Measuring the Intangibles:
A New Metric for the Economic Complexity of Countries and Products

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Abstract

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 and industrial sectors, 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. Specialization may be the leading effect in a static situation but the strongly dynamical globalized world market suggests instead that flexibility and adaptability are essential elements of competitiveness as in bio-systems. The situation is different for individual 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 corresponds to the fixed point of the iteration of two nonlinear coupled equations. The nonlinearity is crucial because it represents the fact that the upper bound on the Complexity of a product is given by the less developed country that can produce it. The information provided by the new metrics can be used in various ways. 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 perfomances. This implies also an assessment of the Risk. In addition it can be used as a strategic guide for industrial policy and the possible exit from the poverty trap. For this problem we have developed a specific model which seems extremely useful also to predict the stability of ecosystems with mutualistic interactions. The global dynamics shows a large degree of heterogeneity which implies that countries which are in a certain zone of the parameter space evolve in a predictable way while others show a chaotic behaviour. This heterogeneous dynamics is also outside the usual economic concepts. When dealing with heterogeneous systems, in fact, the usual tools of linear regressions become of inappropriate. Making reliable predictions of growth in the context of economic complexity will then require a paradigm shift in order to catch the information contained in the complex dynamic patterns

observed.

References

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