Following the product progression network to escape from the poverty trap

A. Zaccaria[1], M. Cristelli[1], E. Pugliese[1], A. Tacchella[1], G.L. Chiarotti[1], L. Pietronero[2]

[1]Institute for Complex Systems - CNR

[6]Sapienza University of Rome

Is there a common path of development for different countries, or each one must follow its own way? In order to produce cars, one has to learn how to produce wheels before? Let us represent countries as walkers in a network made of goods[1], defined such that if a country steps on one product, it exports it. Which are the best paths in the product network?

We build a network of products using the UN-Comtrade data about the international trade flows. A possible approach is to connect two products if many countries produce both of them[2]. Wanting to study the countries' dynamics, our links should be directed: a country usually goes from one product to another, but not vice versa, indicating a natural progression. In particular, we project the empirical country-product bipartite network in a filtered monopartite one in which a suitable normalization takes into account the nested structure of the system.

We study the temporal evolution of countries, finding that they follow the direction of the links during industrialization, and spotting which products are helpful to export new products. These results suggest paths in the product progression network which can drive countries' policies in the industrialization process and to exit from the poverty trap.

In the standard view of the industrialization of countries, these have to face a barrier to escape from the poverty trap, which is a monetary threshold defined in terms of average wage or physical capital. When such a threshold is reached, a self-feeding process quickly brings the country from the poverty trap to the "catching up" with the fully developed countries.

We use a non-monetary measure of the economic complexity of a country, called Fitness[3], to show that complex economies start the industrialization process with a lower threshold[4]. On the contrary, if the Fitness is low, a sustainable growth can be reached only if a higher standard, monetary threshold is reached. As a consequence, we can introduce the concept of a two-dimensional poverty trap: a country will start the industrialization process if it is not complex but rich, or if it is poor but very complex (exploiting this new dimension to escape from the poverty trap), or a linear combination of the two.

Finally, we show that following the recommendations given by the previously introduced product network is correlated with a systematic increase of Fitness, showing that such a strategy can lower the barrier to exit from the poverty trap.

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