



Contribution ID: 16

Type: **not specified**

New Metrics for Economic Complexity: Measuring the Intangible Growth Potential of Countries

Thursday, 10 December 2015 15:00 (40 minutes)

Economic Complexity refers to a new line of research which portrays economic growth as a process of evolution of ecosystems of technologies and industrial capabilities. Complex systems analysis, simulation, systems science methods, and big data capabilities offer new opportunities to empirically map technology and capability ecosystems of countries, industrial sectors and companies, analyse their structure, understand their dynamics and measure economic complexity. This approach provides a new vision of a data driven fundamental economics in a strongly connected, globalised world.

In particular here we discuss the COMTRADE dataset which provides the matrix of countries and their exported products. According to the standard economic theory the specialization of countries towards certain specific products should be optimal. The observed data show that this is not the case and that diversification is actually more important. The situation is different for companies or sectors which seem instead to specialize only on few products.

The crucial challenge is then how to turn these qualitative observations into quantitative variables. We have introduced a new metrics for the Fitness of countries and the Complexity of products which is a sort of economic version of the Google Page rank approach. The direct comparison of the Fitness with the country GDP gives an assessment of the non-expressed potential of the country. This can be used as a predictor of GDP evolution or stock index and sectors performances. These results are also useful for risk analysis, planning of industrial development and strategies to exit from the “poverty trap”. Analogously the Complexity of products can be compared with its added value leading also to new information.

The dynamics in the GDP-Fitness plane reveals a heterogeneous structure and certain areas behave in a laminar way (high predictability) while others appear turbulent (low predictability). This situation requires an analysis inspired to the theory of Dynamical Systems and it is not appropriate to study with the usual regressions.

Recently we are considering the extension of these ideas also to the Fitness of Companies which are instead mostly specialized in terms of products. This requires different datasets and a new algorithm. The implication of the present study for the general problem of Big Data Science will be discussed.

References

- [1] A. Tacchella, M. Cristelli, G. Caldarelli, A. Gabrielli and L. Pietronero:
A New Metrics for Countries' Fitness and Products' Complexity, *Nature: Scientific Reports*, 2-723 (2012)
- [2] M. Cristelli, A. Gabrielli, A. Tacchella, G. Caldarelli and L. Pietronero:
Measuring the Intangibles: A Metrics for the Economic Complexity of Countries and Products, *PLOS One* Vol. 8, e70726 (2013)
- (3) M. Cristelli, A. Tacchella, L. Pietronero: The Heterogeneous Dynamics of Economic Complexity, *PLOS One* 10(2): e0117174 (2015) and *Nature* editorial 2015: <http://www.nature.com/news/physicists-make-weather-forecasts-for-economies-1.16963>

Primary author: Prof. PIETRONERO, Luciano (University of Rome Sapienza and Institute of Complex Systems, ISC-CNR)

Presenter: Prof. PIETRONERO, Luciano (University of Rome Sapienza and Institute of Complex Systems, IS-C-CNR)

Session Classification: Session 5