

*Network Dynamics and Firms' Technological Performance:  
A Longitudinal View*

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What are the implications of firms' embeddedness within large evolving networks of cooperative ties for their future outcomes such as innovation? In this paper I integrate the long tradition of research on the technological performance of companies forming strategic alliances with some more recent approaches to the study of complex network structures and dynamics. Large alliance networks have been shown to combine high local clustering with low global separation and thus to be topologically consistent with the pervasive notion of a small world. Using a novel community detection algorithm aided by an effective technique to optimize the split, I first develop a micro perspective on evolving small worlds decomposing them in each period into sets of ties that run locally within clusters, bridge between clusters, or lie outside of the main component. I then apply this framework to show how such positionally differentiated relations of a company may have different effects on its subsequent innovative output depending on the created link type and how those effects change over time as individual ties grow old and the entire social structure grows old. Specifically, conducting a longitudinal analysis of the alliance network in the global Computer industry over a 15-year period from 1985-1999, I reveal an initially negative impact of bridging ties on firms' patenting rates that over time becomes positive and initially positive impact of local and outside ties that later turns negative. I contrast these early results both with the theories of social capital and with alternative positions based on the idea of exploiting structural holes. Finally, I discuss how my analysis can be used as a baseline for future models of interaction between network dynamics and actor behavior in an empirical setting.