

# Spatial Dependency of Double Truncated Lifetime Data: A Copula Approach

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## **Abstract**

This paper proposes a novel method to address two often overlooked sources of bias and incorrectly calculated variances of estimators in regression analysis: double truncation and spatial correlation. Double truncation arises when data is observed only if it falls within a specific range, bounded both above and below. Ignoring this truncation can lead to biased parameter estimates and flawed inferences, as values outside these boundaries are systematically excluded. Moreover, spatial correlation captures the degree to which a variable exhibits dependency across space. Failing to account for this correlation can further undermine the validity of the model. To address these challenges, this paper introduces a framework that integrates the treatment of double truncation with spatial correlation within a copula-based modeling approach. The copula, a method that separates the marginal distributions of the data, which account for truncation, from the spatial dependency structure. This allows for simultaneous estimation of the parameters that govern the marginal distribution and the spatial correlation. The relevance of this methodology is demonstrated through its application to German firm insolvency data. Recording insolvency events often exhibit double truncation, as companies must go insolvent within the observation window. Furthermore, spatial correlation plays a critical role, as economic conditions and dependencies among firms in neighboring regions influence insolvency rates. By addressing both of these issues, the proposed method offers valuable insights for policymakers and stakeholders in financial and economic systems.