with relatively low ECI economic complexity scores. Accordingly, the upper left corner of the matrix is ​​weakly filled with ones.

The matrix constructed for the RCA threshold of 0.5 (on the left in Fig. 1) contains more elements equal to 1. It should be noted that at the threshold of 0.5, some sectors are strong in almost all regions. This somewhat reduces the information content of the matrix. But this matrix has approximately the same structure as the matrix with an RCA threshold of 1. In the matrix built for an RCA threshold of 1.5 (in Fig. 1 on the right), there are relatively few elements equal to 1. Therefore, it may also be insufficiently informative for calculating the index of economic complexity. The structure of each of the three matrices constructed for close RCA thresholds correctly reflects the idea behind the economic complexity index. Therefore, to justify the choice of a threshold value, it is advisable to consider the correlation matrix of indices of the economic complexity of regions constructed for different threshold values. As a result of correlation analysis, it is shown that at threshold 1, the index of economic complexity of sectors is more resistant to threshold changes than at other threshold values.

**Hidalgo, C. (2015).** Why information grows: The evolution of order, from atoms to economies. New York: Penguin Press.

**Hidalgo, C. A., & Hausmann, R. (2009)**. The building blocks of economic complexity. Proceedings of the National Academy of Sciences, 106(26), 10570–10575. http://dx.doi.org/10.1073/pnas.0900943106.