

# Estimating Dyadic Treatment Effects with Unknown Confounders

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May 28, 2024

## Abstract

This paper proposes a statistical inference method for assessing treatment effects with dyadic data. Under the assumption that the treatments follow an exchangeable distribution, our approach allows for the presence of any unobserved confounding factors that potentially cause endogeneity of treatment choice without requiring additional information other than the treatments and outcomes. Building on the literature of graphon estimation in network data analysis, we propose a neighborhood kernel smoothing method for estimating dyadic average treatment effects. We also develop a permutation inference method for testing the sharp null hypothesis. Under certain regularity conditions, we derive the rate of convergence of the proposed estimator and demonstrate the size control property of our test. We apply our method to international trade data to assess the impact of free trade agreements on bilateral trade flows.

**Keywords:** causal inference, dyadic data, endogeneity, graphon, network analysis.

**JEL Classification:** C14, C31, C51.

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