Competitive Centrality: Equilibrium and Comparative Statics in Networks*

Jian Li† Yves Zenou‡ Junjie Zhou§

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Abstract

We study competition in networks and develop a new approach to characterizing equilibrium and tracing how local shocks propagate through competitive interactions. We introduce competitive centrality, a novel nonlinear centrality measure that is uniquely determined by the primitives of the network and provides a sufficient statistic for equilibrium behavior. Competitive centrality determines effort allocations and winning probabilities in each bilateral competition. We then use competitive centrality to derive both cardinal and ordinal comparative statics. Local shocks propagate along network paths according to players' relative competitive positions, generating responses that can be non-monotone but whose signs can nevertheless be characterized. A simple sign function determines whether a shock raises or lowers the competitive centrality and effort of any player along the propagation path. These results reveal how network structure and strategic position jointly shape equilibrium competition and show that seemingly competition-reducing interventions—including resolving local conflicts, removing links, or imposing effort caps—can have unintended consequences elsewhere in the network.

Keywords: Networked competition, non-linear network games, competitive centrality, non-monotone comparative statics, policies.

JEL Classification: C72, D74, D85.

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†Department of Economics, Iowa State University. Email: jianli02@gmail.com.

‡Department of Economics, Monash University, Australia. yves.zenou@monash.edu.

§School of Economics and Management, Tsinghua University. Email: zhoujj03001@gmail.com.