# Logical Differencing in Dyadic Network Formation Models with Nontransferable Utilities

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July 28, 2021

## Abstract

This paper considers a semiparametric model of dyadic network formation under nontransferable utilities (NTU). Such dyadic links arise frequently in real-world social interactions that require bilateral consent but by their nature induce additive nonseparability. In our model we show how unobserved individual heterogeneity in the network formation model can be canceled out without requiring additive separability. The approach uses a new method we call *logical differencing*. The key idea is to construct an observable event involving the intersection of two mutually exclusive restrictions on the fixed effects, while these restrictions are as necessary conditions of weak multivariate monotonicity. Based on this identification strategy we provide consistent estimators of the network formation model under NTU. Finite-sample performance of our method is analyzed in a simulation study, and an empirical illustration using the risk-sharing network data from Nyakatoke demonstrates that our proposed method is able to obtain economically intuitive estimates.

**Keywords:** dyadic network formation, semiparametric estimation, nontransferable utilities, additive nonseparability

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