



Measuring Synergy in the Russian Innovation Systems

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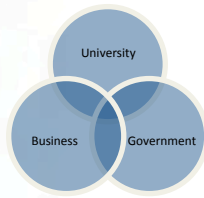
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Outline

- Innovation Activity and its Measurement
- Methodology
- Data
- Preliminary Results



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Objective

Estimate the quality of Russian national and regional innovation systems using the synergy indicator based on entropy statistics.



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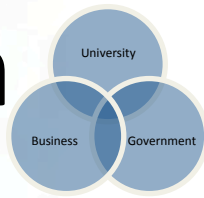


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Various Measures of Innovation Activity



- The European Innovation Scoreboard
- The International Innovation Index, III
- The Global Innovation Index, GII
- Regional Innovation Scoreboard, RIS (EU)
- Portfolio Innovation Index, PII (USA)
- Regional Innovation Development Index (Russia)

Synergy of Innovation Systems

- The synergy between the industrial structure, geographic distributions, and academic traditions is one of the crucial factors determining the strength of an innovation system, its quality and development.
- Various interactions between firms and agents provide more opportunities for synergy, which might not be directly traced back to specific exchanges between innovation agents.

Methodology

- The Triple Helix Indicator (Leydesdorff, 2001)
 - An innovation system's quality depends on how an available knowledge base is being generated and applied.
 - A system of knowledge generation has to be present, and a network of interacting agents applying the knowledge must exist.
 - In order to evaluate and compare various government policies to stimulate national and regional innovation activities, it is necessary to measure the impact of these initiatives on the quality of regional innovation systems and provide a practical tool to compare and evaluate recent government initiatives to boost innovations on both federal and regional levels.

Russia Today

- Abundant in natural resources, Russia remains highly dependent on the petroleum sector.
- But, the recent government's priorities in the context of the triple helix model are directed to facilitate trilateral collaboration as a part of Russia's strategic economic development.
- The crucial issue remains the allocation of government funding to stimulate innovation development on regional level.

Methodology

- According to Shannon (1948), probabilistic entropy, the measure of uncertainty based on the probability density distribution of a random variable x .

$$H_X = -\sum p_x \log_2 p_x$$

- The measure of uncertainty in three dimension based on the joint probability density distribution of three random variables x , y , and z is .

$$H_{XYZ} = -\sum_x \sum_y \sum_z p_{xyz} \log_2 p_{xyz}$$

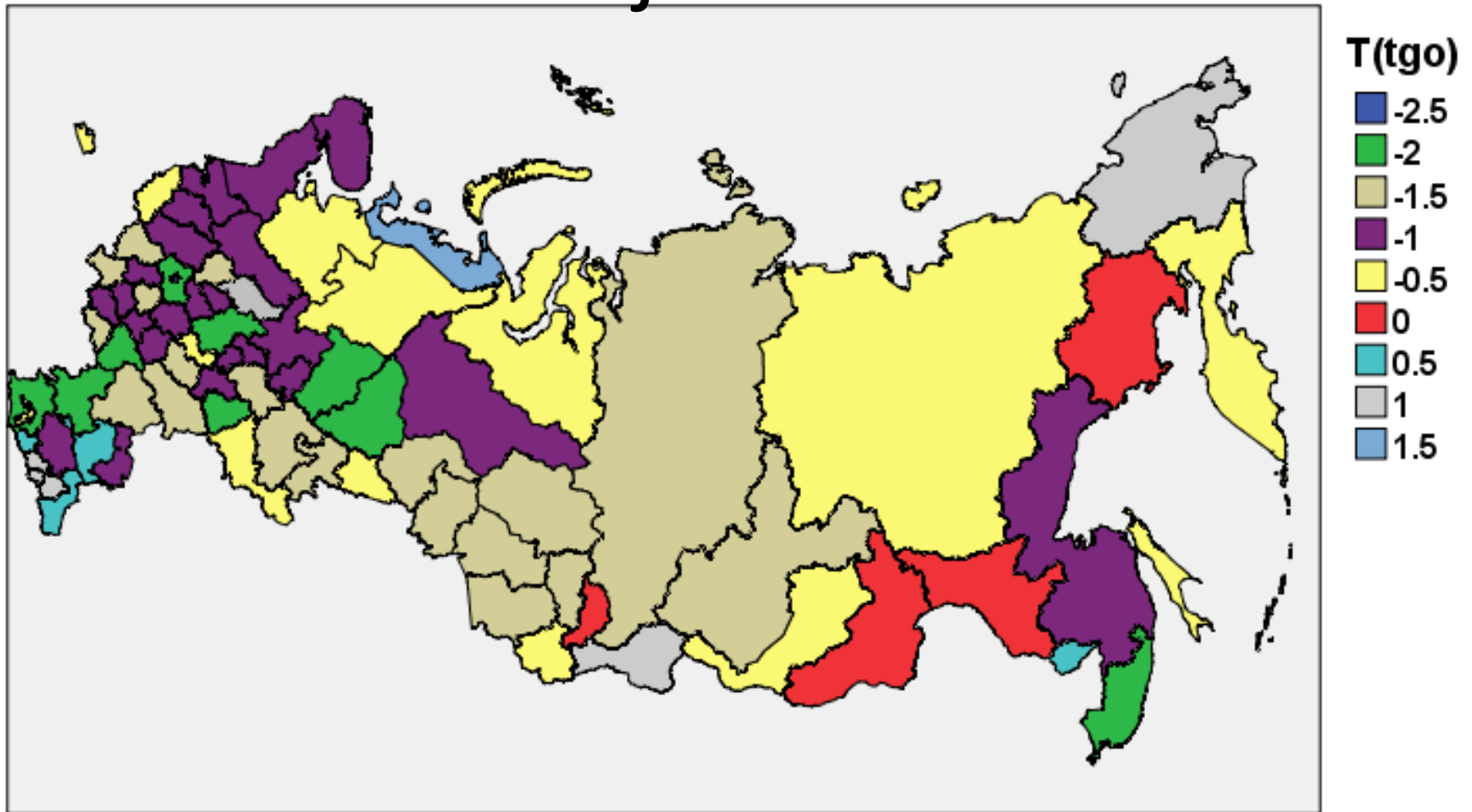
- The measure can be viewed in terms of correlation information and interaction information.

$$T_{XYZ} = H_X + H_Y + H_Z - H_{XY} - H_{XZ} - H_{YZ} + H_{XYZ}$$

Data

- The Orbis database, Van Bureau Dijk (BvD)
- Company level information, units of our analysis
- Sample with 613,018 companies for 2011
- Three variables representing each firm is used as proxies for its geographical, technological, and organizational dimensions
 - (1) zip code an indicator of regional location,
 - (2) size, measured by number of employees, a proxy of economic, and
 - (3) NACE code of the OECD, a measure of technology.

Synergies Estimates, Federal Subject Level



Year=2011, N=594,181

Synergies Estimates for European Part, Federal Subject Level



- Preliminary results show that more knowledge-based states are found in the European part of Russia, which is not a surprise given the heavier density of the firms and larger volume of government subsidies in the region.
- Within the framework of the Triple-Helix theory, this region has achieved a balance between the three sub-dynamics to a larger extent than other parts of the country.
- A significantly different pattern for the European and Siberia parts of the country can be partially explained by the peculiarities of the Russian economy and its historical origin, but additional analysis is required.

Next steps

- More reliable and complete data
- Comparison with other Innovation Activity Indicators
- Analysis of the estimator's statistical properties and development of statistical tests



Thank you!

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