



Copula as a Measure of Affiliation and Asymmetry in First  
Price Auctions

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# Copula as a Measure of Affiliation and Asymmetry in First Price Auctions

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## Abstract

This paper presents a new, copula based, two step semiparametric estimation technique for structural estimation of distributions of bidders' unobserved valuations in first price auctions. In the first step, the marginal distributions of 'valuations' are non-parametrically estimated using the equilibrium distribution of bids. The second stage involves a simple maximum likelihood procedure to estimate the 'copula' parameter which measures the association (affiliation) between the valuations. By Sklar's (1959) theorem, the second stage is equivalent to estimating the joint distribution of valuations. For continuous marginal distributions, the copula parameter is unique and hence identified. We also show how the copula parameter can be used to test for asymmetry among bidders. The copula parameter gives a measure of association and degree of asymmetry among bidders, which is useful for mechanism design and other relevant policy experiments. We present some Monte Carlo evidence. We apply our methodology to data from wildcat oil tract auctions.

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