Socio-dynamic discrete choice: Theory and application

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Part III

DECISION IN NETWORKS

In Part II, we have derived theoretical results for the equilibrium behavior of the trinary nested logit model with social interactions, assuming homogeneous decision makers, global interactions and laws of large of numbers, but allowing for unobserved preference heterogeneity between choice alternatives. Next, by drawing on the computational possibilities permitted through social simulation of multi-agent systems (Macal and North 2010), Part III of this thesis relaxes the assumption of global interactions and considers instead local interactions within several hypothesized social and spatial network structures. Additional heterogeneity is thus hereby induced by the influence on a given decision maker's choice by the particular network connections he or she has and the particular perceived percentages, for example, of the agent's neighbors or socioeconomic peers making each choice. Discrete choice estimation results controlling these heterogeneous individual preferences are embedded in a multi-agent based simulation model in order to observe the evolution of choice behavior over time with sociodynamic feedback due to the network effects. The multi-agent based simulation approach also gives us an additional advantage in the possibility to test size effects, and thus relax the assumption of large numbers, as well as test the effect of different initial conditions. Finally an extra benefit is gained via the multi-agent based simulation approach in that we are not confined to study only the equilibrium behavior, and have the possibility here to observe the time-varying trajectories of the choice behavior. This is important since smaller network sizes are revealed to be associated with higher volatility of the choice behavior in this model, and consequently stochastic cycling between equilibria. Furthermore being able to observe the emergent behavior allows us to see the subtle role of the unobserved heterogeneity in the nested logit model in breaking the symmetry of the multinomial logit model. We can see the temporal patterns by which theoretically predicted dominant equilibria emerge or not according to different social and spatial network scenarios.