

Innovation Systems Knowledge and Talent Development Program

Gemeinsam mit der Wirtschaftsuniversität Wien / Institut für Wirtschaftsgeographie und Geoinformatik wird folgende Dissertation ausgeschrieben:

Knowledge complexity and economic productivity of regions: Evidence from Europe

Background

While knowledge is understood as one of the key drivers of long-run economic growth, it is clear from the literature that not all knowledge has the same value. Rather than counting the number of knowledge inputs and outputs it may be more important to assess the quality of knowledge produced. Recently introduced by Hidalgo and Hausmann (2009) to grasp the ability of countries to export non-ubiquitous product groups, the notion of complexity will be employed to examine the ability of European regions to create and sustain non-ubiquitous knowledge bases. The uniqueness of created knowledge should confer a competitive advantage on regions which should be reflected in higher productivity growth rates.

Objective, research question and significance

While knowledge complexity at the firm level (Singh 1997) and U.S. metropolitan regions (Balland and Rigby 2016) exists, there are, to the best of our knowledge, no studies of knowledge complexity in European regions or the link between knowledge complexity and productivity growth. Because of the expected centrality of knowledge complexity for regional competitiveness, the thesis will define a measure of knowledge complexity (Ivanova et al. 2016) for EU NUTS-2 regions starting with the complexity measure developed by Hidalgo and Hausmann (2009). Rather than exports, the thesis will rely on patent information – in particular *patent citation* data – to develop these measures of knowledge complexity. More specifically the thesis will pose a number of questions: How is knowledge complexity distributed among EU regions? What are the characteristics of regions producing complex knowledge? Are regions that produce complex knowledge also those regions with the highest rates of patenting? Does complex knowledge spill over more locally than non-complex knowledge? Is the production of complex knowledge a good indicator of complex knowledge absorption? And finally, does knowledge quantity or quality determine the competitiveness of regions?

Approach and methods

The objectives will be realized by employing recently developed spatial econometric techniques in combination with advanced network analytical tools. A spatial Durbin model (SDM) will be used to relate regional knowledge complexity of regions to regional total factor productivity. Large-scale databases on patent citations will serve as information source to measure knowledge complexity. The dissertation should be based on three research papers:

- i. The first paper should focus on the conceptualization of knowledge complexity for EU NUTS-II regions. Patent citations will be used to apply the measure in a descriptive way.

- ii. The second paper will explain regional differences in knowledge complexity. Based on a sample of NUTS-II regions, region-internal and – external characteristics influencing regional knowledge complexity will be identified with a spatial econometric model.
- iii. The third paper will focus on the relationship between regional knowledge complexity and economic productivity. A dynamic SDM will estimate the impact of a region's knowledge complexity on its total factor productivity over the time period 2000-2015 in Europe.

Qualifications of the candidate

The candidate should have good knowledge of data science, data analysis and visualization, multivariate statistical modelling and advanced spatial econometric modelling. The candidate should have a strong interest in economic geography and innovation economics.

References

Balland, P.A. and Rigby, D.L. (2016) The geography of complex knowledge. Economic Geography. Forthcoming. DOI: 10.1080/00130095.2016.1205947.

Ivanova, I., Strand, O., Kushnir, D. and Leydesdorff, L. (2016) Economic and technological complexity: A model study of indicators of knowledge-based innovation systems. E-prints in Physics, Mathematics, Computer Science, Quantitative Biology, Quantitative Finance and Statistics. arXiv: 1602.02348. Cornell University.

Hidalgo, C. and Hausmann R. (2009) The building blocs of economic complexity. Proceedings of the national Academy of Sciences 106 (26) 10570-10575.

Singh, K. (1997) The impact of technological complexity and interfirm cooperation on business survival. Academy of Management Journal 40(2) 339-367.

Für die Bearbeitung der Dissertation wird eine befristete Fixanstellung am AIT für die Dauer von 3 Jahren (1500 Euro pro Monat) vorgenommen. Arbeitsplatz wird am AIT zur Verfügung gestellt.

Startzeitpunkt: 1.2.2017

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