The Rise of China in the Global Production Network: What can Autocatalytic Sets teach us ?, Flora Bellone, Arnaud Persenda and PAolo Zeppini

Work in Progress
Extensive abstract

We investigate the emergence of China as a dominant player in the international trade network by using the innovative concept of autocatalytic set (ACS) introduced by Jain and Krishna (1998, 2001). We start by building a World Input-Output Network (WION) from the second release of the World Input-Output database (WIOD), which covers the period 2000-2014. We can empirically identify ACSs in the WION and explore both their scaling properties and time patterns. Our analysis shows the evolution of Chinese industries from peripheral to core positions of autocatalytic structures in both local and global production systems.

Earlier contributions have already highlighted the rise of the Chinese economy within trade networks and global value chains (Zhu et al. 2014; Li et al. 2014; Baldwin and Lopez-Gonzalez 2015; Cerina et al. 2015). However, these earlier contributions are silent about the mechanisms that underly these network dynamics. In order to dig deeper into the dynamics of the Chinese economic miracle, this paper proposes an explanation based on circular causation mechanisms. Specifically, our working hypothesis is that cyclical structures of trade are particularly important because they can determine the processes of cumulative causation in economic activities. To develop this idea, we use the framework in network theory developed by Jain and Krishna (1998) which proposes a model of network formation, where autocatalytic sets form endogenously within a selective evolutionary process, where they result in successful self-sustaining structures.

Our paper is the first one to apply the ACS framework to trade networks. In particular, attention is devoted to the evolution of Chinese industries within both local and global autocatalytic structures of the WION. This approach allows us to observe how each ACS is structured and the links within each industries the set. It thus makes it possible to directly observe how the relative position of key industries in Chinese development evolved over time both outside and within the global production system.

So far, our key result are as follows. First, we show that IO relationships are characterized by one global ACS and several local ones. Local ACS are auto-catalytic structures based on domestic IO relationships only while the global ACS is made of both intra-country and inter-country IO relationships. Then we show that some key Chinese industries became part of an isolated local ACS which densified continuously between 2000 to 2004 and then, in 2005, this local ACS branched itself to the global ACS. This result brings some new insights on how local and global production networks can intertemporally complement each other in the industrial development of an emerging economy. We also investigate comparatively how the position of American, European, and Japanese industries evolved comparatively to the one of Chinese industries within the core to the periphery of the Global ACS.