

# Modeling Varying Aggregations of Social Networks with Applications to Wealth Dynamics

*Keywords: social networks, wealth inequality, discrete choice, households, multi-level networks*

## Extended Abstract

Across the social and behavioral sciences, there is interest in how wealth accumulates and economic inequality emerges. Focus has largely been placed on the roles that differences in individual attributes—such as level of education, generational wealth, and ethnicity—play in determining differences in income or wealth [1]. While this attribute-based approach has provided important advances, researchers have recently shifted their focus to understanding how social relationships affect wealth inequality [2]. This relational perspective posits that people in advantageous social positions more effectively accumulate economic wealth by leveraging their social capital; i.e., their access to the social, informational and material resources of other individuals through social connections [3]. This burgeoning, interdisciplinary field has produced several relational theories using network methods to formalize the effects of social relationships on wealth inequality [4]. As increasingly complex empirical investigations of these theories emerge, they face increasingly difficult measurement issues that require new statistical modeling approaches to accurately capture network structure. We contribute to this need.

Data on economic and social networks is typically collected by asking individuals to report on their ties to other individuals. However, resources are often shared within households, making individuals an improper unit of analysis for many economic relationships. Depending on the type and distribution of resources, many of these reported individual-to-individual (I-I) ties would be better characterized as individual-to-household (I-H) or household-to-household (H-H) relationships [5, 6]. For example, food is often a household good, making its exchange a H-H relationship. Childcare, on the other hand, may be considered an I-H relationship between a caregiver and the household of the children being cared for. In their social and economic relationships, individuals are constantly operating at different scales of aggregation. However, there exists a key knowledge gap in how to probabilistically model these varying scales of connections simultaneously.

In this work, we bridge this gap by reframing network structure as discrete choice data, which is composed of agents choosing from sets of options [7]. Specifically, we expand the concept of “agents” to encompass individuals and households and the concept of “choice sets” to encompass collections of individuals. Under this structure, all the relationships we consider (visualized in Figure 1) can be represented simultaneously. The I-I network is composed of individuals in one household choosing between the power set of members of another household (i.e., all possible sets of household members), and the H-H network is composed of households (with characteristics that correspond to its members) choosing between either the complete or empty set of members of other households. This allows the I-H and H-I networks to be natural combinations of the individual and household layers. In the I-H context, we consider the agents as individuals and the choice set as complete or empty. In the H-I context, we consider the agents as households and the choice set as the power set. This approach formally models both individual-level reports and household-level connections so that the full range of relationships described by economic and social support structures can be accurately represented.

## References

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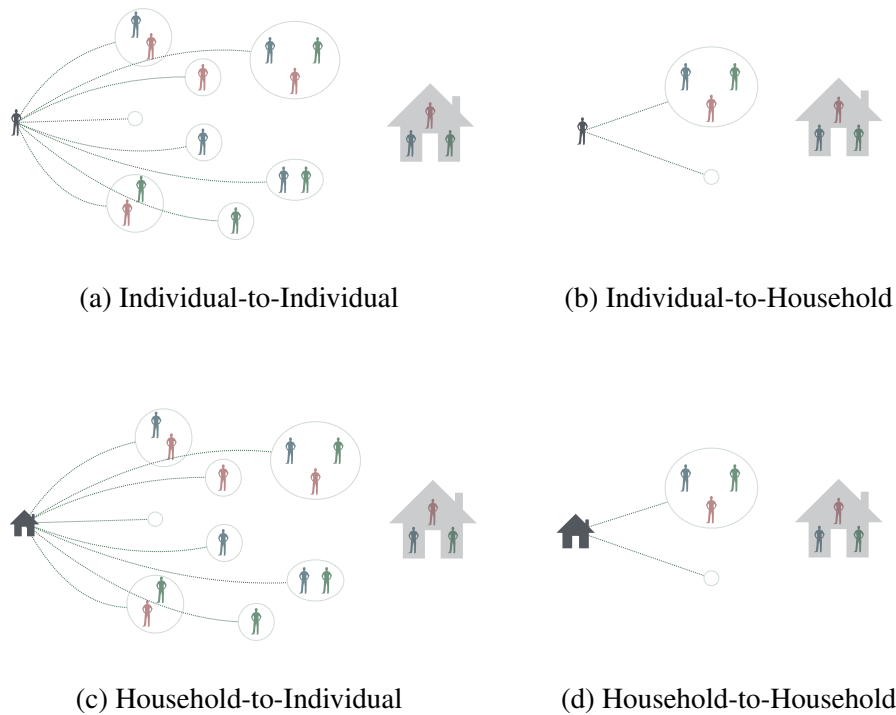


Figure 1: This figure depicts the components of the discrete choice framework for each type of relationship. The agent and choice set change to accommodate varying aggregations, but the general structure stays consistent.