(Draft coming soon.)

# Connected Trade Flows: How Trade Networks Endogenize Trade Costs and Amplify Pair-Specific Heterogeneity—A Spatial Econometric Approach

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This paper introduces a network interaction model for origin-destination flows with a particular focus on trade flows and its corresponding estimation method. We derive a new type of gravity equation that illustrates how trade flows are shaped by a network-interaction-based trade cost structure, resulting in mutually recursive interdependence and amplified pair-specific heterogeneity. Specifically, by adopting the structure of the widely used spatial autoregressive model, we endogenize the trade cost mechanism, yielding a new specification that extends beyond the conventional exogenous iceberg costs. For estimation, we employ a Poisson pseudo-maximum-likelihood estimator targeting the conditional mean of trade flows in levels. Our approach ensures robust statistical inference by accommodating arbitrary correlation and heteroscedasticity in the error structure. Monte Carlo simulations demonstrate the consistency of our estimator and its reasonable nominal coverage.

In our empirical application, we suspect different structures and sources of consensus effects across the following four phases: Phase 1 (1986, trade liberalization), Phase 2 (1997, active NAFTA implementation), Phase 3 (2007, emergence of the China trade shock), and Phase 4 (2016, expansion of global supply chains). We identify variations in spillover patterns among trade pairs across these phases. We investigate whether differences in spillover mechanisms lead to varying effects of trade policies, such as tariffs or free trade agreements. Our impact analysis further addresses several critical questions, including how country-specific shocks—such as economic restructuring or changes in trade policy—affect international trade flows, and how geopolitical conflicts between two countries influence third-party nations. Finally, we examine how risks originating from dominant economies propagate, potentially causing welfare losses for consumers.

Keywords: Origin-destination flows, gravity equation, trade costs, international trade, spatial autoregressive model, endogenous trade costs, pair-specific heterogeneity, Poisson pseudo-maximum likelihood estimation.

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